

A Comprehensive Wildlife Conservation Strategy for Wyoming

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EXECUTIVE SUMMARY

The Wyoming State Comprehensive Wildlife Conservation Strategy (CWCS) was produced to provide a long-range conservation plan to conserve Wyoming's Species of Greatest Conservation Need (SGCN) and meet the requirements of the Congressionally-authorized State Wildlife Grants (SWG) Program. The Wyoming Game and Fish Department (WGFD) served as the lead agency in the development of this strategy, but many other partners and major stakeholders were invited to participate. The CWCS identifies 279 SGCN in Wyoming, along with key habitats for these species. Of these species, 44 have been included because of specific known conservation needs. The remaining 235 have been included primarily due to a lack of key data necessary to assess their conservation status. Key habitats for these species have been identified. Threats or challenges are identified, and the proposed actions to conserve the SGCN and their associated habitats are addressed. Monitoring measures are also identified. This strategy will guide conservation decisions in Wyoming for the next five years. It will be updated in 2010. A broad range of stakeholders reviewed the CWCS and their comments were incorporated. A total of seven public meetings were held in Wyoming to present the CWCS, and extensive outreach efforts were designed to inform the public of its development and to encourage their participation in the process.

PURPOSE

In the United States of America, most of the authority and responsibility for fish and wildlife conservation is vested with the states. For over 50 years, state fish and wildlife agencies have worked, in partnership with the U.S. Fish and Wildlife Service (FWS) under the Federal Aid in Wildlife Restoration Act and the Federal Aid to Sport Fish Restoration Act to conserve and properly manage certain species of fish and wildlife. Populations of many species, especially species that are pursued for food, sport, or for their fur have been restored and continue to thrive as a result of the investigations, habitat protection and management supported by these federal aid programs.

Yet, for most states, including Wyoming, the ability to conserve and properly manage the vast majority of species has been impossible because of inadequate funding. In recognition of these unmet needs, Congress provided funds to the states through Title IX of the Commerce, Justice, State Appropriations Act of 2000 (CJS). These funds were to have been administered as a sub-account in the Federal Aid to Wildlife Restoration fund to be known as the Wildlife Conservation and Restoration Account. Wyoming enhanced its wildlife stewardship, wildlife-associated education and wildlife-associated recreation under this program. Still, the scope and duration of funding were only sufficient to provide a beginning. With the passage of Public Law 107-63 in 2001, and the establishment of the State Wildlife Grants (SWG) program, Wyoming has the opportunity to develop a comprehensive program of conservation devoted to species with the greatest conservation need. This program will be guided by this document, *A Comprehensive Wildlife Conservation Strategy for Wyoming*, and will address the unmet needs for a diverse array of wildlife and associated habitats of species with the greatest conservation need.

There are over 800 mammals, birds, reptiles, amphibians, fish, mollusks and crustaceans in Wyoming over which the WGFD has statutory authority (W.S. 23-1-101 (a) (xiii)). These are

the only species that have been considered in the development of this strategy. Many of these species are those that have the least available data concerning their status, distribution and habitats. Funding for nongame species, native fishes, reptiles and amphibians is inadequate. To address this need, Wyoming has initiated efforts under the SWG program to collect needed data.

The CWCS provides a foundation for Wyoming’s future efforts in the conservation of all wildlife. The species and habitats identified here, along with the associated challenges and conservation actions, will define the focus of cooperative efforts to conserve and manage all Wyoming’s wildlife. Granted, this is an endeavor that is both grand in scope and daunting in complexity. But it is an endeavor worthy of efforts by all the citizens of Wyoming, and all those who care about Wyoming’s wildlife and wild places. The intent of this CWCS is to serve as a central “hub” for all existing and future management plans and conservation strategies in Wyoming, and to guide the combined efforts of government agencies at all levels, non-profits, academia, non-governmental organizations, tribes and individuals to conserve all Wyoming’s wildlife for future generations. Coordination with these stakeholders and partners is vital to the success of the Wyoming CWCS. Continued coordination may prove even more vital in the future. Appendix I lists the stakeholders who were contacted for input or otherwise invited to participate during CWCS development. Many of these stakeholders provided crucial feedback and important information.

ROADMAP TO THE EIGHT ELEMENTS

The Wyoming CWCS has been designed to be reader and reviewer friendly. As such, the sections of the CWCS have been designed to correspond directly with the eight required elements noted below. Table 1 below summarizes the location of information on each of the elements.

Table 1. Location of the required eight elements in the Wyoming CWCS.

Required Elements	Sections in Wyoming CWCS	Pages
1. Information on the distribution and abundance of species of wildlife, including low and declining populations as the Wyoming Game and Fish Department deems appropriate, that are indicative of the diversity and health of Wyoming’s wildlife.	1. Species of Greatest Conservation Need	7-19
2. Descriptions of the locations and relative condition of key habitats and community types essential to conservation of species identified in Element #1.	2. Key Habitats	20-35
3. Descriptions of problems which may adversely affect species identified in Element #1 or their habitats, and priority research and survey efforts needed to identify factors which may assist in restoration and improved conservation of these species and habitats.	3. Challenges	36-72

4. Descriptions of conservation actions proposed to conserve the identified species and habitats, and priorities for implementing such actions.	4. Conservation Actions	73-110
5. Proposed plans for monitoring species identified in Element #1 and their habitats, for monitoring the effectiveness of the conservations actions proposed in Element #4, and for adapting these conservation actions to respond appropriately to new information or changing conditions.	5. Monitoring	111-116
6. Descriptions of procedures to review the Wyoming CWCS at intervals not to exceed ten years.	6. Review and Updates	117-118
7. Plans for coordinating the development, implementation, review and revision of the Wyoming CWCS with federal, state and local agencies and Indian tribes that manage significant land and water areas within the state or administer programs that significantly affect the conservation of identified species and habitats.	7. Partnerships and Coordination	119-122
8. An effective public participation process.	8. Public Participation	123-125

In addition, the Wyoming CWCS includes an extensive Literature Cited section and seven important appendices:

- Appendix I – Partners and Major Stakeholders in the Wyoming CWCS
- Appendix II – Species Accounts
- Appendix III – Habitat Type Descriptions
- Appendix IV – Habitat Quality and Protection Assessment of Wyoming’s Ecological System
- Appendix V – Application of a Modified Index of Centers of Density to Four Drainages within the Missouri River Drainage, Wyoming
- Appendix VI – Monitoring of Reptiles, Amphibians, Fishes, Mollusks and Crustaceans
- Appendix VII – Monitoring of Birds and Mammals
- Appendix VIII - Coordination
- Appendix IX - Public Participation

COORDINATION WITH PARTNERS

The development of this CWCS would not have been possible without the involvement of numerous partners and major stakeholders. The WGFD has a long history of working with volunteers and partners and much of the CWCS is based upon those previous efforts. Many individuals, organizations and agencies were asked to be involved in assembling the Wyoming

CWCS. Of these, at least 14 chose to participate. A brief account of the involvement is summarized here. Past efforts with volunteers and partners were particularly important in developing the species accounts presented in Appendix II.

Potential partners for developing the CWCS were selected based on their involvement in wildlife, wildlife habitats, and other wildlife-related issues in Wyoming. In general, the primary criterion used in determining the difference between potential partners and stakeholders in the Wyoming CWCS was the availability of information. Stakeholders were defined as individuals with an interest in the CWCS. Partners were defined as stakeholders who contributed information that aided in the development of this CWCS.

Potential stakeholders were contacted in a variety of ways. WGFD personnel met in person with many potential stakeholders to explain the CWCS and the importance of their involvement. Usually, this was followed by a discussion of the ways stakeholders might contribute to the overall effort, what information they had and how that information might be used in the process. In some instances, e-mail or other communications were substituted for personal contacts. Throughout the process of developing the CWCS, additional stakeholders were added, as other individuals or organizations learned of the effort or WGFD personnel learned of additional potential stakeholders.

Partners were directly involved in the development of the list of SGCN in Wyoming. A number of species were added, and others deleted, based on input from these partners. Significant changes were made to species accounts for all SGCN based on comments from the partners. These included changes to information presented on abundance, population trend, key habitats, challenges and important conservation actions for each species. Partners were also involved in a series of workshops to more clearly define key habitats for SGCN and to discuss surveys, research and monitoring. The involvement of partners in these workshops was very important, and the WGFD is indebted to those who participated. Both partners and stakeholders reviewed Draft #1 of the CWCS.

Finally, all stakeholders, partners and the general public were invited to comment directly on the 2nd Draft CWCS during the public involvement process. A complete list of stakeholders and partners and a description of their involvement is contained in Appendix II. To ensure the success of Wyoming's CWCS, the WGFD recognizes the need to continually engage these and additional stakeholders. The voluntary involvement of private landowners and public land management agencies will be particularly crucial.

PUBLIC PARTICIPATION

The 2nd Draft Wyoming CWCS was posted on the WGFD website on May 10, 2005. Numerous public outreach tools were used to solicit comment on this draft document. Press releases were sent to forty-four (44) Wyoming newspapers and a number of newspapers in adjoining. Radio and television coverage of the development and subsequent release of the draft document actually began in March 2005, and continued through the public participation process in April and May, 2005.

A total of seven public meetings were held around the state in mid-May to present the 2nd Draft CWCS and solicit public comment. Meeting dates, locations and attendance are summarized below:

May 10	Green River	WGFD Office	2
May 11	Jackson	49er Inn	9
May 12	Lander	Lander Public Library	6
May 16	Laramie	Albany County Public Library	3
May 17	Cody	Holiday Inn	14
May 18	Sheridan	CTEL Hall at Sheridan College	3
May 19	Casper	WGFD Office	6
		Total attendance	43

The deadline for comments was June 9, 2005. A total of 20 responses to the request for comments were received. Analysis of those comments yielded many changes to the draft document.

The Final Draft Wyoming CWCS was presented for review and approval at the July 12, 2005, Wyoming Game and Fish Commission (WGFC) meeting. Notice of this action was published 14 days prior to the meeting. Ten comments on the plan were provided at the meeting.

SECTION I

WYOMING'S SPECIES OF GREATEST CONSERVATION NEED

As indicated within the Congressional guidelines, each state CWCS must discuss the SGCN. Specifically, Element #1 indicates each CWCS must provide “Information on the distribution and abundance of species of wildlife, including low and declining populations as the WGFD deems appropriate, that are indicative of the diversity and health of Wyoming’s wildlife”.

PROCESS FOR SPECIES SELECTION

Over 800 species of wildlife exist in Wyoming. In order to select those species that would be considered in the CWCS, the WGFD developed a process to identify species, including low and declining populations, that are indicative of the diversity and health of Wyoming’s wildlife. The process that ultimately resulted in the identification of Wyoming’s SGCN began with the Wyoming Native Species Status (NSS) matrix. This system was developed in the mid-1980s by WGFD and biologists from other agencies and non-governmental organizations in an effort to identify species of special concern. Initially, the majority of this effort was focused on nongame birds and nongame mammals. In the 1990s, it was expanded to include fishes and amphibians, and the NSS process was endorsed by the WGFC. Reptiles, mollusks, and crustaceans were subsequently incorporated into the NSS process. While WGFD acknowledges that many other systems for identifying priority species exist, WGFD chose this system because it was broadly familiar to scientists and wildlife managers in Wyoming and provides a common foundation for identifying SGCN.

The basis of this classification involves reviewing species’ status as determined by population and habitat variables. For birds and mammals, a 16-cell matrix is used. For fish, reptiles, amphibians and invertebrates, a 9-cell matrix is used. Both are described below.

16-CELL MATRIX (MAMMALS AND BIRDS)

In the 16-cell matrix, the population variables form the y-axis of the matrix and include the following conditions: 1) populations are greatly restricted or declining – extirpation appears possible; 2) populations are declining or restricted in numbers and or distribution – extirpation is not imminent; 3) species is widely distributed: population status and trends are unknown but are suspected to be stable; and 4) populations are either stable or increasing and are not restricted in either numbers or distribution.

The habitat variables form the x-axis of the matrix and include the following conditions: 1) ongoing significant loss of habitat; 2) habitat is restricted or vulnerable, but no recent or ongoing significant loss; species may be sensitive to human disturbance; 3) habitat is not restricted, the habitat is vulnerable but there is no loss, and the species is not sensitive to human disturbance; and 4) habitat is stable and not restricted.

At the intersection of the two most appropriate population and habitat conditions, any given species is given an NSS ranking. For example, a species such as the yellow-billed cuckoo (*Coccyzus americanus*) is ranked as an NSS2 species because its breeding populations are restricted in numbers and distribution, and there is ongoing significant loss of nesting habitat. Conversely, a species such as the hoary bat (*Lasiurus cinereus*) is ranked as an NSS4 species because, although it is widely distributed, it may be sensitive to human disturbance. A copy of the 16-cell matrix is shown in Table 2 below.

Table 2. 16-cell Wyoming Native Species Status matrix.

		HABITAT VARIABLES			
		A On-going significant loss of habitat	B Habitat is restricted or vulnerable but no recent or on-going significant loss; species may be sensitive to human disturbance	C Habitat is not restricted, vulnerable but no loss; species is not sensitive to human disturbance	D Habitat is stable and not restricted
P O P U L A T I O N V A R I A B L E S	1 Populations are greatly restricted or declining - extirpation appears possible	NSS1	NSS2	NSS3	NSS4
	2 Populations are declining or restricted in numbers and/or distribution - extirpation is not imminent	NSS2	NSS3	NSS4	NSS5
	3 Species is widely distributed; population status and trends are unknown but are suspected to be stable	NSS3	NSS4	NSS5	NSS6
	4 Populations are stable or increasing and not restricted in numbers and/or distribution	NSS4	NSS5	NSS6	NSS7

**9-CELL MATRIX
(FISHES, AMPHIBIANS, REPTILES, MOLLUSKS AND CRUSTACEANS)**

Over the course of time, it became evident to biologists in Wyoming that the 16-cell matrix did not effectively meet the needs of all taxa. It was especially problematic for species whose abundance and distribution was confined to aquatic or narrowly defined habitats. As a result, the 9-cell matrix was developed. This matrix is a simplified version of the 16-cell matrix. A copy of this matrix is shown in Table 3, below:

Table 3. 9-cell Wyoming Native Species Status matrix.

	HABITAT DECLINING OR VULNERABLE	HABITAT STABLE	HABITAT INCREASING
RARE Populations are physically isolated and /or extremely low densities throughout historic range. Extirpation appears possible.	<u>NSS1</u>	<u>NSS2</u>	
COMMON Species is widely distributed throughout its native range and populations status is stable.	<u>NSS3</u>	<u>NSS4</u>	<u>NSS5</u>
EXPANDING Species is widely distributed throughout its native range and populations appear to be expanding.		<u>NSS6</u>	<u>NSS7</u>

In the 9-cell matrix, the population variables again form the y-axis of the matrix and include the following conditions: 1) Populations are physically isolated and/or extremely low densities throughout historic range. Extirpation appears possible; 2) Species is widely distributed throughout its native range and populations status is stable; and 3) Species is widely distributed throughout its native range and populations appear to be expanding.

The habitat variables form the x-axis of the 9-cell matrix and include the following conditions: 1) habitat declining or vulnerable; 2) habitat stable; and 3) habitat increasing.

Again, as in the 16-cell matrix, the intersection of the two most appropriate population and habitat conditions, any given species is given a NSS ranking. For example, a species such as the Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*) is ranked as an NSS2 species because its habitat is stable, but populations are physically isolated and/or at extremely low densities throughout its historic range. Conversely, a species such as the Great Basin spadefoot (*Spea intermontanus*) is ranked as an NSS4 species due to a lack of quantifiable data on its abundance and distribution.

The great benefit of evaluating species using these two fixed criteria is that it allows individual species to be classified in one of seven NSS categories and plotted within an organizational matrix. The matrix's key function is to identify species in need of additional conservation effort and graphically prioritize those species using the same criteria.

For purposes of the CWCS, species identified as NSS1, NSS2, NSS3 or NSS4 were considered to be SGCN. This list was circulated to partners and stakeholders, and comments were solicited. Many agreed with the draft list. Based on information from other partners and stakeholders, species were either added or deleted. These additions and deletions were relatively few in number and included species classified NSS5-7. Without exception, these were species whose population status and habitat were relatively stable in Wyoming. However, Wyoming represents a significant part of their total ranges.

Several other considerations were important in determining Wyoming's SGCN. First, no species were excluded by virtue of their status as a "game" or "nongame" species. Neither were any wildlife species excluded by virtue of legal status in Wyoming. That is, species considered as "wildlife" and protected under state law were considered along with those considered "predatory animals" and not protected under state law. Species were evaluated primarily on the basis of the status of their conservation need, not political status. Notwithstanding this approach, we have included species with a wide variety of conservation needs. Some Wyoming SGCN exist nowhere else in the world (i.e. Kendall Warm Springs dace). Others are species that may be in some stage of recovery through conservation actions that are continuing at this time (i.e., black-footed ferret). Still others are species that may be common in other parts of their range, but have special significance for Wyoming by virtue of the absence of information on the species in this state (i.e. all mollusks) or by virtue of its potential for listing under the federal Endangered Species Act (i.e. greater sage-grouse). In all, this list represents those species that most nearly meet the designation "Species of Greatest Conservation Need".

The CWCS deals only with species that are legally considered wildlife in Wyoming. Wyoming Statute 23-1-101 (a) (xiii) defines "Wildlife" as all wild mammals, birds, fish, amphibians, reptiles, crustaceans and mollusks, and wild bison designated by the Wyoming Game and Fish Commission and the Wyoming Livestock Board within Wyoming. Currently, there is no statutory authority in Wyoming for insect conservation. As such, insects are not considered in the CWCS. Information on the abundance and distribution of insects in Wyoming is extremely limited, and primarily confined to insect control, not insect conservation. Those updating Wyoming's CWCS in 2010 may be encouraged by the National Acceptance Advisory

Team (NAAT) to consider insects within the next iteration. However, the WGFD has no statutory authority or responsibility to manage insects in Wyoming.

The following list of SGCN is intended to provide a foundation for conserving these species in Wyoming. Crucial management data is lacking for many species. However, the WGFD believes the no differentiation should be made between species for which information is lacking and species which have demonstrated conservation needs. As additional management information becomes available, species may be removed from this list or other species may be added. In any event, the following list is offered not as an indictment of any user group, but rather as a first step to conserving all wildlife in Wyoming.

Species of Greatest Conservation Need

Wyoming has determined 279 species are in greatest conservation need, including 54 mammals, 60 birds, 26 reptiles, 12 amphibians, 40 fishes, 19 crustaceans, and 68 mollusks. Table 4 below summarizes the entire list of species by taxa.

Table 4. Wyoming’s Species Of Greatest Conservation Need

Type	Common Name	Scientific Name
Mammals (54)	Abert's Squirrel *	<i>Sciurus aberti</i>
	Big Brown Bat *	<i>Eptesicus fuscus</i>
	Bighorn Sheep	<i>Ovis canadensis</i>
	Black-footed Ferret *	<i>Mustela nigripes</i>
	Black-tailed Prairie Dog *	<i>Cynomys ludovicianus</i>
	Canada Lynx *	<i>Lynx canadensis</i>
	Canyon Mouse *	<i>Peromyscus crinitus</i>
	Cliff Chipmunk *	<i>Tamias dorsalis</i>
	Dwarf Shrew *	<i>Sorex nanus</i>
	Fisher *	<i>Martes pennanti</i>
	Fringed Myotis *	<i>Myotis thysanodes</i>
	Great Basin Pocket Mouse *	<i>Perognathus parvus</i>
	Grizzly Bear	<i>Ursus arctos</i>
	Hayden's Shrew *	<i>Sorex haydeni</i>
	Hispid Pocket Mouse *	<i>Chaetodipus hispidus</i>
	Hoary Bat *	<i>Lasiurus cinereus</i>
	Idaho Pocket Gopher *	<i>Thomomys idahoensis</i>
	Least Weasel *	<i>Mustela nivalis</i>
	Little Brown Myotis *	<i>Myotis lucifugus</i>
	Long-eared Myotis *	<i>Myotis evotis</i>
	Long-legged Myotis *	<i>Myotis volans</i>
	Marten *	<i>Martes americana</i>
	Meadow Jumping Mouse *	<i>Zapus hudsonius</i>
	Moose *	<i>Alces alces</i>
Northern Flying Squirrel *	<i>Glaucomys sabrinus</i>	
Northern Myotis *	<i>Myotis septentrionalis</i>	
Olive-backed Pocket Mouse *	<i>Perognathus fasciatus</i>	

Type	Common Name	Scientific Name
Mammals	Pallid Bat *	<i>Antrozous pallidus</i>
	Pinyon Mouse *	<i>Peromyscus truei</i>
	Plains Harvest Mouse *	<i>Reithrodontomys montanus</i>
	Plains Pocket Gopher *	<i>Geomys bursarius</i>
	Plains Pocket Mouse *	<i>Perognathus flavescens</i>
	Prairie Vole *	<i>Microtus ochrogaster</i>
	Preble's Shrew *	<i>Sorex preblei</i>
	Pygmy Rabbit *	<i>Brachylagus idahoensis</i>
	Pygmy Shrew *	<i>Sorex hoyi</i>
	River Otter *	<i>Lutra canadensis</i>
	Sagebrush Vole *	<i>Lemmiscus curtatus</i>
	Silky Pocket Mouse *	<i>Perognathus flavus</i>
	Silver-haired Bat *	<i>Lasionycteris noctivagans</i>
	Spotted Bat *	<i>Euderma maculatum</i>
	Spotted Ground Squirrel *	<i>Spermophilus spilosoma</i>
	Swift Fox *	<i>Vulpes velox</i>
	Townsend's Big-eared Bat *	<i>Corynorhinus townsendii</i>
	Uinta Ground Squirrel *	<i>Spermophilus armatus</i>
	Vagrant Shrew *	<i>Sorex vagrans</i>
	Water Shrew *	<i>Sorex palustris</i>
	Water Vole *	<i>Microtus richardsoni</i>
	Western Heather Vole *	<i>Phenacomys intermedius</i>
	Western Small-footed Myotis *	<i>Myotis ciliolabrum</i>
	White-tailed Prairie Dog *	<i>Cynomys leucurus</i>
	Wolverine *	<i>Gulo gulo</i>
	Wyoming Ground Squirrel *	<i>Spermophilus elegans</i>
	Wyoming Pocket Gopher *	<i>Thomomys clusius</i>
Birds (60)	American Bittern	<i>Botaurus lentiginosus</i>
	American Three-toed Woodpecker *	<i>Picoides dorsalis</i>
	American White Pelican	<i>Pelecanus erythrorhynchos</i>
	Ash-throated Flycatcher *	<i>Myiarchus cinerascens</i>
	Bald Eagle	<i>Haliaeetus leucocephalus</i>
	Barrow's Goldeneye *	<i>Bucephala islandica</i>
	Black Rosy-Finch *	<i>Leucosticte atrata</i>
	Black Tern	<i>Chlidonias niger</i>
	Black-backed Woodpecker *	<i>Picoides arcticus</i>
	Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>
	Bobolink	<i>Dolichonyx oryzivorus</i>
	Boreal Owl *	<i>Aegolius funereus</i>
	Brewer's Sparrow	<i>Spizella breweri</i>
	Brown-capped Rosy Finch *	<i>Leucosticte australis</i>
	Burrowing Owl	<i>Athene cunicularia</i>
	Bushtit *	<i>Psaltriparus minimus</i>
	Canvasback	<i>Aythya valisineria</i>

Type	Common Name	Scientific Name
Birds	Caspian Tern	<i>Sterna caspia</i>
	Chestnut-collared Longspur	<i>Calcarius ornatus</i>
	Clark's Grebe	<i>Aechmophorus clarkii</i>
	Columbian Sharp-tailed Grouse	<i>Tympanuchus phasianellus</i>
	Common Loon	<i>Gavia immer</i>
	Dickcissel	<i>Spiza americana</i>
	Ferruginous Hawk *	<i>Buteo regalis</i>
	Forster's Tern	<i>Sterna forsteri</i>
	Franklin's Gull	<i>Larus pipixcan</i>
	Grasshopper Sparrow	<i>Ammodramus savannarum</i>
	Great Blue Heron	<i>Ardea herodias</i>
	Great Gray Owl *	<i>Strix nebulosa</i>
	Greater Sage-Grouse	<i>Centrocercus urophasianus</i>
	Greater Sandhill Crane	<i>Grus canadensis</i>
	Harlequin Duck *	<i>Histrionicus histrionicus</i>
	Juniper Titmouse *	<i>Baeolophus ridgwayi</i>
	Lark Bunting	<i>Calamospiza melanocorys</i>
	Lesser Scaup	<i>Aythya affinis</i>
	Lewis' Woodpecker *	<i>Melanerpes lewis</i>
	Long-billed Curlew *	<i>Numenius americanus</i>
	McCown's Longspur	<i>Calcarius mccownii</i>
	Merlin *	<i>Falco columbarius</i>
	Mountain Plover *	<i>Charadrius montanus</i>
	Northern Goshawk *	<i>Accipiter gentilis</i>
	Northern Pintail	<i>Anas acuta</i>
	Northern Pygmy-Owl *	<i>Glaucidium gnoma</i>
	Peregrine Falcon *	<i>Falco peregrinus</i>
	Pygmy Nuthatch *	<i>Sitta pygmaea</i>
	Redhead	<i>Aythya americana</i>
	Sage Sparrow	<i>Amphispiza belli</i>
	Sage Thrasher	<i>Oreoscoptes montanus</i>
	Scott's Oriole *	<i>Icterus parisorum</i>
	Short-eared Owl	<i>Asio flammeus</i>
	Snowy Egret	<i>Egretta thula</i>
	Swainson's Hawk	<i>Buteo swainsoni</i>
	Trumpeter Swan	<i>Cygnus buccinator</i>
	Upland Sandpiper	<i>Bartramia longicauda</i>
	Virginia Rail	<i>Rallus limicola</i>
	Western Grebe	<i>Aechmophorus occidentalis</i>
	Western Scrub-Jay *	<i>Aphelocoma californica</i>
	White-faced Ibis	<i>Plegadis chihi</i>
	Willow Flycatcher	<i>Empidonax traillii</i>
	Yellow-billed Cuckoo *	<i>Coccyzus americanus</i>
Reptiles (26)	Black Hills Redbelly Snake *	<i>Storeria occipitomaculata pahasapae</i>

Type	Common Name	Scientific Name
	Bullsnake *	<i>Pituophis catenifer sayi</i>
	Cliff Tree Lizard *	<i>Urosaurus ornatus wrighti</i>
	Common Garter Snake *	<i>Thamnophis sirtalis</i>
	Eastern Yellow-bellied Racer *	<i>Coluber constrictor flaviventris</i>
	Great Basin Gophersnake *	<i>Pituophis catenifer deserticola</i>
	Great Plains Earless Lizard *	<i>Holbrookia maculata</i>
	Greater Short-horned Lizard *	<i>Phrynosoma hernandesi hernandesi</i>
	Intermountain Wandering Gartersnake *	<i>Thamnophis elegans vagrans</i>
	Many-lined Skink *	<i>Eumeces multivirgatus</i>
	Midget Faded Rattlesnake	<i>Crotalus viridis concolor</i>
	Northern Plateau Lizard *	<i>Sceloporus undulatus elongatus</i>
	Northern Prairie Lizard *	<i>Sceloporus undulatus garmani</i>
	Northern Sagebrush Lizard *	<i>Sceloporus graciosus graciosus</i>
	Ornate Box Turtle *	<i>Terrapene ornata ornata</i>
	Pale Milksnake *	<i>Lampropeltis triangulum multistriata</i>
	Plains Black-headed Snake *	<i>Tantilla Nigriceps</i>
	Plains Gartersnake *	<i>Thamnophis radix</i>
	Plains Hog-nosed Snake *	<i>Heterodon nasicus nasicus</i>
	Prairie Racerunner *	<i>Cnemidophorus sexlineatus viridis</i>
	Prairie Rattlesnake *	<i>Crotalus viridis viridis</i>
	Red-lipped Plateau Lizard *	<i>Sceloporus undulatus erythrocheilus</i>
	Rubber Boa *	<i>Charina bottae</i>
	Smooth Green Snake *	<i>Opheodrys vernalis</i>
	Western Painted Turtle *	<i>Chrysemys picta bellii</i>
	Western Spiny Softshell *	<i>Apalone spinifera hartwegi</i>
Amphibians (12)	American Bullfrog *	<i>Rana catesbeiana</i>
	Boreal Chorus Frog *	<i>Pseudacris maculata</i>
	Boreal Toad *	<i>Bufo boreas boreas</i>
	Columbia Spotted Frog	<i>Rana luteiventris</i>
	Great Basin Spadefoot *	<i>Spea intermontana</i>
	Great Plains Toad *	<i>Bufo cognatus</i>
	Northern Leopard Frog *	<i>Rana pipiens</i>
	Plains Spadefoot *	<i>Spea bombifrons</i>
	Tiger Salamander *	<i>Ambystoma tigrinum</i>
	Wood Frog *	<i>Rana sylvatica</i>
	Woodhouse's Toad *	<i>Bufo woodhousii</i>
	Wyoming Toad *	<i>Bufo baxteri</i>
Fishes (40)	Arctic Grayling	<i>Thymallus arcticus</i>
	Bigmouth Shiner *	<i>Notropis dorsalis</i>
	Black Bullhead *	<i>Ameiurus melas</i>
	Bluehead Sucker *	<i>Catostomus discobolus</i>
	Bonneville Cutthroat *	<i>Oncorhynchus clarki utah</i>
	Burbot *	<i>Lota lota</i>

Type	Common Name	Scientific Name
Fishes	Central Stoneroller *	<i>Campostoma anomalum</i>
	Channel Catfish *	<i>Ictalurus punctatus</i>
	Colorado River Cutthroat *	<i>Oncorhynchus clarki pleuriticus</i>
	Common Shiner *	<i>Luxilus cornutus</i>
	Finescale Dace *	<i>Phoxinus neogaeus</i>
	Flannelmouth Sucker *	<i>Catostomus latipinnis</i>
	Flathead Chub *	<i>Platygobio gracilis</i>
	Goldeye *	<i>Hiodon alosoides</i>
	Hornyhead Chub *	<i>Nocomis biguttatus</i>
	Iowa Darter *	<i>Etheostoma exile</i>
	Kendall Warm Springs Dace	<i>Rhinichthys osculus thermalis</i>
	Lake Chub *	<i>Couesius plumbeus</i>
	Leatherside Chub *	<i>Gila copei</i>
	Mottled Sculpin *	<i>Cottus bairdi</i>
	Mountain Sucker *	<i>Catostomus platyrhynchus</i>
	Mountain Whitefish *	<i>Prosopium williamsoni</i>
	Northern Pearl Dace *	<i>Margariscus margarita</i>
	Orangethroat Darter *	<i>Etheostoma spectabile</i>
	Paiute Sculpin *	<i>Cottus beldingi</i>
	Plains Minnow *	<i>Hybognathus placitus</i>
	Plains Topminnow *	<i>Fundulus sciadicus</i>
	Quillback *	<i>Carpionodes cyprinus</i>
	River Carpsucker *	<i>Carpionodes carpio</i>
	Roundtail Chub *	<i>Gila robusta</i>
	Sauger *	<i>Sander canadensis</i>
	Shorthead Redhorse *	<i>Moxostoma macrolepidotum</i>
	Shovelnose Sturgeon *	<i>Scaphirhynchus platyrhynchus</i>
	Snake River Cutthroat *	<i>Oncorhynchus clarki ssp.</i>
	Stonecat *	<i>Noturus flavus</i>
	Sturgeon Chub *	<i>Macrhybopsis gelida</i>
	Suckermouth Minnow *	<i>Phenacobius mirabilis</i>
	Western Silvery Minnow *	<i>Hybognathus argyritis</i>
	Westslope Cutthroat	<i>Oncorhynchus clarki lewisi</i>
	Yellowstone Cutthroat *	<i>Oncorhynchus clarki bouvieri</i>
Crustaceans (19)	Beavertail Fairy Shrimp *	<i>Thamnocephalus platyurus</i>
	Circumpolar Fairy Shrimp *	<i>Branchinecta paludosa</i>
	Colorado Fairy Shrimp *	<i>Branchinecta coloradensis</i>
	Crenatethumb Fairy Shrimp *	<i>Streptocephalus mattoxi</i>
	Devil Crayfish *	<i>Cambarus diogenes</i>
	Eastern Alkali Fairy Shrimp *	<i>Branchinecta redingi</i>
	Ethologist Fairy Shrimp *	<i>Eubbranchipus serratus</i>
	Gambelii Crayfish *	<i>Pacifastacus gambelii</i>
	Giant Fairy Shrimp *	<i>Branchinecta gigas</i>

Type	Common Name	Scientific Name
Crustaceans	Greater Plains Fairy Shrimp *	<i>Streptocephalus texanus</i>
	Knobbedlip Fairy Shrimp *	<i>Eubbranchipus bundyi</i>
	Lemon Tadpole Shrimp *	<i>Lepidurus lemmoni</i>
	Longtail Tadpole Shrimp *	<i>Triops longicaudatus</i>
	Neglectus Crayfish *	<i>Orconectes negectus</i>
	New Mexico Fairy Shrimp *	<i>Streptocephalus dorotheae</i>
	Pocked Pouch Fairy Shrimp *	<i>Branchinecta campestris</i>
	Rock Pool Fairy Shrimp *	<i>Branchinecta packardi</i>
	San Francisco Brine Shrimp *	<i>Artemia franciscana</i>
	Versitle Fairy Shrimp *	<i>Branchinecta lindahli</i>
Mollusks (68)	A Land Snail (Hells Canyon) *	<i>Oreohelix strigosa ssp. 1</i>
	Abbreviate Pondsnailed * *	<i>Stagnicola apicina</i>
	Ash Gyro *	<i>Gyraulus parvus</i>
	Ashy Pebblesnailed *	<i>Stagnicola traski</i>
	Ashy Physa *	<i>Physella integra</i>
	Bear Lake Springsnailed *	<i>Pyrgulopsis pilsbryana</i>
	Berry's Mountain Snail *	<i>Oreohelix strigosa berryi</i>
	California Floater *	<i>Anodonta californiensis</i>
	Callused Vertigo Snail *	<i>Vertigo arthuri</i>
	Cave Physa *	<i>Physella spelunca</i>
	Cloaked Physa *	<i>Physa megalochlamys</i>
	Cooper's Rocky Mountain Snail *	<i>Oreohelix strigosa cooperi</i>
	Creeping Ancyloid *	<i>Ferrissia rivularis</i>
	Cylindrical Papershell *	<i>Anodontoides ferussacianus</i>
	Disc Gyro *	<i>Gyraulus circumstriatus</i>
	Dusky Fossaria *	<i>Fossaria dalli</i>
	Fatmucket *	<i>Lampsilis siliquoidea</i>
	Fat-whorled Pondsnailed *	<i>Stagnicola bonnevillensis</i>
	Fragile Ancyloid *	<i>Ferrissia fragilis</i>
	Giant Floater *	<i>Pyganodon grandis</i>
	Glass Physa *	<i>Physa skinneri</i>
	Glossy Valvata *	<i>Valvata humeralis</i>
	Golden Fossaria *	<i>Fossaria obrussa</i>
	Great Basin Rams-horn *	<i>Helisoma newberryi</i>
	Green River Pebblesnailed *	<i>Fluminicola coloradoensis</i>
	Indecisive Vallonia *	<i>Vallonia albula</i>
	Jackson Lake Springsnailed *	<i>Pyrgulopsis robusta</i>
	Keeled Mountain Snail *	<i>Oreohelix carinifera</i>
	Lance Aplexa *	<i>Aplexa elongata</i>
	Marsh Pondsnailed *	<i>S. elodes</i>
	Marsh Rams-horn *	<i>Planorbella trivolvis</i>
	Meadow Rams-horn *	<i>Planorbula campestris</i>
	Mineral Creek Mountain Snail *	<i>Oreohelix pilsbryi</i>

Type	Common Name	Scientific Name
Mollusks	Morgan Creek Mountain Snail *	<i>Oreohelix swopei</i>
	Mossy Valvata *	<i>V. sincera</i>
	Mountain Marshsnail *	<i>Stagnicola montanensis</i>
	Mud Amnicola *	<i>Amnicola limosus</i>
	Niobrara Ambersnail *	<i>Oxyloma haydeni</i>
	Olive Physa *	<i>Physella cooperi</i>
	Pewter Physa *	<i>Physella heterostropha</i>
	Plain Pocketbook *	<i>Lampsilis cardium</i>
	Protean Physa *	<i>Physella virgata</i>
	Pumpkin Physa *	<i>Physella ancillaria</i>
	Pygmy Fossaria *	<i>Fossaria parva</i>
	Pygmy Mountain Snail *	<i>Oreohelix pygmaea</i>
	Ribbed Dagger *	<i>Pupoides hordaceus</i>
	Rock Fossaria *	<i>Fossaria modicella</i>
	Rocky Mountain Dusksnail *	<i>Colligyrus greggi</i>
	Rocky Mountain Physa *	<i>Physella propinqua</i>
	Rocky Mountain Snail *	<i>Oreohelix strigosa</i>
	Rotund Physa *	<i>Physella columbiana</i>
	Rough Rams-horn *	<i>Planorbella subcrenata</i>
	Rustic Pondsnailed *	<i>Stagnicola hinkleyi</i>
	Sharp Sprite *	<i>Promenetus exacuus</i>
	Sierra Ambersnail *	<i>Catinella stretchiana</i>
	Slope Ambersnail *	<i>Catinella wandae</i>
	Star Gyro *	<i>Gyraulus crista</i>
	Striate Disc *	<i>Discus shimekii</i>
	Tadpole Physa *	<i>Physella gyrina</i>
	Two-ridge Rams-horn *	<i>Helisoma anceps</i>
	Umbilicate Sprite *	<i>Promenetus umbilicatellus</i>
	Utah Physa *	<i>Physella utahensis</i>
	Mystery Vertigo *	<i>Vertigo paradoxa</i>
	Western Pearlshell *	<i>Margaritifera falcata</i>
	White Heel Splitter *	<i>Lasmigona complanata</i>
	Widelip Pondsnailed *	<i>S. traski</i>
	Woodland Pondsnailed *	<i>S. catascopium</i>
	Wrinkled Marshsnail *	<i>S. caperata</i>

* Species listed wholly or in part due to absence of data.

Information on each of the Wyoming SGCN is summarized in a species account. The accounts include information on status, abundance, habitat, threats or management problems and important survey needs and conservation actions for each species. Each includes a number of reference publication citations for additional reading. These species accounts appear in Appendix II.

PERIPHERAL SPECIES

A number of the Wyoming's SGCN might be considered "peripheral" to the state. That is, the portion of their range within Wyoming constitutes only a small percentage of their total range. This contributes to the large number of species on the list and their diversity. In part, the diversity of species on this list and of wildlife in Wyoming, in general, can be attributed to the fact that Wyoming lies at the edge of six different ecoregions and their associated fauna, while other states may only contain two or three ecoregions (Comer, et al 2003). Ecoregions are considered to be large geographical areas that share common ecological characteristics such as vegetation, topography, etc. Wyoming also attracts considerable attention because some well-known and important ecotypes (such as the boreal forest) and the associated wildlife are represented in the state. In addition, many species that have not persisted in other states can still be found in Wyoming.

Concern and rhetoric over the importance of peripheral species has received considerable attention for many decades (Simpson 1944, Mayr 1954, 1963, Carson 1959, Stebbins and Major 1965, Levin 1970). Excellent scientific data and analysis of the subject continues to be published in more recent years (Frankle and Soule 1981, Beardmore 1983, Gilpin and Soule 1986, Lawton 1993, Lesica and Allendorf 1995, Furlow and Amrijo-Prewit 1995, Lomolino and Channell 1993, Aranjo and Williams 2001). These recent publications provide empirical data and elaborate on the importance of peripheral populations in relation to speciation, evolution, resiliency to changing environments, the conservation of genetic diversity, and prevention of extinction.

Perhaps the most compelling reason for Wyoming to include peripheral populations in conservation planning efforts is the prevention of extinction or listing under the Endangered Species Act. The concept that a peripheral population might play a significant role in preventing extinction of a species may seem at first to be counter-intuitive. Many biologists assume that habitat at the periphery of a species range is marginal and, in fact, this may often be the case. Yet, history is full of examples where peripheral populations are spared while center-of-range populations become extirpated. Most species of endangered mammals studied experienced population collapses at population centers that spread out toward the peripheries (Lomolino and Channell 1995). There are also well-known examples of birds, like the California Condor (Nielson et al. 2001). This species persisted at the periphery of its historical distribution, which ranged from California to New York. In Wyoming, examples of species avoiding extirpation at the peripheries of their ranges are well known. The black-footed ferret escaped near extinction at the western periphery of its range (Caughley and Gunn 1996). The distribution of the swift fox could well have been classified as peripheral in Wyoming (Crowe 1986) while it was disappearing and being proposed for listing in adjacent eastern states. Today, both species have been successfully translocated and reintroduced from Wyoming sources to cores and peripheries of extirpated ranges. In addition, species on the periphery of their range may have unique genetic variation not found in other segments of the total population.

In Wyoming, conservation efforts must focus on the continuum of core to peripheral species. Wyoming's CWCS, at least in the short term, will focus primarily on core species and on maintaining biological diversity. Future efforts of Wyoming, in cooperation with partners in other states, may focus on species that may be peripheral to Wyoming, but which are extremely important on a range-wide, regional or national scale if such efforts are funded appropriately. In the short-term, efforts to conserve peripheral species will focus on identifying the importance of their habitats and working with private landowners and land management agencies to conserve these habitats.

SECTION II

HABITAT

As indicated within the Congressional guidelines, each state CWCS must include a discussion of habitats. Specifically, Element #2 indicates each CWCS must provide, “Description of locations and relative condition of key habitats and community types essential to the conservation of species identified in Element #1”.

IDENTIFICATION OF HABITATS

To determine which habitat classification system would be used within Wyoming’s CWCS, three issues were considered: 1) the classification system needed to be relatively current; 2) it needed to be comprehensive and detailed enough to help guide management decisions; and 3) it needed the capacity to facilitate future work both within Wyoming and between Wyoming and the surrounding states. Unfortunately, no single system could be found for both terrestrial and aquatic habitats.

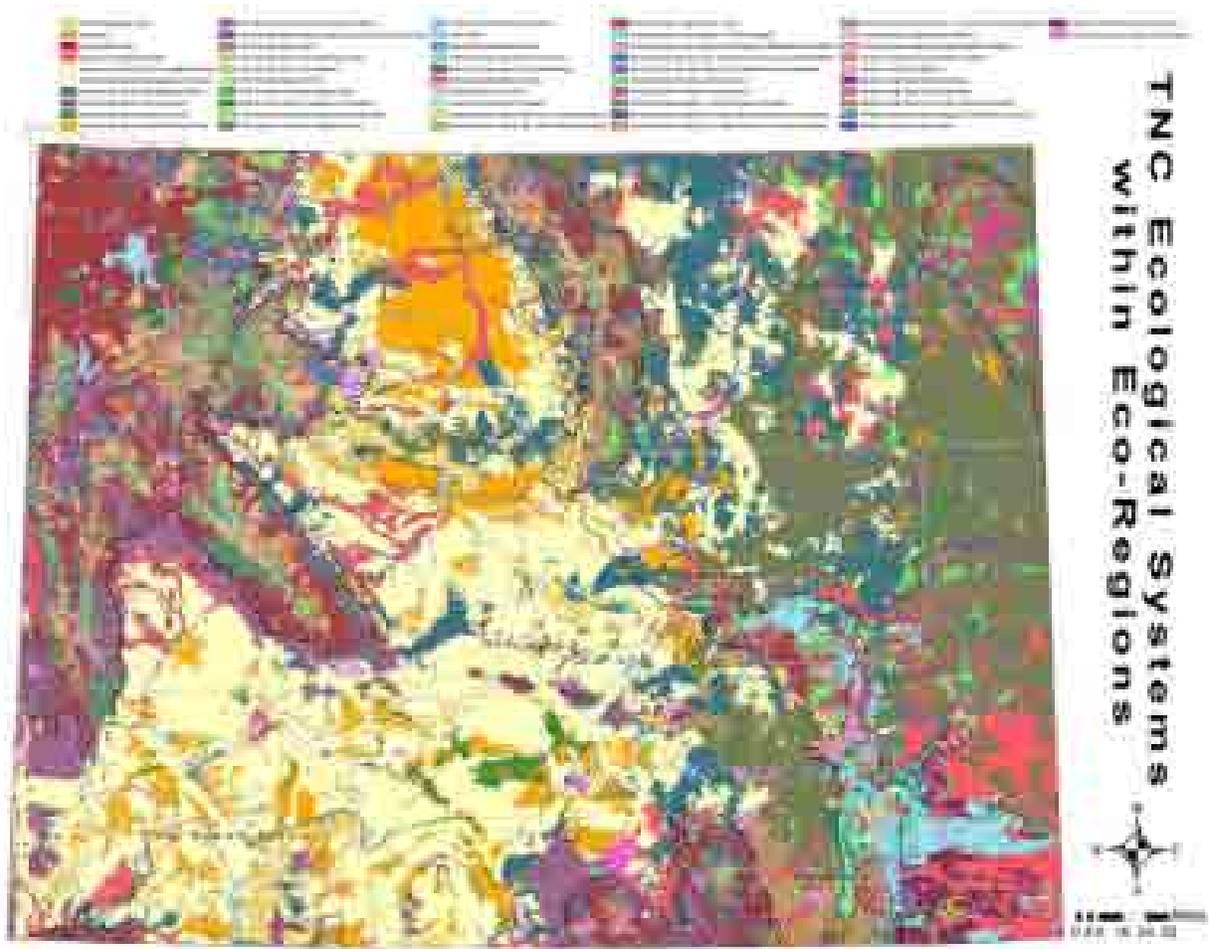
TERRESTRIAL HABITATS

For terrestrial habitats, NatureServe’s Ecoregions and Ecological Systems approach (Comer, 2003) was selected as the most appropriate habitat classification system. This program is based upon ecoregions, large landscape areas that have relatively consistent patterns of topography, geology, soils, vegetation, natural processes, and climate (Cleland, 1997). Under this system, North America has been subdivided into 81 ecoregions. Wyoming encompasses parts of the Black Hills, Central Shortgrass Prairie, Columbia Plateau, Northern Great Plains Steppe, Southern Rocky Mountains, Utah-Wyoming Rocky Mountains, and the Wyoming Basin ecoregions.

Each ecoregion contains a variety of ecological systems (habitats). Although the concept of ecological systems is fully described in *Ecological Systems of the United States, A Working Classification of U.S. Terrestrial Systems*, (Comer et. al. 2003), they can be summarized as areas between hundreds and hundreds of thousands of acres in size which are expected to be stable for the next 50 to 100 years, and are characterized by consistent varieties of biotic (i.e. vegetation) and abiotic (i.e. soils, elevation, precipitation, and geologic) features. Excluding developed and cultivated areas, Wyoming contains 52 distinct habitat types (Map 1). A detailed description of each habitat type is provided in Appendix III.

The Wyoming Chapter of The Nature Conservancy developed the mechanism used to estimate average intactness for each habitat type within each of Wyoming’s ecoregions. The goals of this effort were two-fold. The first was to quantify the viability of existing habitats. The second was to provide guidance on areas of opportunity where management and cooperative efforts could yield the most beneficial results. The report, *Habitat Quality and Vulnerability Assessment of Wyoming’s Ecological Systems* (Copeland 2005), describes this effort in considerable detail and has been included as Appendix IV. As such, the following summary is only meant to describe the process used and the general results.

Map 1. TNC Ecological Systems within Ecoregions



Determining the “quality” of habitats for SGCN on a statewide basis across Wyoming is difficult. The habitat requirements of many different species vary, and may be impossible to quantify in diverse habitats. As a surrogate measure, “habitat intactness” was used to estimate overall habitat quality. The WGFD believes that “intactness” constitutes an adequate measure of habitat stability. The factors used to calculate “intactness” included: road density; mine presence; oil and gas pipeline presence; oil and gas well presence; residential development; dams; impaired streams; Hilsenhoff’s Biotic Index (HBI) score; surface water use; and the occurrence of invasive species. Use of these factors was not intended to be an indictment of any particular land use. Rather, they were included to provide a comprehensive view of ongoing landscape changes in Wyoming. For each criterion, a scale was developed and applied to the ecological systems map (Map 1) within a raster GIS framework. When the scores for each criteria were summed, each habitat patch was assigned an overall quality score between one and 10, with 10 indicating the highest known habitat quality (Map 2). From these scores, an average quality score was generated for each habitat type within each ecoregion (Tables 5 thru 15). The acreage of each habitat type within each ecoregion, and the number of SGCN that exist within each habitat type within each ecoregion, have been included to provide a context for the quality

indicator. Using the GIS tools developed for mammals and birds it was possible to calculate the mean number of mammal and bird SGCN that utilize each terrestrial habitat patch within each ecoregion. This process also provided the range of SGCN for each habitat type. Although very small areas may be important for wildlife conservation, habitat types represented by ten acres or fewer were excluded from the individual ecoregional analysis, as they are too small to be represented on a statewide map.

Map 2. Wyoming Ecosystems Habitat Quality (Intactness)

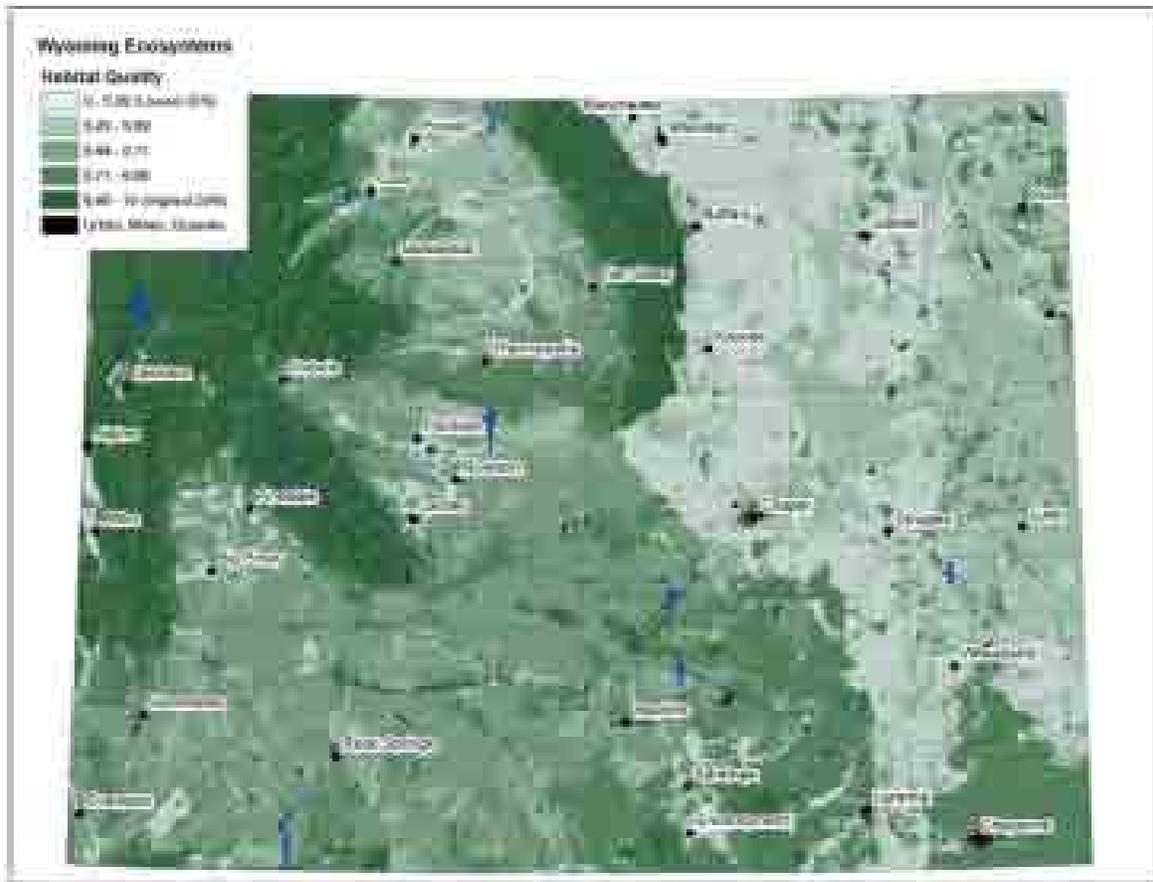


Table 5.

Ecological Systems within the Black Hills Ecoregion (Wyoming)	Acres	Mean Habitat Quality	Avg. # SGCN per Patch	Range of SGCN per Patch
Western Great Plains Badland	24	8.682	4.4	4-6
Rocky Mountain Aspen Forest and Woodland	1,478	7.101	2.7	2-4
Western Great Plains Dry Bur Oak Forest and Woodland	5,746	6.298	13.6	13-15
Rocky Mountain Lower Montane Foothill Riparian Woodland and Shrubland	4,024	6.288	14	13-17
Northwestern Great Plains Mixedgrass Prairie	394,245	5.731	0.6	0-1
Rocky Mountain Ponderosa Pine Woodland	289,546	5.460	10.5	10-11
Inter-Mountain Basins Big Sagebrush Steppe	592	5.338	3	2-4
Rocky Mountain Ponderosa Pine Savanna	240,022	5.330	5.3	5-7
Herbaceous Planted/Cultivated	193,997	4.864	0	0
Western Great Plains Riparian/Western Great Plains Floodplain	86,613	4.763	6.4	4-11

Table 6.

Ecological Systems within the Central Shortgrass Prairie Ecoregion (Wyoming)	Acres	Mean Habitat Quality	Avg. # SGCN per Patch	Range of SGCN per Patch
Rocky Mountain Ponderosa Pine Savanna	2,405	6.901	0.6	0-1
Rocky Mountain Foothill Limber Pine - Juniper Woodland	13,995	6.761	16.7	15-18
Western Great Plains Cliff and Outcrop	17,426	6.425	7.1	4-11
Inter-Mountain Basins Active and Stabilized Dune	1,678	6.401	3	3-3
Rocky Mountain Gambel Oak - Mixed Montane Shrubland	7,250	6.276	17.5	15-19
Herbaceous Planted/Cultivated	703,052	6.251	3.7	3-4
Western Great Plains Shortgrass Prairie	500,225	6.095	3.7	3-4
Rocky Mountain Foothill Grassland	427,478	5.983	14.6	13-16
Northwestern Great Plains Mixedgrass Prairie	827	5.899	1.4	1-2
Inter-Mountain Basins Big Sagebrush Shrubland	9,812	5.652	1.8	1-2
Rocky Mountain Ponderosa Pine Woodland	3,290	5.335	12.4	11-13
Western Great Plains Badland	140	5.246	4.5	2-11
Inter-Mountain Basins Big Sagebrush Steppe	24,580	5.001	0.5	0-1
Rocky Mountain Lower Montane Foothill Riparian Woodland and Shrubland	33,107	4.848	1.6	1-2
Western Great Plains Riparian/Western Great Plains Floodplain	26,114	4.605	2.6	2-3
Rocky Mountain Lower Montane - Foothill Shrubland	51,051	4.581	14.3	14-15
Rocky Mountain Lodgepole Pine Forest	1,216	4.511	17.5	17-18

Table 7.

Ecological Systems within the Columbia Plateau Ecoregion (Wyoming)	Acres	Mean Habitat Quality	Avg. # SGCN per Patch	Range of SGCN per Patch
Rocky Mountain Montane Dry - Mesic Mixed Conifer Forest and Woodland	559	6.550	10.8	9-12
Rocky Mountain Aspen Forest and Woodland	169	6.225	10.6	9-12
Herbaceous Planted/Cultivated	5,114	4.763	8.9	7-10
Rocky Mountain Lower Montane Foothill Riparian Woodland and Shrubland	414	4.239	9.8	7-10
Inter-Mountain Basins Montane Sagebrush Steppe	89	1.520	10.5	9-12

Table 8

Ecological Systems within the Northern Great Plains Steppe Ecoregion (Wyoming)	Acres	Mean Habitat Quality	Avg. # SGCN per Patch	Range of SGCN per Patch
Rocky Mountain Lodgepole Pine Forest	34	7.947	6	6-6
Rocky Mountain Cliff and Canyon	21	7.394	1.3	1-2
Southern Rocky Mountain Montane Grassland	906	7.236	12.4	10-15
Rocky Mountain Ponderosa Pine Savanna	464,935	6.076	3.8	1-8
Inter-Mountain Basins Greasewood Flat	196,760	6.068	8.7	6-10
Western Great Plains Cliff and Outcrop	155,435	5.989	0.8	0-2
Western Great Plains Dry Bur Oak Forest and Woodland	1,140	5.986	0.9	0-1
Rocky Mountain Montane Dry - Mesic Mixed Conifer Forest and Woodland	477	5.827	7.8	7-8
Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland	12	5.786	5	5-5
Rocky Mountain Ponderosa Pine Woodland	210,421	5.698	2.6	1-6
Rocky Mountain Lower Montane - Foothill Shrubland	81,198	5.468	2.3	0-4
Northwestern Great Plains Mixedgrass Prairie	6,488,667	5.428	15.3	9-19
Inter-Mountain Basins Shale Badland	36,550	5.411	0.6	0-1
Inter-Mountain Basins Montane Sagebrush Steppe	3,073	5.394	10.9	10-12
Rocky Mountain Foothill Limber Pine - Juniper Woodland	121,958	5.298	2.5	1-4
Western Great Plains Badland	2,524	5.279	0.6	0-1
Inter-Mountain Basins Mixed Salt Desert Scrub	333,302	5.052	7.1	6-9
Inter-Mountain Basins Big Sagebrush Steppe	2,752,288	4.885	11.7	9-14
Rocky Mountain Foothill Grassland	1,246	4.831	16.3	15-19
Western Great Plains Shortgrass Prairie	22	4.747	16.3	16-17
Inter-Mountain Basins Big Sagebrush Shrubland	2,410,392	4.714	13.6	11-17
Rocky Mountain Aspen Forest and Woodland	5,340	4.645	2.6	1-5
Western Great Plains Riparian/Western Great Plains Floodplain	743,289	4.532	8.1	2-14

Ecological Systems within the Northern Great Plains Steppe Ecoregion (Wyoming) (Cont.)	Acres	Mean Habitat Quality	Avg. # SGCN per Patch	Range of SGCN per Patch
Rocky Mountain Gambel Oak - Mixed Montane Shrubland	13,345	4.468	0.6	0-2
Herbaceous Planted/Cultivated	1,664,494	4.349	13.2	10-16
Rocky Mountain Lower Montane Foothill Riparian Woodland and Shrubland	73,144	4.184	7.1	3-13
Inter-Mountain Basins Active and Stabilized Dune	26,267	3.821	0.9	0-1
Wyoming Basins Low Sagebrush Shrubland	2,826	3.284	9.2	9-10

Table 9

Ecological Systems within the Southern Rocky Mountains Ecoregion (Wyoming)	Acres	Mean Habitat Quality	Avg. # SGCN per Patch	Range of SGCN per Patch
Rocky Mountain Alpine Bedrock and Scree	17,786	8.398	4.2	4-5
Rocky Mountain Subalpine Mesic - Spruce-Fir Forest and Woodland	282	8.093	3.5	2-5
Rocky Mountain Subalpine Mesic Meadow	14,550	7.512	3.9	3-5
Rocky Mountain Subalpine Dry - Mesic Spruce-Fir Forest and Woodland	73,242	7.260	5.7	4-7
Inter-Mountain Basins Mixed Salt Desert Scrub	2,191	7.243	7.6	7-9
Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland	51	7.136	3.4	1-4
Rocky Mountain Subalpine - Montane Riparian Woodland	60,423	7.040	2.8	1-5
Rocky Mountain Subalpine-Montane Riparian Shrubland	84,677	6.890	4.2	2-6
Rocky Mountain Lodgepole Pine Forest	563,524	6.622	5.2	2-7
Rocky Mountain Aspen Forest and Woodland	152,070	6.618	3.8	1-8
Rocky Mountain Montane Dry - Mesic Mixed Conifer Forest and Woodland	122,285	6.266	4	3-5
Inter-Mountain Basins Montane Sagebrush Steppe	248,818	6.219	12.4	10-16
Rocky Mountain Cliff and Canyon	11,498	5.990	1.5	0-3
Rocky Mountain Gambel Oak - Mixed Montane Shrubland	14,631	5.453	1.6	1-3
Rocky Mountain Lower Montane - Foothill Shrubland	249,715	5.383	2.9	1-5
Rocky Mountain Foothill Limber Pine - Juniper Woodland	127,293	5.281	2.7	2-4
Wyoming Basins Low Sagebrush Shrubland	7,878	5.187	10.6	9-13
Rocky Mountain Ponderosa Pine Woodland	173,194	5.162	2.8	1-5
Western Great Plains Cliff and Outcrop	175	5.157	1.8	1-2
Rocky Mountain Ponderosa Pine Savanna	165,597	5.102	3.7	1-7
Southern Rocky Mountain Montane Grassland	307,824	5.067	16.1	9-19
Inter-Mountain Basins Big Sagebrush Shrubland	68,063	4.975	14.4	12-16

Ecological Systems within the Southern Rocky Mountains Ecoregion (Wyoming) (Cont.)	Acres	Mean Habitat Quality	Avg. # SGCN per Patch	Range of SGCN per Patch
Rocky Mountain Lower Montane Foothill Riparian Woodland and Shrubland	143,617	4.964	5.8	2-13
Northwestern Great Plains Mixedgrass Prairie	4,007	4.904	16.3	14-19
Inter-Mountain Basins Big Sagebrush Steppe	187,197	4.791	12.9	12-17
Rocky Mountain Foothill Grassland	443,894	4.698	16.3	9-19
Herbaceous Planted/Cultivated	90,747	4.518	13.6	12-16
Western Great Plains Badland	195	4.363	0.6	0-1
Western Great Plains Riparian/Western Great Plains Floodplain	9,266	4.153	10.7	5-14
Inter-Mountain Basins Cliff and Canyon	1,081	4.084	2	0-3
Inter-Mountain Basins Shale Badland	487	4.081	1.3	0-2
Western Great Plains Shortgrass Prairie	583	3.757	16.5	16-17

Table 10

Ecological Systems within the Utah-Wyoming Rocky Mountains Ecoregion (Wyoming)	Acres	Mean Habitat Quality	Avg. # SGCN per Patch	Range of SGCN per Patch
Rocky Mountain Dry Tundra	193,669	8.836	5.5	3-6
Northern Rocky Mountain Subalpine Dry Parkland	198,631	8.795	3	1-4
Rocky Mountain Alpine Bedrock and Scree	640,649	8.760	6.1	3-8
Rocky Mountain Subalpine Mesic - Spruce-Fir Forest and Woodland	26,072	8.677	7.4	4-8
North American Alpine Ice Field	6,206	8.645	1.1	0-3
Inter-Mountain Basins Shale Badland	360	8.596	2.4	0-3
Rocky Mountain Cliff and Canyon	233,358	8.398	3.1	0-5
Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland	28,132	8.075	9.2	4-11
Rocky Mountain Subalpine Dry - Mesic Spruce-Fir Forest and Woodland	716,497	8.067	11.8	7-14
Rocky Mountain Lodgepole Pine Forest	3,350,175	7.995	12.5	2-16
Rocky Mountain Subalpine Mesic Meadow	1,667,233	7.941	6	3-8
Rocky Mountain Subalpine - Montane Riparian Woodland	512,663	7.760	6.9	2-9
Rocky Mountain Montane Dry - Mesic Mixed Conifer Forest and Woodland	847,081	7.736	10.7	4-15
North American Arid West Emergent Marsh	19,248	7.715	3.1	2-5
Rocky Mountain Subalpine-Montane Riparian Shrubland	264,824	7.518	6.7	3-9
Rocky Mountain Ponderosa Pine Savanna	63,250	7.351	2.5	2-4
Rocky Mountain Ponderosa Pine Woodland	59,639	7.250	3.4	2-5
Rocky Mountain Lower Montane Foothill Riparian Woodland and Shrubland	411,215	7.132	10.3	3-17

Ecological Systems within the Utah-Wyoming Rocky Mountains Ecoregion (Wyoming) (Cont.)	Acres	Mean Habitat Quality	Avg. # SGCN per Patch	Range of SGCN per Patch
Inter-Mountain Basins Mountain Mahogany Woodland and Shrubland	38,308	7.023	0.2	0-2
Northwestern Great Plains Mixedgrass Prairie	235,941	6.999	11.8	7-16
Inter-Mountain Basins Montane Sagebrush Steppe	1,101,247	6.964	11.8	8-16
Inter-Mountain Basins Mixed Salt Desert Scrub	19,319	6.859	7	6-10
Inter-Mountain Basins Cliff and Canyon	19,488	6.753	1.9	1-5
Southern Rocky Mountain Montane Grassland	414,578	6.746	11.9	8-14
Rocky Mountain Aspen Forest and Woodland	282,718	6.668	10.1	2-13
Rocky Mountain Gambel Oak - Mixed Montane Shrubland	19,846	6.517	1.5	0-3
Rocky Mountain Foothill Limber Pine - Juniper Woodland	289,531	6.442	2.7	1-12
Rocky Mountain Lower Montane - Foothill Shrubland	4,604	6.219	1.3	0-2
Inter-Mountain Basins Big Sagebrush Steppe	129,770	6.076	10.7	8-15
Inter-Mountain Basins Big Sagebrush Shrubland	214,242	6.067	12.7	9-17
Western Great Plains Riparian/Western Great Plains Floodplain	24,249	6.043	7.8	4-14
Geothermal Feature	3,797	5.935	1.5	1-2
Inter-Mountain Basins Semi-Desert Grassland	8,350	5.613	7.2	5-9
Western Great Plains Badland	2,327	5.493	1	0-4
Rocky Mountain Foothill Grassland	48	5.264	8	8-8
Western Great Plains Cliff and Outcrop	41	5.161	0.1	0-1
Wyoming Basins Low Sagebrush Shrubland	4,366	4.822	11.3	11-12
Herbaceous Planted/Cultivated	153,741	4.367	10.2	7-14

Table 11.

Ecological Systems within the Wyoming Basins Ecoregion (Wyoming)	Acres	Mean Habitat Quality	Avg. # SGCN per Patch	Range of SGCN per Patch
Northern Rocky Mountain Subalpine Dry Parkland	410	9.620	3.7	3-4
Rocky Mountain Subalpine Mesic - Spruce-Fir Forest and Woodland	664	9.129	7.8	6-8
Rocky Mountain Cliff and Canyon	13	9.121	3.1	0-4
Rocky Mountain Subalpine Dry - Mesic Spruce-Fir Forest and Woodland	12,703	8.782	12	5-13
Rocky Mountain Alpine Bedrock and Scree	397	8.324	6.5	6-7
Rocky Mountain Subalpine Mesic Meadow	604	7.728	6.9	6-7
Inter-Mountain Basins Playa	30,285	7.511	0.5	0-2
Rocky Mountain Subalpine-Montane Riparian Shrubland	33,813	6.985	5.2	1-8
Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland	395	6.898	6.4	2-11

Ecological Systems within the Wyoming Basins Ecoregion (Wyoming) (Cont.)	Acres	Mean Habitat Quality	Avg. # SGCN per Patch	Range of SGCN per Patch
Inter-Mountain Basins Active and Stabilized Dune	157,664	6.880	0.7	0-3
Rocky Mountain Lodgepole Pine Forest	95,840	6.694	9.4	2-15
Rocky Mountain Gambel Oak - Mixed Montane Shrubland	4,724	6.596	2.1	1-3
Rocky Mountain Montane Dry - Mesic Mixed Conifer Forest and Woodland	43,848	6.541	10	2-14
Southern Rocky Mountain Montane Grassland	497,762	6.493	15.8	8-20
Inter-Mountain Basins Greasewood Flat	644,227	6.411	10.3	8-13
Inter-Mountain Basins Cliff and Canyon	445,526	6.287	1.6	0-4
Northwestern Great Plains Mixedgrass Prairie	964,640	6.286	12.8	7-19
Wyoming Basins Low Sagebrush Shrubland	102,428	6.071	11.4	9-15
Rocky Mountain Subalpine - Montane Riparian Woodland	19,925	5.982	4.6	1-8
Inter-Mountain Basins Montane Sagebrush Steppe	1,341,759	5.852	12.7	10-16
Rocky Mountain Aspen Forest and Woodland	119,170	5.808	6.6	1-12
Inter-Mountain Basins Big Sagebrush Steppe	1,810,489	5.747	12.4	8-19
Rocky Mountain Foothill Limber Pine - Juniper Woodland	1,189,038	5.728	3.7	1-13
Inter-Mountain Basins Big Sagebrush Shrubland	13,011,919	5.715	13.9	9-19
Inter-Mountain Basins Shale Badland	104,489	5.589	0.8	0-3
Rocky Mountain Lower Montane Foothill Riparian Woodland and Shrubland	738,319	5.479	9.6	2-17
Inter-Mountain Basins Mixed Salt Desert Scrub	3,866,186	5.447	7.7	6-13
Western Great Plains Badland	46,664	5.431	0.9	0-4
Rocky Mountain Lower Montane - Foothill Shrubland	43,620	5.348	2	0-4
Herbaceous Planted/Cultivated	1,618,303	4.736	9.8	6-17
North American Arid West Emergent Marsh	7,838	4.653	2.9	1-5
Rocky Mountain Ponderosa Pine Savanna	10,784	4.603	1	1-2
Rocky Mountain Ponderosa Pine Woodland	2,643	4.583	1.5	1-3
Western Great Plains Riparian/Western Great Plains Floodplain	215,032	4.339	8.9	3-12
Rocky Mountain Foothill Grassland	199	3.342	15	14-16

In order to connect individual species with specific habitats, a Geographic Information System (GIS) was employed. Point location data for most of the mammalian and avian SGCN was derived from the Wildlife Observation System (WOS) maintained by the WGFD's Biological Services Section. From this, an initial point distribution map was generated. These point distribution maps were combined with the habitat map to identify the specific ecoregions and ecological systems where each of these species is known to occur. At a series of workshops held in Casper, Wyoming during March, 2005, (Section VII) WGFD personnel, academic researchers, nongovernmental and organization representatives, Federal personnel, and other knowledgeable parties reviewed and updated each map and the associated GIS database. Once each map was finalized, the individual GIS coverage were merged to form one mammalian/avian

GIS coverage. This system can be queried to identify habitats where individual species may occur, can be queried to rank habitat polygons based upon the number of SGCN that may occur there, or indicate SGCN that may occupy any specific habitat polygon within the state.

AQUATIC HABITATS

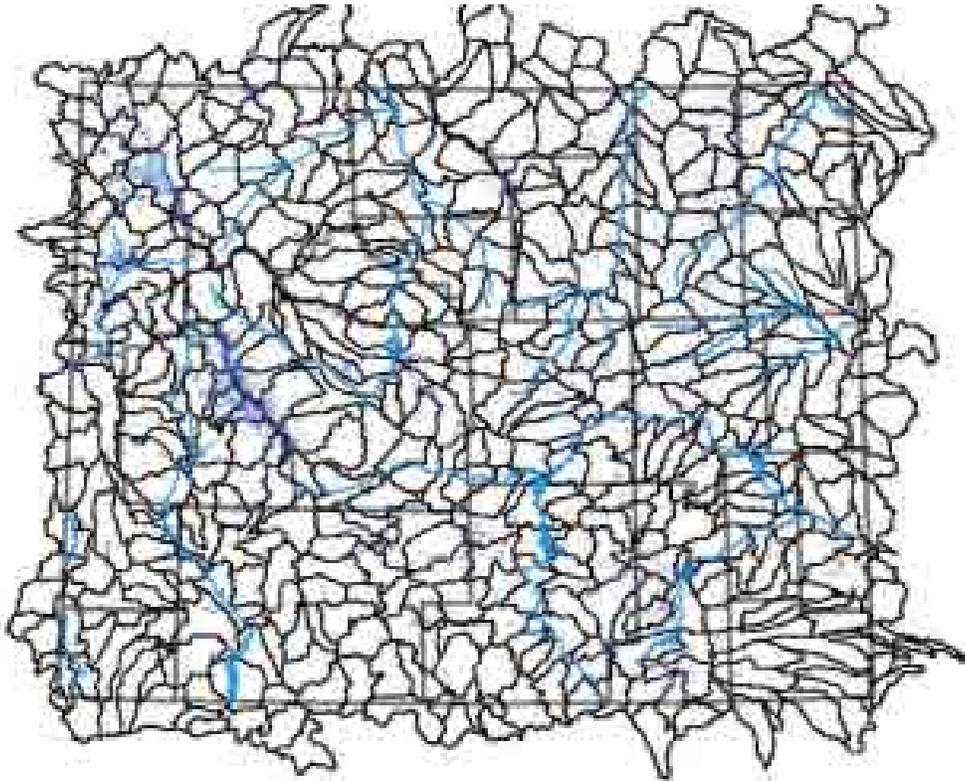
NatureServe and The Nature Conservancy have not included aquatic habitats within their habitat mapping efforts. As such, a different habitat classification system was used to deal with species other than birds and mammals in Wyoming. For the management and monitoring of Wyoming's fishes, amphibians, reptiles, and aquatic mollusks, the distributions of these species have been mapped using hydrologic units. Several waterfowl and riparian-dependent birds were also mapped using hydrologic units due to their specific habitat needs. Hydrologic units can generally be defined as watersheds. The U.S. Geological Survey has subdivided the United States into 21 regions based either upon major watershed boundaries (i.e. Missouri River) or a series of similar unconnected watersheds that are in close proximity (i.e. Texas Gulf Coast). Wyoming contains portions of three of these regions: the Missouri River; the Columbia River; and the Colorado River. Using GIS technology, each of these regions was subdivided into progressively smaller hydrologic units. Complete details of the process used in Wyoming are described in, *Creating Hydrologic Unit Boundaries for Wyoming: A Semi-Automated Approach* (Berelson, Caffrey, and Hamerlinck 2001). For Wyoming's CWCS, the distributions of fishes, reptiles, amphibians, aquatic mollusks, and the remaining birds were mapped using fifth level hydrologic units. Wyoming contains part or all of 434 fifth level hydrologic units, which were mapped at the 1:24,000 scale and range in size from 62mi² to 390mi² (see Map 3).

Initial maps for aquatic SGCN were created either using existing fisheries databases, the WOS, and/or information derived from non-WGFD sources. These maps indicate either the presence or absence of each SGCN within each fifth level hydrologic unit. As with the terrestrial and avian species, the aquatic maps were reviewed and updated during the March, 2005 workshops by wildlife professionals and academics from a variety of agencies and organizations. This effort also resulted in a database of species that can be queried using either a species or watershed criteria. During the summer/fall of 2005, efforts will be made to combine the terrestrial and aquatic SGCN databases into a single comprehensive tool using the hydrologic unit boundaries.

A variety of conditions have prevented a consistent statewide aquatic habitat assessment from being developed. As such, the relative conditions of Wyoming's aquatic habitats have been estimated from a variety of sources.

The majority of waters originating in northern and eastern Wyoming drain into the Missouri River. From 1993 until 1995, these waters were surveyed to determine the distribution and status of fishes in the Missouri River tributaries in Wyoming (Patton, 1997). These data were used to compile a Modified Index of Centers of Density (MICD). The full details of this effort are described within Patton's dissertation, *Distribution and Status of Fishes in the Missouri River Drainage in Wyoming: Implications for Identifying Conservation Areas*, and the subsequent publication *Application of a Modified Index of Centers of Density to Four Drainages within the Missouri River Drainage, Wyoming* (Appendix V).

Map 3. Wyoming's 5th Level Hydrologic Units



$$\text{MICD} = \frac{\text{Sum of relative densities of all species at the site}}{\text{Total number of species of interest in the region}}$$

Generally speaking, higher MICD scores indicate higher species density and diversity and will be used as surrogate indicators of habitat quality for Wyoming's portions of these Missouri River tributaries. To accommodate the presence of nonnative fishes and prevent their densities from skewing the analysis, MICD scores were calculated for "all species" and "special concern species"¹. The following tables (Patton, 2001) indicate the MICD scores for the watersheds surveyed.

¹ The species of special concern surveyed by Patton are very similar, but do not exactly correspond with the fishes identified as SGCN within Wyoming's CWCS.

Table 12

Big Horn and Clark's Fork Drainage	MICD Score based on within-drainage data, all species	MICD Score based on within-drainage data, special concern species only.	State-wide Rank Based on State-wide MICD score, all native species.
Beaver Creek, Fremont Co.	2.2166	0.0469	25
Shoshone R.	1.3172	1.1436	53
Beaver Creek, Big Horn Co.	1.2825	0.51	10
Big Sand Coulee	0.7768	0.344	12
Nowater Creek	0.7692	0.3084	51
Owl Creek	0.6908	0.0815	40
Cottonwood Creek	0.6794	0.1808	46
Meeteetse Creek	0.6097	0.188	21
Dry Creek	0.4739	0.3693	35
Sage Creek	0.3924	0.217	36
Baldwin Creek	0.3346	0.081	42
Gooseberry Creek	0.2862	0.112	48
Nowood River	0.2831	0.0225	60
Badwater Creek	0.2253	0.0078	68
Muddy Creek, Fremont Co.	0.2244	0.1474	45
Greybull River	0.1819	0.107	47
Crystal Creek	0.1542	na	56
Five mile Creek	0.0775	0.0506	61
Pat O'Hara Creek	0.0708	0.0473	63
Shell Creek	0.0707	0.0126	52
Clarks Fork	0.0555	0.0019	71
Bridger Creek	0.0459	0.0187	74
Little Popo Agie River	0.0231	0.0019	80
Grass Creek	0.0095	na	82

Table 13

Powder, Tongue, and Little Missouri Drainages	MICD Score based on within-drainage data, all species	MICD Score based on within-drainage data, special concern species only.	State-wide Rank Based on State-wide MICD score, all native species.
Little Missouri River	3.2748	2.3928	1
Crazy Woman River	2.2292	0.6598	2
South Fork Powder River	2.1894	1.1553	3
Middle Fork Powder River	2.0933	0.817	10
Prairie Creek	1.895	na	6
Prairie Dog Creek	1.7435	0.2877	7
Upper Powder River	1.1452	0.1086	5
Lower Powder River	0.9502	0.7758	4
Little Goose Creek	0.9367	0.1711	13

Powder, Tongue, and Little Missouri Drainages (Cont)	MICD Score based on within-drainage data, all species	MICD Score based on within-drainage data, special concern species only.	State-wide Rank Based on State-wide MICD score, all native species.
Clear Creek	0.7575	0.042	11
Salt Creek	0.573	0.5325	9
Little Powder River	0.5165	0.2667	8
Tongue River	0.4916	0.0441	12
Big Goose Creek	0.3604	0.1628	14

Table 14

Cheyenne, Niobrara, and Belle Fourche Drainages	MICD Score based on within-drainage data, all species	MICD Score based on within-drainage data, special concern species only.	State-wide Rank Based on State-wide MICD score, all native species.
Inyan Kara Creek	3.863	1.1628	20
Niobrara River	3.8372	2.0125	3
Upper Belle Fourche River	3.4272	1.1793	18
Van Tassel Creek	3.0252	0.9875	6
Upper Cheyenne River	1.4917	1.2523	14
Beaver Creek	1.1509	0.5414	29
Lower Cheyenne River	1.0389	0.7654	22
Lance Creek	0.3036	0.6135	31
Redwater Creek	0.3026	na	78
Indian Creek	0.2298	na	79
Lower Belle Fourche River	0.0428	0.069	76

Table 15.

North and South Platte Drainages	MICD Score based on within-drainage data, all species	MICD Score based on within-drainage data, special concern species only.	State-wide Rank Based on State-wide MICD score, all native species.
Lodgepole Creek	4.4512	2.3672	1
Horse Creek	3.1825	2.0165	5
North Laramie River	2.9102	1.3076	2
Lower Laramie River	1.9456	0.0544	11
Chugwater Creek	0.9785	na	15
Lower North Platte River	0.8683	0.0019	32
Sheep Creek	0.8418	na	27
Richeau Creek	0.8378	0.1237	19
Rawhide Creek	0.8352	0.0113	39
Pass Creek	0.8005	na	17
Muddy Creek, Laramie Co.	0.7235	na	30
Little Medicine Bow River	0.5096	na	23
La Prele Creek	0.4392	na	57

North and South Platte Drainages (Cont.)	MICD Score based on within-drainage data, all species	MICD Score based on within-drainage data, special concern species only.	State-wide Rank Based on State-wide MICD score, all native species.
Muddy Creek, Converse Co.	0.3981	0.0865	41
South Spring Creek	0.39	na	33
Bear Creek	0.3587	na	37
Poison Spider Creek	0.333	na	38
Sage Creek, Carbon Co.	0.288	na	58
Sweetwater River	0.2551	na	49
Sybillie Creek	0.2478	na	55
Upper North Platte River	0.2032	na	62
La Bonte Creek	0.1622	na	69
Alkali Creek	0.1557	na	66
Jack Creek	0.1505	na	59
Crow Creek	0.1342	na	54
Little Horse Creek	0.1124	na	73
Little Laramie River	0.1015	0.0171	65
Medicine Bow River	0.0795	na	67
Rock Creek	0.0756	na	77
Upper Laramie River	0.059	0.0051	75
Casper Creek	0.0482	na	72
Box Elder Creek	0.464	0.0088	70
Elkhorn Creek	0.0305	na	81
Lone Tree Creek	0.003	na	83

Upon review, neither a formal analysis of habitat quality nor a suitable surrogate indicator could be found for the watersheds in western Wyoming. To develop the WGFD's *Strategic Habitat Plan*, (WGFD, 2001) western watershed priorities were based upon local managerial input and the location of genetically pure populations of the various cutthroat trout subspecies. In the coming years, the WGFD's Fish Division will update individual basin management plans and the *Strategic Habitat Plan* to include habitat descriptors for watersheds in both eastern and western Wyoming. When Wyoming's CWCS is revised in 2010, the information collected during the interim will be included.

MISSING HABITAT INFORMATION

It should be noted that recent, reliable distribution information for many species does not exist. Specifically, maps could not be generated for most of Wyoming's mollusks or any of Wyoming's crustaceans. These taxa have received little research attention, and very little is known about their distribution or habitat needs. As such, it was impossible to include them within the resulting GIS databases. When distribution maps could not be generated, a notation was made within the individual species summaries (Appendix II).

Likewise, in cases involving reptiles and amphibians, insufficient data exists to map distribution at a scale finer than the fifth level hydrologic unit. Before Wyoming's CWCS is revised in 2010, efforts will be made to address as many of these deficiencies as possible. Although the WGFD may be able to collect information on some of these species (i.e. bivalves), cooperation with other state agencies, Federal agencies, academics, and private individuals will be required if comprehensive results are to be achieved.

SECTION III

PROBLEMS AND THREATS

As indicated within the Congressional guidelines, each state CWCS must include a discussion of problems. Specifically, Element #3 indicates each CWCS must provide, “Descriptions of problems which may adversely affect species identified in Element #1 or their habitats, and priority research and survey efforts needed to identify factors which may assist in restoration and improved conservation of these species and habitats”.

DEFINING PROBLEMS AND THREATS

The process for defining problems and threats to Wyoming’s SCGN began with the development of the species accounts (Appendix II). For each of the 279 SGCN, the most significant problems and threats are noted. As WGFD and its partners developed the species accounts, these problem/threat statements were considered and modified. It should be noted here that these problem/threat statements are not included as an indictment of any particular land use, user group or constituency. Not every problem statement is accompanied by a reference to a peer reviewed publication. However, all are the best professional judgments of the preparers. It is the intention of the WGFD and its partners to work cooperatively with all potential stakeholders to minimize the impact of these problems and threats on Wyoming’s SGCN.

PROBLEMS AND THREATS TO WYOMING SGCN

The specific problems and threats identified in the species accounts (Appendix II) were reviewed and summarized by category and species in tabular form (Tables 16 thru 22). The specific problem/threat statements from the species accounts were combined into 13 general categories:

- Habitat Degradation – declines in the quality of habitat;
- Habitat Fragmentation – breaking of habitat in to smaller blocks;
- Inter-specific Competition – competition between species for resources;
- Habitat Loss – removal of habitat;
- Human Conflict/Disturbance – human activities which may result in impacts to the species;
- Disease – a variety of pathogens, etc., which may affect the species;
- Loss of Prey Base – declines in food source;
- Unregulated Take/Mortality – includes accidental mortality, absence of regulations, etc.;
- Absence of Data – data on important components of the species’ abundance, distribution, etc. are unavailable;
- Predation – effects of predators that impact a species;
- Contaminants – substances which may negatively affect the species are present;
- Restricted Habitat – habitat is limited in its availability; and
- Hybridization – genetic exchange between species affects species integrity.

As shown in Tables 16 thru 22, no SGCN in Wyoming faces all 13 problems/threats. The number of problems and threats varies both by species and by taxa. Some of these problems/threats are natural phenomena (i.e. inter-specific competition and disease). Others are the result of anthropogenic impacts (i.e. habitat degradation and habitat fragmentation). By considering all 279 species and their associated problems/threats, some general conclusions can be drawn. The most frequently mentioned problem/threat was that of insufficient data, noted in 235 of the 279 species. The absence of meaningful levels of funding for many SGCN has long been a matter of concern, and the quality and quantity of the data available for many SGCN reflect this limited funding. This lack of adequate data no doubt compromises Wyoming's ability to recognize other threats to SGCN in Wyoming, since some threats may go unrecognized. Likewise, without adequate data, few meaningful conservation actions can be undertaken. Some SGCN may be subject to listing under the federal Endangered Species Act, litigation or other regulation, and, without sufficient data, it would be difficult to support or refute such actions.

Table 16: Threats - Mammals

COMMON NAME	HADE	HAFR	HALO	COMP	DIST	DISE	PREY	TAKE	DATA	PRED	CONT	REHA	HYBR	Total
Abert's Squirrel	1		1	1					1					4
Big Brown Bat			1		1		1		1					4
Bighorn Sheep	1					1								2
Black-footed Ferret		1			1	1		1	1					5
Black-tailed Prairie Dog	1				1	1			1					4
Canada Lynx	1	1			1				1					4
Canyon Mouse									1					1
Cliff Chipmunk									1					1
Dwarf Shrew									1					1
Fisher	1								1					2
Fringed Myotis	1				1		1		1					4
Great Basin Pocket Mouse	1								1					2
Grizzly Bear			1		1									2
Hayden's Shrew									1					1
Hispid Pocket Mouse									1					1
Hoary Bat	1	1	1		1				1					5
Idaho Pocket Gopher									1					1
Least Weasel									1					1
Little Brown Myotis	1		1		1		1		1					5
Long-eared Myotis	1		1		1		1		1					5
Long-legged Myotis	1		1		1		1		1					5
Marten									1					1
Meadow Jumping Mouse					1				1					2
Moose	1			1	1	1			1	1				6
Northern Flying Squirrel									1					1
Northern Myotis	1		1		1		1		1					5
Olive-backed Pocket Mouse									1					1
Pallid Bat			1		1		1		1					4
Pinyon Mouse									1					1
Plains Harvest Mouse									1					1
Plains Pocket Gopher									1					1

Threats - Mammals
(continued)

COMMON NAME	HADE	HAFR	HALO	COMP	DIST	DISE	PREY	TAKE	DATA	PRED	CONT	REHA	HYBR	Total
Plains Pocket Mouse									1					1
Prairie Vole									1					1
Preble's Shrew	1								1					2
Pygmy Rabbit	1	1							1					3
Pygmy Shrew									1					1
River Otter								1	1					2
Sagebrush Vole									1					1
Silky Pocket Mouse									1					1
Silver-haired Bat			1				1		1					3
Spotted Bat					1		1		1					3
Spotted Ground Squirrel									1					1
Swift Fox					1			1	1					3
Townsend's Big-eared Bat			1		1		1		1					4
Uinta Ground Squirrel									1					1
Vagrant Shrew									1					1
Water Shrew	1								1					2
Water Vole	1	1							1					3
Western Heather Vole	1								1					2
Western Small-footed Myotis			1		1		1		1					4
White-tailed Prairie Dog	1				1	1		1	1					5
Wolverine	1	1			1				1					4
Wyoming Ground Squirrel						1			1					2
Wyoming Pocket Gopher								1	1					2
MAMMALS TOTAL	20	6	12	2	20	6	11	5	52	1	0	0	0	134

HADE-Habitat Degradation
HAFR-Habitat Fragmentation
COMP-Interspecific Competition
HALO-Habitat Loss
DIST-Human Disturbance/Conflict
DISE-Disease
HYBR-Hybridization

TAKE-Unregulated Take/Mortality
DATA-Absence of Data
PRED-Predation
CONT-Contaminants
REHA-Restricted Habitat
PREY-Loss of Prey

Table 17: Threats - Birds

COMMON NAME	HADE	HAFR	HALO	COMP	DIST	DISE	PREY	TAKE	DATA	PRED	CONT	REHA	HYBR	Total
American Bittern		1		1	1									3
American Three-toed Woodpecker		1		1					1					3
American White Pelican				1	1					1				3
Ash-throated Flycatcher	1	1							1					3
Bald Eagle		1			1						1			5
Barrow's Goldeneye	1			1					1		1			4
Black Rosy-Finch									1					1
Black Tern	1	1			1									3
Black-backed Woodpecker				1					1					2
Black-crowned Night-Heron	1			1	1						1			4
Bobolink	1				1									2
Boreal Owl	1	1							1					3
Brewer's Sparrow		1		1										2
Brown-capped Rosy Finch		1			1				1					3
Burrowing Owl	1			1			1							3
Bushtit		1			1				1					3
Canvasback	1			1						1	1			4
Caspian Tern	1	1			1									3
Chestnut-collared Longspur	1	1		1										3
Clark's Grebe	1	1			1									3
Columbian Sharp-tailed Grouse	1	1		1	1						1			5
Common Loon	1	1		1	1						1			5
Dickcissel	1			1	1									3
Ferruginous Hawk	1			1	1		1		1					5
Forster's Tern	1	1			1									3

Threats – Birds
(continued)

COMMON NAME	HADE	HAFR	HALO	COMP	DIST	DISE	PREY	TAKE	DATA	PRED	CONT	REHA	HYBR	Total
Franklin's Gull	1	1			1									3
Grasshopper Sparrow	1	1			1									3
Great Blue Heron	1	1		1	1									4
Great Gray Owl	1								1					2
Greater Sage-Grouse	1	1		1		1								4
Greater Sandhill Crane	1	1		1	1									4
Harlequin Duck	1				1				1					3
Juniper Titmouse		1							1					2
Lark Bunting	1			1							1			3
Lesser Scaup	1										1			2
Lewis' Woodpecker	1	1							1					3
Long-billed Curlew	1								1					2
McCown's Longspur	1	1		1										3
Merlin	1								1		1			3
Mountain Plover	1	1		1					1					4
Northern Goshawk	1			1	1				1					4
Northern Pintail			1											1
Northern Pygmy-Owl	1								1					2
Peregrine Falcon									1		1			2
Pygmy Nuthatch	1								1					2
Redhead	1			1						1				3
Sage Sparrow		1		1										2
Sage Thrasher		1		1										2
Scott's Oriole		1							1					2
Short-eared Owl	1	1		1										3
Snowy Egret	1	1		1	1						1			5
Swainson's Hawk	1			1				1			1			4
Trumpeter Swan		1			1									2
Upland Sandpiper	1			1	1									3
Virginia Rail	1	1												2
Western Grebe	1	1			1									3

Threats – Birds
(continued)

COMMON NAME	HADE	HAFR	HALO	COMP	DIST	DISE	PREY	TAKE	DATA	PRED	CONT	REHA	HYBR	Total
Western Scrub-Jay		1			1				1					3
White-faced Ibis	1	1			1									3
Willow Flycatcher	1		1	1										3
Yellow-billed Cuckoo	1	1							1		1			4
BIRDS TOTAL	43	35	2	29	27	1	4	1	23	3	13	0	0	181

HADE-Habitat Degradation

HAFR-Habitat Fragmentation

COMP-Interspecific Competition

HALO-Habitat Loss

DIST-Human Disturbance/Conflict

DISE-Disease

HYBR-Hybridization

TAKE-Unregulated Take/Mortality

DATA-Absence of Data

PRED-Predation

CONT-Contaminants

REHA-Restricted Habitat

PREY-Loss of Prey

Table 18: Threats - Reptiles

COMMON NAME	HADE	HAFR	HALO	COMP	DIST	DISE	PREY	TAKE	DATA	PRED	CONT	REHA	HYBR	Total
Black Hills Redbelly Snake									1					1
Bullsnake									1					1
Cliff Tree Lizard									1					1
Common Garter Snake									1					1
Eastern Yellow-bellied Racer									1					1
Great Basin Gophersnake									1					1
Great Plains Earless Lizard									1					1
Greater Short-horned Lizard									1					1
Intermountain Wandering Gartersnake									1					1
Midget Faded Rattlesnake					1			1						2
Northern Many-lined Skink									1					1
Northern Plateau Lizard									1					1
Northern Prairie Lizard									1					1
Northern Sagebrush Lizard									1					1
Ornate Box Turtle									1					1
Pale Milksnake									1					1
Plains Black-headed Snake									1					1
Plains Gartersnake									1					1
Plains Hog-nosed Snake					1				1					2
Prairie Racerunner									1					1
Prairie Rattlesnake									1					1
Red-lipped Plateau Lizard									1					1
Rubber Boa									1					1
Smooth Green Snake									1					1
Western Painted Turtle									1					1
Western Spiny Softshell									1					1
REPTILES TOTAL	0	0	0	0	2	0	0	1	25	0	0	0	0	28

HADE-Habitat Degradation
 HAFR-Habitat Fragmentation
 COMP-Interspecific Competition
 HALO-Habitat Loss
 DIST-Human Disturbance/Conflict
 DISE-Disease
 HYBR-Hybridization

TAKE-Unregulated Take/Mortality
 DATA-Absence of Data
 PRED-Predation
 CONT-Contaminants
 REHA-Restricted Habitat
 PREY-Loss of Prey

Table 19: Threats - Amphibians

COMMON NAME	HADE	HAFR	HALO	COMP	DIST	DISE	PREY	TAKE	DATA	PRED	CONT	REHA	HYBR	Total
Boreal Chorus Frog						1			1					2
Boreal Toad	1					1			1					3
American Bullfrog									1					1
Columbia Spotted Frog	1		1											2
Great Basin Spadefoot	1	1							1					3
Great Plains Toad	1	1							1					3
Northern Leopard Frog	1		1			1			1		1			5
Plains Spadefoot	1	1							1					3
Tiger Salamander	1	1		1		1			1	1				6
Wood Frog									1					1
Woodhouse's Toad									1					1
Wyoming Toad	1			1		1			1	1	1			6
AMPHIBIANS TOTAL	8	4	2	2	0	5	0	0	11	2	2	0	0	36

HADE-Habitat Degradation
 HAFR-Habitat Fragmentation
 COMP-Interspecific Competition
 HALO-Habitat Loss
 DIST-Human Disturbance/Conflict
 DISE-Disease
 HYBR-Hybridization

TAKE-Unregulated Take/Mortality
 DATA-Absence of Data
 PRED-Predation
 CONT-Contaminants
 REHA-Restricted Habitat
 PREY-Loss of Prey

Table 20: Threats - Fish

COMMON NAME	HADE	HAFR	HALO	COMP	DIST	DISE	PREY	TAKE	DATA	PRED	CONT	REHA	HYBR	Total
Arctic Grayling				1										1
Bigmouth Shiner									1					1
Black Bullhead									1					1
Bluehead Sucker	1		1						1					3
Bonneville Cutthroat	1		1						1				1	4
Burbot	1								1					2
Central Stoneroller									1					1
Channel Catfish									1					1
Colorado River Cutthroat	1	1	1						1				1	5
Common Shiner									1					1
Finescale Dace									1					1
Flannelmouth Sucker	1		1						1	1				4
Flathead Chub	1								1					2
Goldeye	1			1					1					3
Hornyhead Chub	1			1					1					3
Iowa Darter			1						1					2
Kendall Warm Springs Dace												1		1
Lake Chub			1						1					2
Leatherside Chub	1		1						1					3
Mottled Sculpin									1					1
Mountain Sucker	1								1					2
Mountain Whitefish									1					1
Orangethroat Darter		1							1					2
Paiute Sculpin									1					1
Pearl Dace		1							1	1				3
Plains Minnow	1								1					2
Plains Topminnow			1	1					1					3
Quillback									1					1
River Carpsucker									1					1
Roundtail Chub	1	1	1						1					4
Sauger		1							1				1	3

Threats – Fish
(continued)

COMMON NAME	HADE	HAFR	HALO	COMP	DIST	DISE	PREY	TAKE	DATA	PRED	CONT	REHA	HYBR	Total
Shorthead Redhorse									1					1
Shovelnose Sturgeon	1	1							1					3
Snake River Cutthroat	1	1							1	1			1	5
Stonecat									1					1
Sturgeon Chub	1	1							1					3
Suckermouth Minnow	1			1					1					3
Western Silvery Minnow	1	1	1						1	1				5
Yellowstone Cutthroat		1	1	1					1				1	5
Westslope Cutthroat														0
FISH TOTAL	17	10	11	6	0	0	0	0	37	4	0	1	5	91

HADE-Habitat Degradation

HAFR-Habitat Fragmentation

COMP-Interspecific Competition

HALO-Habitat Loss

DIST-Human Disturbance/Conflict

DISE-Disease

HYBR-Hybridization

TAKE-Unregulated Take/Mortality

DATA-Absence of Data

PRED-Predation

CONT-Contaminants

REHA-Restricted Habitat

PREY-Loss of Prey

Table 21: Threats - Crustaceans

COMMON NAME	HADE	HAFR	HALO	COMP	DIST	DISE	PREY	TAKE	DATA	PRED	CONT	REHA	HYBR	Total
Beavertail Fairy Shrimp									1					1
Circumpolar Fairy Shrimp									1					1
Colorado Fairy Shrimp									1					1
Crenatethumb Fairy Shrimp									1					1
Devil Crayfish	1		1						1					3
Eastern Alkali Fairy Shrimp									1					1
Ethologist Fairy Shrimp									1					1
Gambelii Crayfish	1		1						1					3
Giant Fairy Shrimp									1					1
Greater Plains Fairy Shrimp									1					1
Knobbedlip Fairy Shrimp									1					1
Lemon Tadpole Shrimp									1					1
Longtail Tadpole Shrimp									1					1
Neglectus Crayfish	1		1						1					3
New Mexico Fairy Shrimp									1					1
Pocked Pouch Fairy Shrimp									1					1
Rock Pool Fairy Shrimp									1					1
San Francisco Brine Shrimp									1					1
Versatile Fairy Shrimp									1					1
CRUSTACEANS TOTAL	3	0	3	0	0	0	0	0	19	0	0	0		25

HADE-Habitat Degradation
HAFR-Habitat Fragmentation
COMP-Interspecific Competition
HALO-Habitat Loss
DIST-Human Disturbance/Conflict
DISE-Disease
HYBR-Hybridization

TAKE-Unregulated Take/Mortality
DATA-Absence of Data
PRED-Predation
CONT-Contaminants
REHA-Restricted Habitat
PREY-Loss of Prey

Table 22: Threats - Mollusks

COMMON NAME	HADE	HAFR	HALO	COMP	DIST	DISE	PREY	TAKE	DATA	PRED	CONT	REHA	HYBR	Total
A Land Snail (Hells Canyon)									1					1
Abbreviate pondsnail									1					1
Ash gyro									1					1
Ashy physa									1					1
Berry's Mountain Snail									1					1
California Floater	1								1					2
Callused Vertigo Snail	1	1							1					3
Cooper's Rocky Mountain Snail									1					1
Creeping ancylid									1					1
Cylindrical Papershell	1								1					2
Disc gyro									1					1
Dusky fossaria									1					1
Fatmucket	1								1					2
Fragile ancylid									1					1
Giant Floater	1								1					1
Glass physa									1					1
Glossy valvata									1					3
Golden fossaria									1					1
Jackson Lake Springsnail			1	1					1					1
Lance Aplexa									1					1
Marsh Pondsnail									1					1
Marsh Rams-horn									1					1
Mineral Creek Mountain Snail									1					1
Morgan Creek Mountain Snail									1					1
Mossy Valvata									1					1
Mud amnicola									1					1
Olive physa									1					1
Pewter physa									1					2
Tadpole Physa									1					1
Plain Pocketbook	1								1					1
Protean physa									1					1

Threats – Mollusks
(continued)

COMMON NAME	HADE	HAFR	HALO	COMP	DIST	DISE	PREY	TAKE	DATA	PRED	CONT	REHA	HYBR	Total
Pumpkin physa									1					1
Pygmy fossaria									1					1
Rock fossaria									1					1
Rocky Mountain physa									1					1
Rocky Mountainsnail									1					1
Rotund physa									1					1
Rough rams-horn									1					1
Sharp sprite									1					1
Star gyro									1					1
Striate Disc									1					1
Two-ridge rams-horn									1					1
Umbilicate sprite									1					3
Mystery Vertigo Snail	1	1							1					2
Western Pearlshell	1								1					2
White Heel Splitter	1								1					1
Widelip Pondsnaail									1					1
Woodland Pondsnaail									1					1
Wrinkled Marshsnail									1					1
Cave Physa									1					1
Pygmy Mountainsnail									1					1
Fat-whorled Pondsnaail									1					1
Keeled Mountainsnail									1					1
Green River Pebblesnail									1					1
Utah Physa									1					1
Bear Lake Springsnail									1					1
Great Basin Rams-horn									1					1
Slope Ambersnail									1					1
Ribbed Dagger									1					1
Niobrara Ambersnail									1					1
Sierra Ambersnail									1					1
Mountain Marshsnail									1					1

Threats – Mollusks
(continued)

COMMON NAME	HADE	HAFR	HALO	COMP	DIST	DISE	PREY	TAKE	DATA	PRED	CONT	REHA	HYBR	Total
Ashy Pebblesnail									1					1
Cloaked Physa									1					1
Meadow Rams-horn									1					1
Indecisive Vallonia									1					1
Rocky Mountain Dusksnail									1					1
Rustic Pondsail									1					1
MOLLUSKS TOTAL	9	2	1	1	0	0	0	0	68	0	0	0	0	80
GRAND TOTAL – ALL SGCN	100	57	31	40	49	12	15	10	235	10	15	1	5	544

HADE-Habitat Degradation
HAFR-Habitat Fragmentation
COMP-Interspecific Competition
HALO-Habitat Loss
DIST-Human Disturbance/Conflict
DISE-Disease
HYBR-Hybridization

TAKE-Unregulated Take/Mortality
DATA-Absence of Data
PRED-Predation
CONT-Contaminants
REHA-Restricted Habitat
PREY-Loss of Prey

Tables 16 thru 22 also illustrate some pertinent differences in problems/threats by taxa. Mammals, fishes, reptiles, amphibians, crustaceans, and mollusks are most dominated by absence of sufficient data. Birds represent the taxa least impacted by absence of data, probably due to the many ongoing efforts at monitoring birds in Wyoming. Data inadequacies are clearly the most important problems/threats facing WGFD and its partners in the conservation of SGCN.

For those species that have documented problems/threats in addition to absence of data, habitat-related issues are important. For example, as shown in Tables 16-22, 100 species (36 percent) of the SGCN either are or may be experiencing problems with habitat degradation. It is a particularly important problem/threat for mammals, birds and fishes. Habitat fragmentation is also important; 57 species (21 percent) of the SGCN either are or may be experiencing problems. It is particularly significant for fishes and birds.

Other significant problems/threats for some species include human conflict/disturbance for mammals and birds, inter-specific competition for fishes and habitat loss for birds.

PROBLEMS AND THREATS TO KEY HABITATS

Within Wyoming, approximately half of the land area is privately-owned. The other half is managed by a variety of Federal, state, county/municipal, and tribal entities. As such, different patches of the same habitats can be subject to dramatically different land management regimes (Map 4). Some regimes seek to preserve habitats in near pristine condition (i.e. National Park Service). Others promote multiple conservation, economic, and recreational uses (i.e. USFS and BLM). Finally, privately-held lands can be managed for any variety of goals. Some landowners manage their lands in ways that may benefit SGCN. Other landowners may not. The following ranking does not imply that privately owned lands do not adequately protect habitats for these species. It does, however, assume that protection for these species on private lands is not formal as a result of statute or regulation. To help assess this variance, lands were ranked on a scale of one to ten based upon the management regime used (Table 23). The higher the figure, the more formal protection an area enjoys.

Table 23.

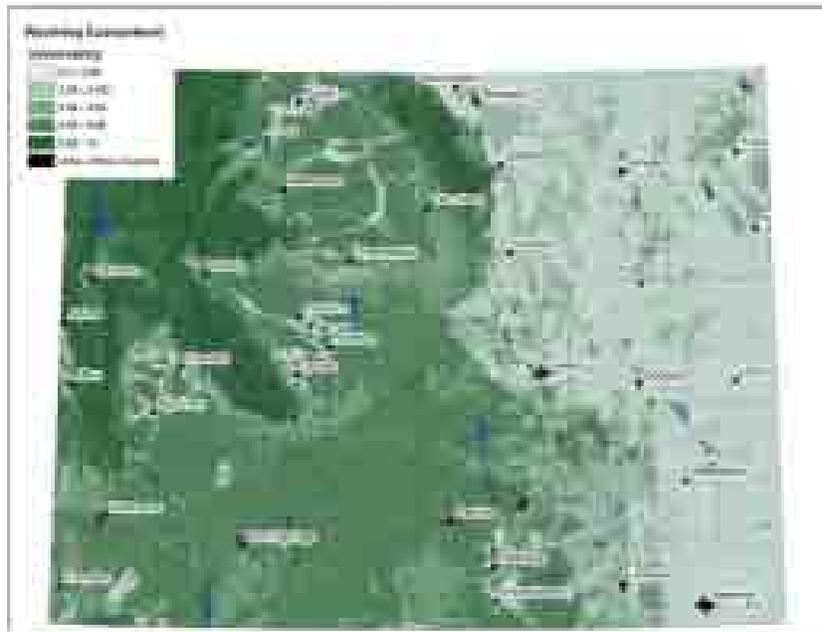
Table of Management Values

Status Code	Land Management Type
10	NPS National Parks NPS National Monuments USFS Wilderness Areas National Wildlife Refuges Nature Conservancy Preserves

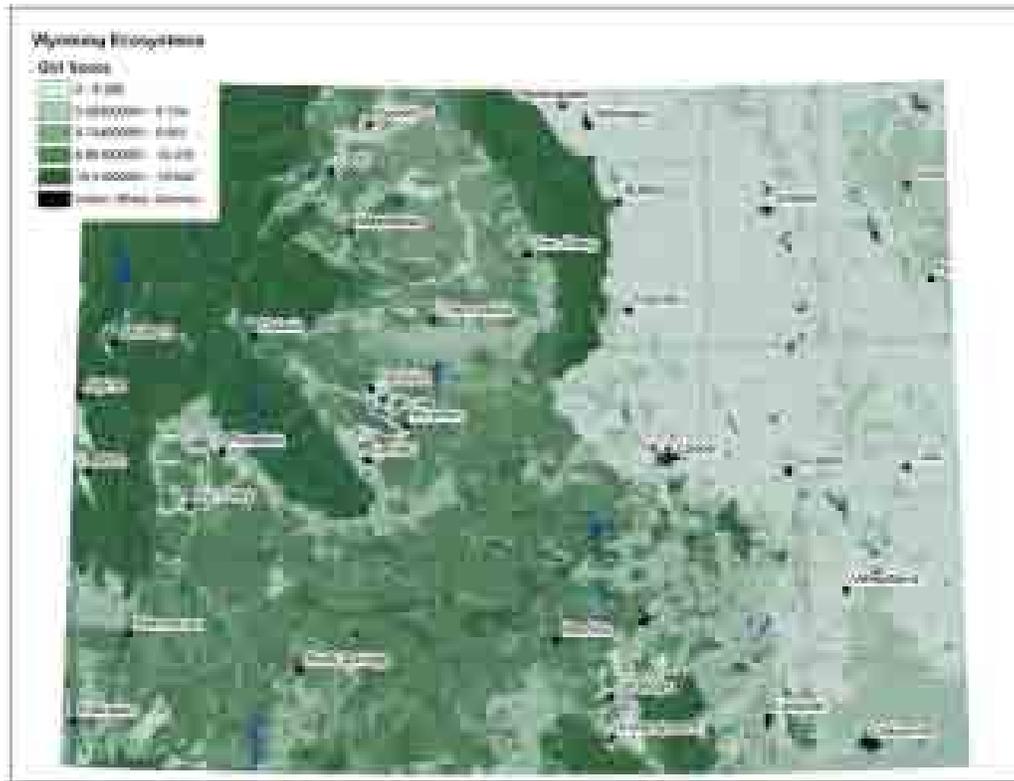
Table 23. Continued

Status Code	Land Management Type
7.5	USFS Special Interest Area USFS Research Natural Area NPS National Recreation Areas State Wildlife Habitat Management Areas Conservation Easements
5	State Parks USFS National Recreation Areas USFS National Forests USFS National Grasslands BLM Lands DOD Military Lands
2.5	Private Lands Native Lands State Trust Lands

Map 4: Habitat Vulnerability



Map 5: QVI Score



Defining the quality of habitats in Wyoming requires examining both land management values (degree of formal protection) with habitat intactness values (degree of habitat integrity). For example, similarly high habitat qualities may be found on private lands and in wilderness areas, but the absence of voluntary formal protection on the private land may identify opportunities to work with landowners to strengthen voluntary protection for their properties. To develop habitat conservation strategies for SGCN in the 21st century, landowners and land managers will need sophisticated tools. Using a raster-based GIS to sum land management values with habitat values (see Section II), the Wyoming Chapter of The Nature Conservancy was able to develop the Habitat Quality-Protection Index (HQPI) for each habitat patch within each of Wyoming's ecoregions. The values for each habitat type were then averaged to indicate the mean HQPI value for each habitat type within each of Wyoming's ecoregions (Map 5). Tables 24 thru 30 indicate the HQPI scores for each habitat type within each ecoregion. Full details of this effort are provided within *Habitat Quality and Vulnerability Assessment of Wyoming's Ecological Systems* (Copeland 2005), which has been included as Appendix IV.

Challenges that affect an ecological system in one ecoregion often affect that same ecological system or closely-related systems in other ecoregions. For example, rural residential development is resulting in habitat fragmentation and loss in many areas of Wyoming, not just in the grasslands and shrub steppe systems of eastern Wyoming. Ongoing conversion from native habitat types is a significant issue for many SGCN. These conversions, especially those that are unsuccessful and those that create monotypic stands of vegetation, may tend to reduce biological diversity and reduce the quality of that habitat for many SGCN. Finally, the invasion of exotic

plants such as cheatgrass is an important problem in at least 12–15 ecological systems in four ecoregions

Some ecological systems are important statewide, however, to reduce redundancy, they are described within the discussion of a single ecoregion. Examples include Aspen, Riparian, Sagebrush Steppe and Shrub Communities.

Each of Wyoming’s seven major ecoregions has important characteristics with respect to habitat quality and protection. For example, as shown in Table 24, the Black Hills ecoregion is dominated by ponderosa pine and northwest Great Plains mixedgrass prairie, ecological systems. They exhibit high habitat quality and low formal protection.

Table 24.

Ecosystems Within the Black Hills Ecoregion (Wyoming)	Acres	Habitat Quality	Protection Status	QPI Score	Quadrant Q-P	Avg. # SGCN Per Patch
Northwestern Great Plains Mixedgrass Prairie	394,245	5.731	2.662	8.393	H-L	0.6
Rocky Mountain Ponderosa Pine Woodland	289,546	5.460	3.513	8.973	H-L	10.5
Rocky Mountain Ponderosa Pine Savanna	240,022	5.330	3.028	8.358	H-L	5.3
Herbaceous Planted/Cultivated	193,997	4.864	2.527	7.391	L-L	0.0
Western Great Plains Riparian/Western Great Plains Floodplain	86,613	4.763	3.125	7.888	L-L	6.4
Western Great Plains Dry Bur Oak Forest and Woodland	5,746	6.298	3.413	9.711	H-L	13.6
Rocky Mountain Lower Montane Foothill Riparian Woodland and Shrubland	4,024	6.288	3.395	9.683	H-L	14.0
Rocky Mountain Aspen Forest and Woodland	1,478	7.101	2.700	9.801	H-L	2.7
Inter-Mountain Basins Big Sagebrush Steppe	592	5.338	2.790	8.128	H-L	3.0
Western Great Plains Badland	24	8.682	2.500	11.182	H-L	4.4

Rocky Mountain Ponderosa Pine Savanna and Ponderosa Pine Woodland are two ecological systems that occupy lower elevations, are readily accessible to human activity, and may be affected by habitat-related threats. Management concerns and conservation actions would tend to emphasize efforts to maintain the distribution and close monitoring of ongoing and proposed land use changes in these systems.

The Central Shortgrass Prairie ecoregion is, like the Black Hills, a fairly small ecoregion in Wyoming, but one that has been significantly converted from native ecological systems to cropland, as shown in Table 25. This ecoregion contains most of Wyoming’s western shortgrass prairie. This ecological system is also high in habitat quality, but is generally low in formal protection.

Urbanization is an important habitat issue in all grassland systems of eastern Wyoming. As an example, residential development is radiating from Cheyenne, causing habitat loss and fragmentation to grasslands in Laramie County. In other states, urbanization and conversion to agriculture significantly impacted the Western Great Plains Shortgrass Prairie ecological system. Although only a small portion of this ecological system occurs in Wyoming, near Cheyenne, the remaining habitats are widely recognized as an example of the system that is of high quality and in excellent condition.

The Rocky Mountain foothills grassland in this ecoregion also is largely intact, but low in formal protection. Residential development is a concern in this ecological system, as are invasive plant species.

Table 25

Ecosystems Within the Central Shortgrass Prairie Ecoregion (Wyoming)	Acres	Habitat Quality	Protection Status	QPI Score	Quadrant Q-P	Avg. # SGCN Per Patch
Herbaceous Planted/Cultivated	703,052	6.251	2.507	8.758	H-L	3.7
Western Great Plains Shortgrass Prairie	500,225	6.095	2.505	8.600	H-L	3.7
Rocky Mountain Foothill Grassland	427,478	5.983	2.550	8.533	H-L	14.6
Rocky Mountain Lower Montane - Foothill Shrubland	51,051	4.581	2.617	7.198	L-L	14.3
Rocky Mountain Lower Montane Foothill Riparian Woodland and Shrubland	33,107	4.848	2.650	7.498	L-L	1.6
Western Great Plains Riparian/Western Great Plains Floodplain	26,114	4.605	2.505	7.110	L-L	2.6
Inter-Mountain Basins Big Sagebrush Steppe	24,580	5.001	2.560	7.561	H-L	0.5
Western Great Plains Cliff and Outcrop	17,426	6.425	2.797	9.222	H-L	7.1
Rocky Mountain Foothill Limber Pine - Juniper Woodland	13,995	6.761	2.620	9.381	H-L	16.7
Inter-Mountain Basins Big Sagebrush Shrubland	9,812	5.652	2.502	8.154	H-L	1.8
Rocky Mountain Gambel Oak - Mixed Montane Shrubland	7,250	6.276	2.688	8.964	H-L	17.5
Rocky Mountain Ponderosa Pine Woodland	3,290	5.335	2.500	7.835	H-L	12.4
Rocky Mountain Ponderosa Pine Savanna	2,405	6.901	2.500	9.401	H-L	0.6
Inter-Mountain Basins Active and Stabilized Dune	1,678	6.401	2.797	9.198	H-L	3.0
Rocky Mountain Lodgepole Pine Forest	1,216	4.511	2.500	7.011	L-L	17.5
Northwestern Great Plains Mixedgrass Prairie	827	5.899	2.525	8.424	H-L	1.4
Western Great Plains Badland	140	5.246	4.010	9.256	H-L	4.5

Wyoming's portion of the Columbia Plateau ecoregion is extremely small. Much of the land within the valley in which it occurs has been subject to habitat conversion, as shown in Table 26.

Table 26.

Ecosystems Within the Columbia Plateau Ecoregion (Wyoming)	Acres	Habitat Quality	Protection Status	QPI Score	Quadrant Q-P	Avg. # SGCN Per Patch
Herbaceous Planted/Cultivated	5,114	4.763	2.685	7.448	L-L	8.9
Rocky Mountain Montane Dry - Mesic Mixed Conifer Forest and Woodland	559	6.550	4.582	11.132	H-L	10.8
Rocky Mountain Aspen Forest and Woodland	169	6.225	3.673	9.898	H-L	10.6
Rocky Mountain Lower Montane Foothill Riparian Woodland and Shrubland	414	4.239	2.635	6.874	L-L	9.8
Inter-Mountain Basins Montane Sagebrush Steppe	89	1.520	2.563	4.083	L-L	10.5

The Northern Great Plains Steppe ecoregion makes up much of northeastern Wyoming. As shown in Table 27, it is dominated by the northwestern Great Plains mixedgrass ecological system. This system is largely intact and low in formal protection. Two major sagebrush systems, the inter-mountain basins big sagebrush steppe and inter-mountain basins big sagebrush shrubland, are also very important in this ecoregion. Both are low in quality and low in formal protection.

Conversion is an important issue in this ecoregion. Conversion of sagebrush steppe and shrubland vegetation has been identified as a cause of decline in sagebrush ecosystems in portions of Wyoming. In addition, vegetative conversions have been historically attempted over larger portions of Wyoming sagebrush landscapes. In some areas of the state, big sagebrush is regularly treated to enhance grass and forb production. Paige and Ritter (1999) found that in the western United States, approximately 10 percent of the native sagebrush steppe has been completely replaced by invasive annuals or seeded to non-native grasses. This figure does not include areas where non-native grasses are now mixed with sagebrush or areas where land managers attempted to control sagebrush.

Resource extraction is also an issue for many systems in this ecoregion. Mineral extraction results in both the direct removal of sagebrush and other shrub steppe communities and physical fragmentation of habitats. These losses are caused by mining, roads, drill pads, fences, power lines, pipelines, etc. Much of the Nation's coal is produced in Wyoming, most of which comes from private lands in the eastern part of the State. However, coal producers have made efforts to restore wildlife habitats on disturbed lands. Natural gas production from coalbed methane and deep natural gas fields is the fastest growing energy development in Wyoming. Coal bed methane gas fields occur predominantly on private land in eastern Wyoming.

Invasive plants may be the biggest threat and most significant conservation issue for some ecological systems in this ecoregion. Cheatgrass in particular, is a weed that is rapidly altering some systems. Other noxious invaders needing control include Canada thistle, leafy spurge, Russian knapweed, spotted knapweed, and saltcedar.

Table 27.

Ecosystems Within the Northern Great Plains Steppe Ecoregion (Wyoming)	Acres	Habitat Quality	Protection Status	QPI Score	Quadrant Q-P	Avg. # SGCN Per Patch
Northwestern Great Plains Mixedgrass Prairie	6,488,667	5.428	2.840	8.268	H-L	15.3
Inter-Mountain Basins Big Sagebrush Steppe	2,752,288	4.885	2.895	7.780	L-L	11.7
Inter-Mountain Basins Big Sagebrush Shrubland	2,410,392	4.714	3.043	7.757	L-L	13.6
Herbaceous Planted/Cultivated	1,664,494	4.349	2.612	6.961	L-L	13.2
Western Great Plains Riparian/Western Great Plains Floodplain	743,289	4.532	2.728	7.260	L-L	8.1
Rocky Mountain Ponderosa Pine Savanna	464,935	6.076	2.930	9.006	H-L	3.8
Inter-Mountain Basins Mixed Salt Desert Scrub	333,302	5.052	3.555	8.607	H-L	7.1
Rocky Mountain Ponderosa Pine Woodland	210,421	5.698	3.070	8.768	H-L	2.6
Inter-Mountain Basins Greasewood Flat	196,760	6.068	3.048	9.116	H-L	8.7
Western Great Plains Cliff and Outcrop	155,435	5.989	2.870	8.859	H-L	0.8
Rocky Mountain Foothill Limber Pine - Juniper Woodland	121,958	5.298	3.395	8.693	H-L	2.5
Rocky Mountain Lower Montane - Foothill Shrubland	81,198	5.468	3.008	8.476	H-L	2.3
Rocky Mountain Lower Montane Foothill Riparian Woodland and Shrubland	73,144	4.184	2.875	7.059	L-L	7.1
Inter-Mountain Basins Shale Badland	36,550	5.411	3.845	9.256	H-L	0.6
Inter-Mountain Basins Active and Stabilized Dune	26,267	3.821	3.152	6.973	L-L	0.9
Rocky Mountain Gambel Oak - Mixed Montane Shrubland	13,345	4.468	4.295	8.763	L-L	0.6
Rocky Mountain Aspen Forest and Woodland	5,340	4.645	3.020	7.665	L-L	2.6.
Inter-Mountain Basins Montane Sagebrush Steppe	3,073	5.394	2.723	8.117	H-L	10.9
Wyoming Basins Low Sagebrush Shrubland	2,826	3.284	2.500	5.784	L-L	9.2
Western Great Plains Badland	2,524	5.279	2.873	8.152	H-L	0.6
Rocky Mountain Foothill Grassland	1,246	4.831	3.273	8.104	L-L	16.3
Western Great Plains Dry Bur Oak Forest and Woodland	1,140	5.986	2.585	8.571	H-L	0.9

Ecosystems Within the Northern Great Plains Steppe Ecoregion (Wyoming) (Cont.)	Acres	Habitat Quality	Protection Status	QPI Score	Quadrant Q-P	Avg. # SGCN Per Patch
Southern Rocky Mountain Montane Grassland	906	7.236	3.668	10.904	H-L	12.4
Rocky Mountain Montane Dry - Mesic Mixed Conifer Forest and Woodland	477	5.827	6.545	12.372	H-H	7.8
Rocky Mountain Lodgepole Pine Forest	34	7.947	3.180	11.127	H-L	6.0
Western Great Plains Shortgrass Prairie	22	4.747	2.500	7.247	L-L	16.3
Rocky Mountain Cliff and Canyon	21	7.394	3.245	10.639	H-L	1.3
Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland	12	5.786	5.000	10.786	H-H	5.0

The Southern Rocky Mountains ecoregion extends into southern Wyoming from Colorado along the Medicine Bow and Laramie Ranges. It is a very diverse area, with 32 ecological systems represented. The largest ecological system in this ecoregion, the Rocky Mountain lodgepole pine forest, is largely intact and low in formal protection. The Rocky Mountain foothill grassland in this ecoregion is low in quality and low in formal protection, as shown in Table 28.

Insect infestations are more likely to cause mortality to trees or to make trees more vulnerable to a secondary infestation from bark beetle when they are experiencing additional stress from drought (Livingston 2000). Blister rust infestations also threaten to eliminate white bark and limber pines throughout the region. Widespread loss of older stands, especially if drought continues, makes conservation of unaffected or lightly-blighted mature/old growth stands a high priority. While some SGCN benefit from habitat created by loss of over mature conifers, others may be negatively affected.

Recreational activity, especially motorized, and the associated human conflict and disturbance, is a concern in this ecoregion (Southern Rockies Ecosystem Project, 2004). Extensive road networks exist across this ecoregion. These roads, and the trails, campgrounds and visitor use facilities which are associated with them, are often located along streams or near open water. As such, they may negatively impact several of the SGCN. Almost 94 percent of the ecoregion is within two miles of a road, and approximately 99 percent is within four miles of a road (USGS 1995). Although, there are many hypotheses, evaluations of potential impacts to wildlife have not kept pace with the need to identify and understand land use trends in these ecological systems and what management actions (if any) should be applied.

Table 28.

Ecosystems Within the Southern Rocky Mountains Ecoregion (Wyoming)	Acres	Habitat Quality	Protection Status	QPI Score	Quadrant Q-P	Avg. # SGCN Per Patch
Rocky Mountain Lodgepole Pine Forest	563,524	6.622	4.993	11.615	H-L	5.2
Rocky Mountain Foothill Grassland	443,894	4.698	2.945	7.643	L-L	16.3
Southern Rocky Mountain Montane Grassland	307,824	5.067	3.320	8.387	H-L	16.1

Ecosystems Within the Southern Rocky Mountains Ecoregion (Wyoming) (Cont.)	Acres	Habitat Quality	Protection Status	QPI Score	Quadrant Q-P	Avg. # SGCN Per Patch
Rocky Mountain Lower Montane - Foothill Shrubland	249,715	5.383	2.788	8.171	H-L	2.9
Inter-Mountain Basins Montane Sagebrush Steppe	248,818	6.219	4.197	10.416	H-L	12.4
Inter-Mountain Basins Big Sagebrush Steppe	187,197	4.791	3.160	7.951	L-L	12.9
Rocky Mountain Ponderosa Pine Woodland	173,194	5.162	3.615	8.777	H-L	2.8
Rocky Mountain Ponderosa Pine Savanna	165,597	5.102	3.275	8.377	H-L	3.7
Rocky Mountain Aspen Forest and Woodland	152,070	6.618	3.942	10.560	H-L	3.8
Rocky Mountain Lower Montane Foothill Riparian Woodland and Shrubland	143,617	4.964	3.287	8.251	L-L	5.8
Rocky Mountain Foothill Limber Pine - Juniper Woodland	127,293	5.281	3.442	8.723	H-L	2.7
Rocky Mountain Montane Dry - Mesic Mixed Conifer Forest and Woodland	122,285	6.266	4.902	11.168	H-L	4.0
Herbaceous Planted/Cultivated	90,747	4.518	2.712	7.230	L-L	13.6
Rocky Mountain Subalpine-Montane Riparian Shrubland	84,677	6.890	5.330	12.220	H-H	4.2
Rocky Mountain Subalpine Dry - Mesic Spruce-Fir Forest and Woodland	73,242	7.260	5.242	12.502	H-H	.57
Inter-Mountain Basins Big Sagebrush Shrubland	68,063	4.975	3.132	8.107	L-L	14.4
Rocky Mountain Subalpine - Montane Riparian Woodland	60,423	7.040	4.950	11.990	H-L	2.8
Rocky Mountain Alpine Bedrock and Scree	17,786	8.398	5.138	13.536	H-H	4.2
Rocky Mountain Gambel Oak - Mixed Montane Shrubland	14,631	5.453	2.970	8.423	H-L	1.6
Rocky Mountain Subalpine Mesic Meadow	14,550	7.512	6.385	13.897	H-H	3.9
Rocky Mountain Cliff and Canyon	11,498	5.990	3.415	9.405	H-L	1.5
Western Great Plains Riparian/Western Great Plains Floodplain	9,266	4.153	2.685	6.838	L-L	10.7
Wyoming Basins Low Sagebrush Shrubland	7,878	5.187	3.918	9.105	H-L	10.6
Northwestern Great Plains Mixedgrass Prairie	4,007	4.904	3.100	8.004	L-L	16.3
Inter-Mountain Basins Mixed Salt Desert Scrub	2,191	7.243	3.728	10.971	H-L	7.6
Inter-Mountain Basins Cliff and Canyon	1,081	4.084	2.777	6.861	L-L	2.0
Western Great Plains Shortgrass Prairie	583	3.757	2.500	6.257	L-L	16.5
Inter-Mountain Basins Shale Badland	487	4.081	2.888	6.969	L-L	1.3

Ecosystems Within the Southern Rocky Mountains Ecoregion (Wyoming) (Cont.)	Acres	Habitat Quality	Protection Status	QPI Score	Quadrant Q-P	Avg. # SGCN Per Patch
Rocky Mountain Subalpine Mesic - Spruce-Fir Forest and Woodland	282	8.093	6.230	14.323	H-H	3.5
Western Great Plains Badland	195	4.363	2.500	6.863	L-L	0.6
Western Great Plains Cliff and Outcrop	175	5.157	2.577	7.734	H-L	1.8
Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland	51	7.136	4.955	12.091	H-L	3.4

The Utah-Wyoming Rocky Mountains ecoregion is a large, extremely diverse area that dominates western Wyoming and makes up much of the Greater Yellowstone Area. As shown in Table 29, this ecoregion is dominated by three ecological systems: the Rocky Mountain Lodgepole Pine Forest, Rocky Mountain Subalpine Mesic Meadow and Inter-Mountain Basins Montane Sagebrush Steppe. All these systems are high in habitat intactness and high in formal protection. Never the less, some specific ecological systems within this ecoregion are experiencing significant impacts from human use.

Fire management is a concern in this and other ecoregions. In forest habitats with historically frequent fire regimes, fire suppression over the past 60 years has resulted in changed forest composition and structure that may lead to more homogeneous stands and a more intense fire regime in the future. Loss of aspen habitat has also resulted from fire suppression.

The Rocky Mountain Aspen Forest and Woodland ecological system is an important component of this and other ecoregions. However, the system is juxtaposed and also serves as a transition into other systems at lower elevations. Aspen enhance diversity in the landscape both as a vegetative component and as a habitat occupied by a rich diversity of wildlife species. However, SGCN birds and mammals that utilize aspen tend to also use adjacent systems and are not considered obligates of aspen. Many of the faunal associates of aspen, however, exhibit higher densities than in adjacent habitats. Higher densities are especially notable when seasonal or successional variations are included in the analysis. In Wyoming, aspen typically occurs in small groves from foothills to the subalpine zone and does not occupy nearly the percentage of the mountainous landscape that it does in adjacent states. In addition, many authors have noted the deteriorating condition and successional decline in acreage of aspen in Wyoming (Knight 1994). Such deterioration and decline is attributed to fire suppression, over utilization by ungulates or a combination of both. All of these factors strongly support the need for conservation actions that interject prescribe fire and careful management of ungulates in the aspen ecological system.

Table 29.

Ecosystems Within the Utah-Wyoming Rocky Mountains Ecoregion (Wyoming)	Acres	Habitat Quality	Protection Status	QPI Score	Quadrant Q-P	Avg. # SGCN Per Patch
Rocky Mountain Lodgepole Pine Forest	3,350,175	7.995	7.732	15.727	H-H	12.5
Rocky Mountain Subalpine Mesic Meadow	1,667,233	7.941	7.640	15.581	H-H	6.0

Ecosystems Within the Utah-Wyoming Rocky Mountains Ecoregion (Wyoming) (Cont.)	Acres	Habitat Quality	Protection Status	QPI Score	Quadrant Q-P	Avg. # SGCN Per Patch
Inter-Mountain Basins Montane Sagebrush Steppe	1,101,247	6.964	5.563	12.527	H-H	11.8
Rocky Mountain Montane Dry - Mesic Mixed Conifer Forest and Woodland	847,081	7.736	6.170	13.906	H-H	10.7
Rocky Mountain Subalpine Dry - Mesic Spruce-Fir Forest and Woodland	716,497	8.067	6.990	15.057	H-H	11.8
Rocky Mountain Alpine Bedrock and Scree	640,649	8.760	8.815	17.575	H-H	6.1
Rocky Mountain Subalpine - Montane Riparian Woodland	512,663	7.760	6.825	14.585	H-H	6.9
Southern Rocky Mountain Montane Grassland	414,578	6.746	4.040	10.786	H-L	11.9
Rocky Mountain Lower Montane Foothill Riparian Woodland and Shrubland	411,215	7.132	6.430	13.562	H-H	10.3
Rocky Mountain Foothill Limber Pine - Juniper Woodland	289,531	6.442	3.790	10.232	H-L	2.7
Rocky Mountain Aspen Forest and Woodland	282,718	6.668	5.252	11.920	H-H	10.1
Rocky Mountain Subalpine-Montane Riparian Shrubland	264,824	7.518	6.140	13.658	H-H	6.7
Northwestern Great Plains Mixedgrass Prairie	235,941	6.999	3.982	10.981	H-L	11.8
Rocky Mountain Cliff and Canyon	233,358	8.398	8.168	16.566	H-H	3.1
Inter-Mountain Basins Big Sagebrush Shrubland	214,242	6.067	4.230	10.297	H-L	12.7
Northern Rocky Mountain Subalpine Dry Parkland	198,631	8.795	8.723	17.518	H-H	3.0
Rocky Mountain Dry Tundra	193,669	8.836	8.793	17.629	H-H	5.5
Herbaceous Planted/Cultivated	153,741	4.367	3.377	7.744	L-L	10.2
Inter-Mountain Basins Big Sagebrush Steppe	129,770	6.076	4.310	10.386	H-L	10.7
Rocky Mountain Ponderosa Pine Savanna	63,250	7.351	4.595	11.946	H-L	2.5
Rocky Mountain Ponderosa Pine Woodland	59,639	7.250	4.525	11.775	H-L	3.4
Inter-Mountain Basins Mountain Mahogany Woodland and Shrubland	38,308	7.023	4.030	11.053	H-L	0.2
Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland	28,132	8.075	6.603	14.678	H-H	9.2
Rocky Mountain Subalpine Mesic - Spruce-Fir Forest and Woodland	26,072	8.677	8.285	16.962	H-H	7.4
Western Great Plains Riparian/Western Great Plains Floodplain	24,249	6.043	4.515	10.558	H-L	7.8
Rocky Mountain Gambel Oak - Mixed Montane Shrubland	19,846	6.517	4.550	11.067	H-L	1.5

Ecosystems Within the Utah-Wyoming Rocky Mountains Ecoregion (Wyoming) (Cont.)	Acres	Habitat Quality	Protection Status	QPI Score	Quadrant Q-P	Avg. # SGCN Per Patch
Inter-Mountain Basins Cliff and Canyon	19,488	6.753	4.875	11.628	H-L	1.9
Inter-Mountain Basins Mixed Salt Desert Scrub	19,319	6.859	4.170	11.029	H-L	7.0
North American Arid West Emergent Marsh	19,248	7.715	9.772	17.487	H-H	3.1
Inter-Mountain Basins Semi-Desert Grassland	8,350	5.613	5.690	11.303	H-H	7.2
North American Alpine Ice Field	6,206	8.645	10.000	18.645	H-H	1.1
Rocky Mountain Lower Montane - Foothill Shrubland	4,604	6.219	4.500	10.719	H-L	1.3
Wyoming Basins Low Sagebrush Shrubland	4,366	4.822	4.720	9.542	L-L	11.3
Geothermal Feature	3,797	5.935	10.000	15.935	H-H	1.5
Western Great Plains Badland	2,327	5.493	6.000	11.493	H-H	1.0
Inter-Mountain Basins Shale Badland	360	8.596	4.960	13.556	H-L	2.4
Rocky Mountain Foothill Grassland	48	5.264	2.500	7.764	H-L	8.0
Western Great Plains Cliff and Outcrop	41	5.161	4.020	9.181	H-L	0.1

The Wyoming Basins ecoregion is Wyoming's largest, making up most of southwestern and central Wyoming. As shown in Table 30, this area is dominated by, the Inter-Mountain Basins, Big Sagebrush, Shrubland Inter-Mountain Basins, and Big Sagebrush Steppe ecological systems, along with the Inter-Mountain Basins, Mixed Salt, Desert Scrub ecological systems. All these ecological systems are largely intact and low in formal protection.

Large areas of Wyoming's sagebrush communities in this ecoregion and others are in declining condition as a result of some management strategies and lack of natural, regularly occurring perturbations. Degradation of these big sagebrush communities is taking place at an alarming rate that has been exacerbated by the prolonged drought impacting much of Wyoming since the early 1980s. In Wyoming, a significant number of sagebrush communities are in late successional stages dominated by older age plants (greater than 50 years old) that are often relatively even-aged (i.e. sagebrush monocultures) and with reduced plant species quantity and diversity. In the *WGFD 2003 Strategic Habitat Annual Report*, big sagebrush communities were often reported in advanced seral stages with poor understory, diversity and plant cover. Recorded sagebrush browse use in several areas has exceeded use index thresholds seven of the past 10 years. During that same time period, there were declines in sagebrush vigor, seed production and carrying capacity, and increases in plant mortality. There has been a downward trend in big sagebrush production since 1993.

Rocky Mountain Foothill Limber Pine – Juniper Woodland is an ecological system that is viewed by resource managers as a system that should be treated to reduce the dominance of juniper. It is often believed that dominance of juniper pushes a landscape towards a more xeric condition reducing the understory of more favorable herbaceous vegetation to a sparse component of the system. However, in southwestern Wyoming, this system provides essential habitat for five species of birds and three mammals with breeding populations limited to this

relatively small area. Conservation actions are primarily limited to keeping resource managers informed of the location and value of this ecological system so that it is not unknowingly included in prescribed treatment projects or automatically excluded from fire suppression plans without adequate consideration for its values. Certainly more information could be obtained for management of this system to allow for a mix of habitat conditions that do not favor one juniper obligate species over others. From an academic standpoint, this area lends itself to studying the dynamics of populations at the periphery of their range.

Resource extraction is also a concern in this and other ecoregions. Prominent deep natural gas fields are located in south-central and southwest Wyoming, primarily on public lands. In Wyoming, natural gas production has increased and further increases in production are projected for the foreseeable decades. Resource extraction in sagebrush communities results in direct removal of native vegetation and fragmentation of habitat by road building, well pad drilling, power line construction, buried pipelines, booster stations and facility building, etc. Habitat fragmentation and loss also occur indirectly through increased traffic, services and noise resulting from the development.

Table 30.

Ecosystems Within the Wyoming Basins Ecoregion (Wyoming)	Acres	Habitat Quality	Protection Status	QPI Score	Quadrant Q-P	Avg. # SGCN Per Patch
Inter-Mountain Basins Big Sagebrush Shrubland	13,011,919	5.715	4.155	9.870	H-L	13.9
Inter-Mountain Basins Mixed Salt Desert Scrub	3,866,186	5.447	4.303	9.750	H-L	7.7
Inter-Mountain Basins Big Sagebrush Steppe	1,810,489	5.747	3.782	9.529	H-L	12.4
Herbaceous Planted/Cultivated	1,618,303	4.736	2.742	7.478	L-L	9.8
Inter-Mountain Basins Montane Sagebrush Steppe	1,341,759	5.852	3.882	9.734	H-L	12.7
Rocky Mountain Foothill Limber Pine - Juniper Woodland	1,189,038	5.728	3.837	9.565	H-L	3.7
Northwestern Great Plains Mixedgrass Prairie	964,640	6.286	3.070	9.356	H-L	12.8
Rocky Mountain Lower Montane Foothill Riparian Woodland and Shrubland	738,319	5.479	3.342	8.821	H-L	9.6
Inter-Mountain Basins Greasewood Flat	644,227	6.411	4.123	10.534	H-L	10.3
Southern Rocky Mountain Montane Grassland	497,762	6.493	3.205	9.698	H-L	15.8
Inter-Mountain Basins Cliff and Canyon	445,526	6.287	4.295	10.582	H-L	1.6
Western Great Plains Riparian/Western Great Plains Floodplain	215,032	4.339	3.322	7.661	L-L	8.9
Inter-Mountain Basins Active and Stabilized Dune	157,664	6.880	4.317	11.197	H-L	0.7
Rocky Mountain Aspen Forest and Woodland	119,170	5.808	3.658	9.466	H-L	6.6
Inter-Mountain Basins Shale Badland	104,489	5.589	3.950	9.539	H-L	0.8

Ecosystems Within the Wyoming Basins Ecoregion (Wyoming) (Cont.)	Acres	Habitat Quality	Protection Status	QPI Score	Quadrant Q-P	Avg. # SGCN Per Patch
Wyoming Basins Low Sagebrush Shrubland	102,428	6.071	4.072	10.143	H-L	11.4
Rocky Mountain Lodgepole Pine Forest	95,840	6.694	4.648	11.342	H-L	9.4
Western Great Plains Badland	46,664	5.431	3.560	8.991	H-L	0.9
Rocky Mountain Montane Dry - Mesic Mixed Conifer Forest and Woodland	43,848	6.541	4.135	10.676	H-L	10.0
Rocky Mountain Lower Montane - Foothill Shrubland	43,620	5.348	3.393	8.741	H-L	2.0
Rocky Mountain Subalpine-Montane Riparian Shrubland	33,813	6.985	3.350	10.335	H-L	5.2
Inter-Mountain Basins Playa	30,285	7.511	3.992	11.503	H-L	0.5
Rocky Mountain Subalpine - Montane Riparian Woodland	19,925	5.982	4.322	10.304	H-L	4.6
Rocky Mountain Subalpine Dry - Mesic Spruce-Fir Forest and Woodland	12,703	8.782	4.577	13.359	H-L	12.0
Rocky Mountain Ponderosa Pine Savanna	10,784	4.603	3.982	8.585	L-L	1.0
North American Arid West Emergent Marsh	7,838	4.653	4.075	8.728	L-L	2.9
Rocky Mountain Gambel Oak - Mixed Montane Shrubland	4,724	6.596	3.978	10.574	H-L	2.1
Rocky Mountain Ponderosa Pine Woodland	2,643	4.583	3.703	8.286	L-L	1.5
Rocky Mountain Subalpine Mesic - Spruce-Fir Forest and Woodland	664	9.129	4.333	13.462	H-L	7.8
Rocky Mountain Subalpine Mesic Meadow	604	7.728	4.203	11.931	H-L	6.9
Northern Rocky Mountain Subalpine Dry Parkland	410	9.620	4.220	13.840	H-L	3.7
Rocky Mountain Alpine Bedrock and Scree	397	8.324	9.223	17.547	H-H	6.5
Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland	395	6.898	4.135	11.033	H-L	6.4
Rocky Mountain Foothill Grassland	199	3.342	2.565	5.907	L-L	15.0
Rocky Mountain Cliff and Canyon	13	9.121	5.905	15.026	H-H	3.1

One final consideration in assessing the threats and conditions of terrestrial wildlife habitat in Wyoming must be that of riparian and wetland systems. Wyoming is an arid state, and these wetland systems make up the circulatory system that keeps all the above systems intact and functioning. Riparian and wetland systems are complex, and a summary of issues and conservation needs in this document runs the risk of over simplification. Classification, assessment and evaluations of these systems can be detailed and relatively complex (Adamus 2004). Comer et al (2003) identifies four ecological systems in Wyoming classified as riparian, and two are considered wetland systems. Although open water is mapped and an essential component of these systems, it has not been described as an ecological system. These systems

are very different, but all have common ecological denominators that warrant their consideration and presentation as a group:

1. These systems are strongly influenced or driven by the presence of subsurface and/or surface water;
2. Most are under private control and many were developed for commercial applications where wildlife benefits are incidental;
3. They are highly susceptible and impacted (either negatively or positively) by human use of associated water and adjacent landscapes;
4. These systems quickly respond to reclamation projects if project sites have not deteriorated to the extent that water is no longer a significant or influential component; and
5. Riparian and wetland systems are essential to more wildlife species (including birds, mammals, amphibians and mollusks) in Wyoming than any of the other groupings of ecological systems.

Many authors have noted the importance of wetland and riparian systems. As an example, McKinstry et al. (2004) noted that these systems in the Intermountain West comprise less than 2 percent of the surface area in Wyoming, Nevada and Montana. More than 80 percent of the wildlife species in those states, however, depend on these systems. Yet, Ehrhart and Hansen (2004) point out that recognizing the importance of these systems was a long time in coming. Even as late as the 1970s, these systems were among the most neglected and poorly understood. Currently, most state and federal agencies and many private landowners have institutionalized conservation actions that benefit these systems. Although there are over 91 species of breeding birds and 25 species of mammals strongly dependent on these systems in Wyoming, 28 SGCN birds and 20 mammals are especially dependent on them.

While water development in Wyoming has had differing effects on different species, in general, SGCN have been affected by changes in aquatic systems. Increasing human populations have significantly altered these systems in Wyoming. Permanent flows have been replaced with discontinued flows in some areas. While some species have benefited, the intensity of human activity on these systems continues today. Ehrhart and Hansen (2004) summarized management concerns for five categories: 1) timber harvesting; 2) water development; 3) livestock grazing; 4) mining; and 5) recreation. Other categories can also be added: habitat conversion, suppression or removal of natural disturbances (especially the stabilization of water flows), and noxious and invasive plants. Management concerns and recommended conservation actions have been detailed in McKinstry et al. (2004), along with a rather exhaustive reference list. Rather than attempting to summarize and repeat this effort, only priority conservation actions for these systems are presented.

Aquatic systems and the taxa that depend on them face a number of significant challenges to native fishes, amphibians, mollusks, and crustaceans. Habitat alteration and degradation may be the biggest threat to native fish. The rivers and streams of the West have been altered since European settlement. Historically, the channels of the mainstem rivers of the Great Plains were shifting, braided, and turbid. Timber was scarce with the exception of a few scattered groves and timber stands on large islands. By the late 1800s, flow regimes had been drastically modified because of ditching, irrigation, and reservoir construction, which reduced inputs from snowmelt runoff. Rivers became more sinuous and less braided. By the 1860s, most mainstem channels had been narrowed in width by 15 percent (Fausch and Bestgen 1997).

Transitional streams between the Rocky Mountains and the mainstem rivers of the Great Plains have also been altered since settlement. Some transitional streams were subject to periods of intermittency although base flows were typically more stable and flood peaks were typically lower than today. Many transitional streams have been subject to siltation and increased fertility (Fausch and Bestgen 1997). On the other hand, some of Wyoming's SGCN, such as certain shorebirds and amphibians, have benefited from the effects of irrigation return flows.

Historically, the major rivers of the Great Basin had greatly variable flows fed by precipitation and snowmelt. Flow regimes were highly variable. Flows were high in the spring, providing proper spawning conditions and backwater nursery areas for warm-water, big river fishes. Turbidity was often high. Strong currents scoured rocks, cleaning them of silty deposits and providing habitat for invertebrate life. With the construction of reservoirs to provide water for human uses and to supply hydroelectric power to the West, flow regimes were modified significantly. While some SGCN have benefited from these modifications (ex. colonial nesting waterbirds), other SGCN have been negatively impacted.

Native fish and other aquatic organisms often require free flowing rivers. The construction of dams has probably had detrimental effects on native aquatic species in Wyoming. Dams have resulted in stabilized flow and altered temperature regimes. Alterations in flow and temperature have modified spawning habitat and altered spawning conditions. Dams also prevent upstream migration of spawning fish (Carlson 1982). The hypolimnetic (cold-water) discharge from the deeper portions of reservoirs is a leading contributor to the decline of warm-water, big river fish in the Colorado River drainage (Clarkson and Childs 2000). Cold temperatures inhibit gonadal maturity, spawning, and embryo development. Many native stream fish spawn in warm tributary streams. After hatching, the fry enter the drift and migrate to mainstem channels. Fry entering a mainstem river with hypolimnetic discharge often experience cold shock. Cold shock may immobilize fry for up to 90 minutes making them susceptible to heavy predation and physical damage. Growth rates and swimming performance of fish reared in cold-water discharges are often greatly reduced (Clarkson and Childs 2000).

Disruptions of permanent flow and increased siltation also have major impacts on warm-water stream fish. Discontinued flow is a problem for native stream fish in many prairie streams. Discontinued flow reduces habitat and exposes fish to desiccation, stagnation, and predation. Disruption of flow is a common occurrence on plains streams, but becomes more severe as flow regimes are altered (Fausch and Bestgen 1997). Flow disruptions may cause stagnation and

result in low oxygen levels and temperature fluctuations. Pools created during periods of intermittency often warm to temperatures above the upper lethal limit for many stream fish.

Little information is available about flow augmentation from unnatural sources such as coal bed methane wells. This type of flow augmentation may have the potential to disrupt spawning cues, change water quality and possibly favor exotic species over native species.

Migratory barriers may fragment populations and stop re-colonization from source populations or to suitable areas where a species has been extirpated. Discontinued flows may also fragment populations and species assemblages.

Siltation is a limiting factor for some fishes. Forty-six percent of the streams within the United States have become silted from erosion (Berkman and Rabeni 1987). Siltation is particularly limiting for riffle dwelling fish and for benthic insectivores. As siltation of riffle habitats increase, community dominance changes from riffle dwelling fish to ubiquitous or run specific species. If heavy siltation occurs, riffles support fish communities more typical of runs or pools (Berkman and Rabeni 1987).

Some land management practices and stream bank alterations from road improvements and streamside development can lead to increased siltation and turbidity, especially when stream channels are altered or riparian vegetation is removed. Grazing by herbivores may degrade aquatic and riparian habitat by increasing bank erosion, destroying riparian vegetation, and degrading the water quality (Myers and Swanson 1995). Nutrient loading also threaten native stream fish (Fausch and Bestgen 1997). Increased aquatic fertility may result in changes in aquatic plant and animal communities.

Populations of fish and other aquatic organisms may be adversely affected by human activities. Culverts, for example, typically create uniform stream bottoms and contribute to siltation (Slawski and Ehlinger 1998). The use of culverts, diversions, and reservoirs to control water flow can alter stream fish communities by disrupting natural flow and temperature regimes and by destroying riffle/pool complexes.

Catastrophic events such as fire and floods may alter habitats in the short term. For example, during the summer of 2002, the Reese Fire burned about 22,000 acres in the Laramie River watershed. This fire was fought using fire retardant dropped from airplanes. About a month after the fire, a heavy rainstorm caused a flash flood in Duck Creek and the Laramie River. Most of the fishes in Duck Creek and the Laramie River for about 20 miles downstream of Duck Creek, were lost during the flood event. The Wyoming hornyhead chub population was affected, but not eliminated, because chubs are also found in the Laramie River upstream of Duck Creek and also in the North Laramie River. In some cases involving severely fragmented habitats, these short-term alterations can permanently deplete fish populations.

Several fish species, both introduced and native, are expanding in Wyoming (Weitzel 2002a-d). These species are often generalists and may cause serious competition and predation threats to rare fish species. Such changes in fish communities often indicate changes in habitat suitability and a decline in the overall health of the system. In the Missouri River drainage,

several native fish are expanding in range. These include the red shiner, sand shiner, fathead minnow, brassy minnow, plains killifish, and johnny darter. In western Wyoming, native Utah suckers, Utah chubs, redbase shiners, speckled dace and several introduced species are expanding in range. The effect of these range expansions is unknown, and the correlations between such range expansion and habitat health has not been studied.

The introduction and expansion of non-native fish has probably resulted in reduced native populations throughout North America. Pleistocene glaciations created innumerable lakes and streams on the North American continent. Many of these waters were originally devoid of top end predatory fish. The introduction and expansion of piscivorous game fish over the last 100 years has detrimentally affected cyprinid (minnow) populations, particularly in the eastern United States (Whittier 1997). Introduced species may also hybridize with native species (Hubert 1994). The introduction or expansion of non-native species may suppress native fish populations through competition, hybridization, and predation (Berkman and Rabeni 1987).

Introduced fish may also carry parasites that may infect native fish. Introduced copepods and trematodes have been linked to native fish declines in the Colorado River drainage (Robinson 1998). Mitchum (1995) studied the parasites of fishes in Wyoming and recommends that introduced fish should be closely checked for parasites before importation is undertaken.

The exotic carp, many species of trout and some warm water fish were all introduced before Wyoming statehood in 1890 and the formation of the WGFD. By 1881, all readily accessible streams and lakes in southeast Wyoming were stocked with non-native trout and some ponds and lakes were planted with non-native bass and sunfish (Simon 1946). Simon (1946) lists 18 introduced species and reports additional species may have been introduced, but accurate data were not available. Hubert (1994) lists 30 introduced fish species in Wyoming. Baxter and Stone (1995) list 27 introduced species, plus 13 provisional species that may have been introduced, but probably were unsuccessful. At least 19 of the introduced species were sport fish introductions. At least 3 species may have been released from aquariums that were ornamental fish. At least 4 species were intentionally introduced as forage species. Grass carp and mosquito fish were introduced to control vegetation and pests, respectively.

Some species were probably illegally introduced by bait fishermen and carp was an exotic introduced for food. Splake and tiger muskies are sterile hybrids that were intentionally introduced by the WGFD to control specific target species and as sport fishes.

Over 10 percent of Wyoming's native fish species have been introduced outside of their native range (Hubert 1994). In western Wyoming, redbase shiners and Utah chubs have been introduced outside of their native ranges into the Green River drainage. Redbase shiners are known to compete with trout and eat the eggs and fry of trout, suckers, and grayling (Carlander 1969, Baxter and Stone 1995).

Several species native to the Missouri River drainage have become established in the Green and Little Snake River drainages. These species include the Iowa darter, creek chub, lake chub, fathead minnow, and white sucker. White sucker introductions have negatively impacted sensitive flannelmouth sucker and bluehead sucker populations in that drainage. White suckers

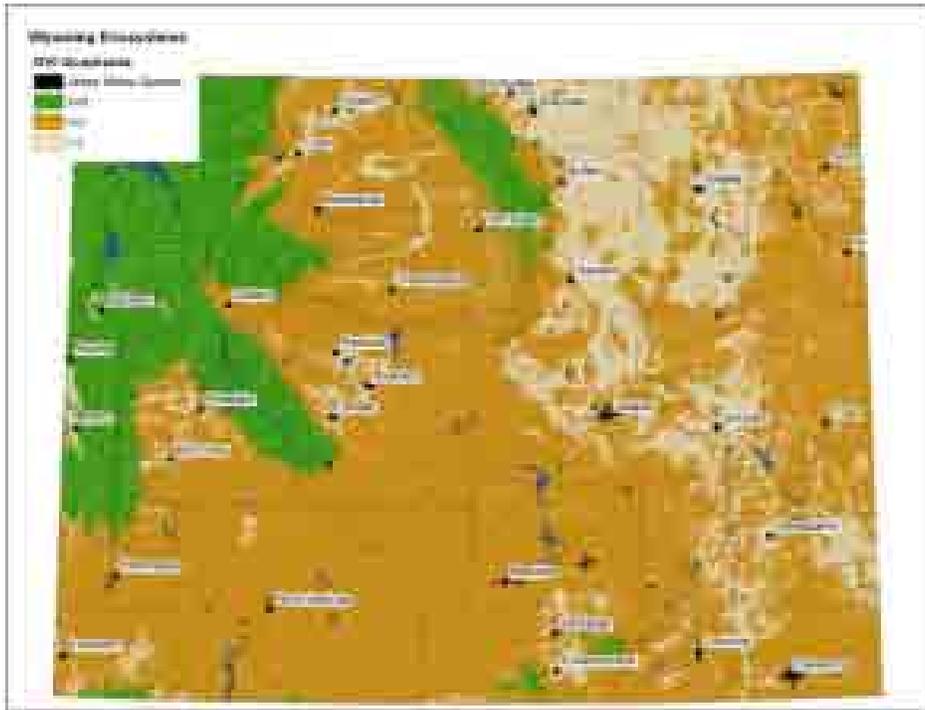
compete with bluehead and flannelmouth suckers for habitat and food (Wheeler 1997). White suckers hybridize with bluehead and flannelmouth suckers and dilute the genetic integrity of native sucker populations (Baxter and Stone 1995).

CONCLUSION

In total, the ecoregions and associated ecological systems make up the habitat mosaic for SGCN in Wyoming. To most effectively assess the overall potential for addressing habitat problems/threats in Wyoming, WGFD has developed a concurrent assessment of habitat quality, habitat protection and geospatial orientation. To do so, the average habitat quality protection index (HQPI) scores were divided into three categories: High Quality – High Protection (H-H), High Quality – Low Protection (H – L), and Low Quality – Low Protection (L – L). (Map 6). When combined with acreage figures and estimates on the number of SGCN that occupy each of those habitats within each of these ecoregions, the HQPI can serve as a valuable tool to help consider problems and threats to SGCN and their habitats in various parts of Wyoming.

Using these QVI quadrants, it is apparent that many high quality habitats in Wyoming are also formally protected to a high degree. The Greater Yellowstone Area in northwestern Wyoming, extending south through the Wind River and Wyoming Ranges, is an excellent example of high quality habitat with high levels of protection in place. Of greater concern to managers might be those lands in central and eastern Wyoming that exhibit high levels of habitat quality, but low levels of formal protection. These are a mixture of public and private lands. The Bureau of Land Management administers most of the public lands in these areas. On these lands, especially, this identifies a clear opportunity for cooperation in managing key habitats for SGCN.

Map 6



On private lands, a similar opportunity exists. Clearly, each of the many private landowners manages his/her lands according to their own plans. Most are excellent stewards of the land. Indeed, it seems questionable to refer to these lands as being low in protection. This term was chosen not because they are not protected, but because less formal regulatory or statutory protection exists. Private lands in Wyoming offer unprecedented opportunities for private landowners and wildlife managers to work together to benefit both SGCN and the private landowner.

SECTION IV

CONSERVATION ACTIONS

As indicated within Congressional guidelines, each state CWCS must include a discussion of conservation actions for their SGCN. Specifically, Element #4 states, the strategy must provide, “Descriptions of conservation actions determined to be necessary to conserve the identified species and habitats and priorities for implementing such actions”.

Within Wyoming’s CWCS, species specific conservation actions are detailed within the individual species accounts (Appendix II) and have been summarized within Tables 31 thru 37 at the end of this section. However, as the species accounts are based upon individual species, significant issues and findings are not made readily apparent unless viewed in a broader context. As such, this section will be devoted to identifying these issues and describing how they will be addressed and/or incorporated within Wyoming’s CWCS. Conservation actions proposed are significantly more detailed for taxa such as birds, mammals and fish. Because of the absence of data on other taxa, such as reptiles, amphibians, mollusks and crustaceans, the conservation actions are less specific. Ongoing efforts to collect additional information on these taxa will aid in developing more specific conservation actions.

COLLECTION OF BASELINE INFORMATION

For nearly 85 percent of Wyoming’s SGCN, a lack of information has been identified as a principal problem. Little, if any, research exists to confirm their abundance and distribution within Wyoming’s borders. A review of the species accounts indicates information needs can be divided into six distinct categories:

1. Distribution Information – the geographic range of the individual species needs to be better defined;
2. Genetic Information – questions related to taxonomy and genetic purity need to be answered to guide effective management strategies;
3. Habitat Information – habitat parameters need to be better defined and/or suitable habitats need to be identified;
4. Biological/Life History Information – basic information about the species and its life cycle are needed;
5. Population Information – data related to the status of local and statewide populations are needed to guide effective management strategies; and
6. Movement/Migration Information – data related to the migration of individual species needs to be mapped.

Table 38 summarizes the information needs by taxa.

Table 38

Number of Species Requiring Baseline Information by Information Type and Taxa						
	Distribution	Genetic	Habitat	Biological	Population	Movement
Mammals	47	-	50	1	50	1
Birds	14	-	19	-	43	-
Reptiles	26	-	26	26	26	-
Amphibians	10	-	10	8	6	-
Fishes	32	10	25	16	32	7
Crustaceans	19	-	19	16	19	-
Mollusks	64	9	59	-	68	-

For some taxa – such as birds, bats, bivalves, amphibians, and some fishes – strategies to collect this information have been developed and are being implemented by WGFD personnel and various partners. For other taxa (i.e. gastropods, terrestrial reptiles, and crustaceans) data collection strategies must be developed. Regardless of the current state of data collection planning by the WGFD, the participation of partners (i.e. academics, government agencies, and volunteers) will be an absolute necessity if this information is to be collected in a timely manner. During the coming years, WGFD personnel will coordinate with partners to determine what additional information may currently exist, develop a mutual strategy to prioritize and collect this baseline data, and facilitate, to the extent possible, the collection and sharing of information among partners.

CONSERVATION ACTIONS FOR SPECIFIC TERRESTRIAL HABITATS

Within Wyoming’s terrestrial habitats, it is possible to aggregate specific ecological systems into commonly-recognized groups. Generally speaking, these groups contain ecological systems that are similar in their floral and faunal composition, occur in close geographic proximity to each other, and are affected by similar issues or circumstances. Currently recognized groups include Grasslands, Sagebrush and Shrubland Systems, Montane and Boreal Forests and Woodlands, Rocky Mountain Aspen Forests and Woodlands, Rocky Mountain Ponderosa Pine Savannas and Woodlands, Rocky Mountain Foothill Limber Pine and Juniper Woodlands, and Riparian and Wetland Systems.

For many of these systems, conservation plans either currently exist or are being developed. For others, the need is recognized, but work has been precluded by higher priority efforts. The following summaries are meant to provide a general overview of the specific ecological systems included within each group, identify the SGCN which are known to occur within those groups, and describe generalized conservation actions meant to conserve the habitats and their associated species.

Grasslands

This discussion of conservation actions applies to the following ecological systems:

1. Central Mixedgrass Prairie;
2. Inter-Mountain Basins Semi-Desert Grassland;
3. Northwestern Great Plains Mixedgrass Prairie;
4. Rocky Mountain Foothill Grassland;
5. Southern Rocky Mountain Montane Grassland; and
6. Western Great Plains Shortgrass Prairie.

Wyoming's grasslands are utilized by the following SGCN:

Swift Fox	Prairie Vole	McCown's Longspur
Black-tailed Prairie Dog	Ferruginous Hawk	Mountain Plover
Upland Sandpiper	Long-billed Curlew	Bobolink
Black-footed Ferret	White-tailed Prairie Dog	Dickcissel
Hispid Pocket Mouse	Plains Pocket Gopher	Grasshopper Sparrow
Olive-backed Pocket Mouse	Burrowing Owl	Short-eared Owl
Plains harvest Mouse	Chestnut-collared Longspur	Plains Pocket Mouse
Lark Bunting		

Proposed conservation actions include working with various incentive programs for private landowners and cooperative programs with FWS, BLM, and USFS to accomplish the following:

1. Increase grassland heterogeneity by:
 - a. Introducing fire back into grassland systems via a patch burning plan;
 - b. Encouraging grazing strategies that also favor habitats for native vegetation and sensitive wildlife species; and
 - c. Introducing habitat disturbance via mechanical treatments
2. Develop cooperative agreements with willing landowners to prevent habitat fragmentation and conversion in those grassland habitats that are integral for maintaining grassland habitat diversity and grassland obligate wildlife species. This action is especially important for the Western Great Plains Shortgrass Prairie Ecological System;
3. Continue cooperative efforts to control noxious and invasive plants, especially cheatgrass, in the Thunder Basin National Grasslands region and the rest of eastern Wyoming;
4. Reseed native grasses and forbs;
5. Develop grass bank management agreements to provide relief to sensitive grassland communities. This may include, but is not limited to, assisting livestock operators with moving grazing to other areas during times when private

lands habitat improvement projects are being implemented, and/or from areas affected by wildfires, droughts or other natural events, to enhance grassland habitat recovery;

6. Where possible, implement mitigation measures and/or best management practices detailed within the WGFC's document, *Recommendations for development of oil and gas resources within crucial and important wildlife habitats*. (2004);
7. Where possible, implement recommendations found within the WGFD's *Draft Plan for Species of Greatest Conservation Need in Grasslands of Eastern Wyoming* (In Prep); and
8. Review management actions proposed by state and federal agencies involving grassland systems, and work closely with the Wyoming governor's office, industry, private land owners, and agency staff during early stages of project planning. Encourage land managers to undertake landscape level planning to maintain or enhance grassland communities.

More detail on specific management concerns and proposed conservation actions can be found within the following documents:

- WGFD's *Draft Plan for Species of Greatest Conservation Need in Grasslands of Eastern Wyoming*. In prep. WGFD, Cheyenne.
- Brennan, L.A., W.P. Kuvlesky. 2005. North American Grassland Birds: An Unfolding Conservation Crisis? *Journal of Wildlife Management* 69(1): 1-13.

Sagebrush and Shrubland Systems

Wyoming has nine ecological systems that are dominated or characterized by shrubs. These include:

1. Inter-Mountain Basins Big Sagebrush Shrubland;
2. Inter-Mountain Basins Big Sagebrush Steppe;
3. Inter-Mountain Basins Montane Sagebrush Steppe;
4. Inter-Mountain Basins Mountain Mahogany Woodland and Shrubland;
5. Rocky Mountain Gambel Oak-Mixed Montane Shrubland;
6. Rocky Mountain Lower Montane-Foothill Shrubland;
7. Rocky Mountain Lower Montane Riparian Woodland and Shrubland;
8. Rocky Mountain Subalpine-Montane Riparian Shrubland; and
9. Wyoming Basins Low Sagebrush Shrubland.

Wyoming's sagebrush and shrubland systems are utilized by the following bird and mammal SGCN:

Greater Sage-grouse
C. Sharp-tailed Grouse
Ferruginous Hawk
Mountain Plover
Long-billed Curlew
Sage Thrasher
Brewer's Sparrow

Sage Sparrow
Pygmy Rabbit
Spotted Ground Squirrel
White-tailed Prairie Dog
Swift Fox
Spotted Bat

Idaho Pocket Gopher
Plains Pocket Gopher
Olive-backed Pocket Mouse
Great Basin Pocket Mouse
Sagebrush Vole
Wyoming Ground Squirrel

Proposed conservation actions include working on various incentive programs with private landowners, and cooperative programs with the FWS, BLM and USFS to implement the following actions:

1. Where possible, implement recommendations presented in recent planning documents (see below);
2. Encourage livestock grazing and sagebrush management practices to improve decadent sagebrush communities that lack sagebrush vigor and understory forb and grass diversity and productivity;
3. Establish cooperative agreements with willing landowners to maintain habitat intactness and preserve the sagebrush habitat that is integral for maintaining sagebrush habitat diversity and sagebrush obligate wildlife species;
4. Develop grass bank or forage reserve management agreements to provide management opportunities for sensitive big sagebrush communities. This may include, but is not limited to, assisting livestock operators with moving grazing to other areas during times when private lands habitat improvement projects are being implemented, and/or from areas affected by wildfires, droughts or other natural events, to enhance sagebrush habitat recovery;
5. Initiate or continue cooperative efforts to control noxious and invasive plants in sagebrush communities on priority areas in Wyoming; and
6. Review management actions proposed by state and federal agencies involving shrub systems, and work closely with the Wyoming governor's office, industry, private land owners, and agency staff during early stages of project planning. Encourage land managers to undertake landscape level planning to maintain or enhance shrub communities.

More detail on specific management concerns and proposed conservation actions can be found within the following documents:

- Connelly, J.W., M.A. Schroeder, A.R. Sands, and C.E. Braun. 2000. Guidelines for management of sage grouse populations and habitats. *Wildlife Society Bulletin* 28(4): 967-985.

- Wyoming Interagency Vegetation Committee. 2002. Wyoming guidelines for managing sagebrush communities with an emphasis on fire management. Wyoming BLM State Office, Cheyenne WY. 54p.
- Wyoming Game and Fish Commission. 2003. Wyoming Greater Sage-grouse Plan. Wyoming Game and Fish Dept., Cheyenne, WY 97p.
- Bohne, J.R., T. Rinkes, and S. Kilpatrick. In press. Sage-grouse habitat management and manipulation guidelines for Wyoming. Wyoming Game and Fish Dept., Cheyenne WY.
- Monsen, Stephen B., Richard S. Stevens, and Nancy L. Shaw (compilers). 2004. Restoring western ranges and wildlands. Gen. Tech. Report RMRS-GTR-136-vol.1. Ft. Collins, CO: U.S. Dept. of Agriculture, Forest Service, Rocky Mountain Experiment Station. 294 p. plus index.

Forest and Woodland Ecological Systems (Montane /Boreal)

Eight specific habitat types are included with the montane/boreal forest and woodland systems. These include:

1. Northern Rocky Mountain Subalpine Dry Parkland;
2. Rocky Mountain Aspen Forest and Woodland (>7,000 ft);
3. Rocky Mountain Lodgepole Pine Forest;
4. Rocky Mountain Montane Dry-Mesic Conifer Forest;
5. Rocky Mountain Montane Mesic Mixed Conifer;
6. Rocky Mountain Subalpine Dry-Mesic Spruce Fir;
7. Rocky Mountain Subalpine Mesic-Spruce-Fir Forest; and
8. Rocky Mountain Subalpine Montane Riparian Woodland

Six other associated ecological systems are important to this complex but are often too small to map. However, the interwoven mosaic of these systems contributes significantly to the species diversity and uniqueness of this Montane/Boreal Complex. These additional systems include:

1. Open Water;
2. Northern Rocky Mountain Subalpine Dry Parkland;
3. Rocky Mountain Subalpine Mesic Meadow;
4. Northern Rocky Mountain Conifer Swamp;
5. Rocky Mountain Subalpine-Montane Riparian Shrub; and
6. Rocky Mountain Alpine – Montane Wet Meadow.

Wyoming's Montane/Boreal Forest and Woodland systems are utilized by the following bird and mammal SGCN:

Common Loon	American Three-toed Woodpecker	Wolverine
Trumpeter Swan	Black-backed Woodpecker	Canada Lynx
Barrow's Goldeneye	Water Shrew	Moose
Harlequin Duck	Northern Flying Squirrel	Northern Goshawk
Northern Pygmy Owl	Water Vole	Great Gray Owl
Marten	Grizzly Bear	Boreal Owl
Fisher		

Implementation of the following proposed conservation actions will require working closely with federal land management agencies that manage most of the montane/boreal forested habitats in Wyoming, and with interested publics who hunt, fish, hold leases or permits, and recreate on these public lands. Specifically, conservation of these habitats will involve:

1. Review management actions proposed by state and federal agencies involving forest and woodland systems, and work closely with the Wyoming governor's office, industry, private land owners, and agency staff during early stages of project planning. Encourage land managers to undertake landscape level planning to maintain or enhance forest and woodland communities;
2. Use the parameters in the Canada Lynx Conservation Assessment and Strategy (LCAS) to ensure that proposed treatments in forest habitat will not exceed thresholds within defined Lynx Analysis Units based on the best quality habitat data available. Work with the Lynx Biology Team to update management recommendations/guidelines as new information becomes available and to clarify understanding of how recommendations are applied. Work with the partners to continue to conduct lynx surveys in suitable habitat;
3. Encourage cooperative surveys for Northern Goshawk, Boreal Owl, and Great Gray Owl using systematic survey techniques at least two years prior to proposed timber harvest treatments, prescribed fire, or other large-scale management activities. Recommend that the Northern Goshawk Management Recommendations for the Southwest be used as a guideline (adjusted based on available regional data) to plan for nesting and foraging habitat for goshawk and habitat for associated prey species on a watershed level prior to treatments (Reynolds et al. 1989). This approach would provide long-term conservation of mature forest habitat for many other species of birds and mammals;
4. Encourage management agencies and research organizations to conduct studies on the ecology of species that form the base of the food chain in forested ecosystems;
5. Continue to support research in northwestern Wyoming on the effects of winter recreation on wolverine, Canada lynx, and fisher; and
6. Work cooperatively to incorporate consideration of SGCN in all forest management habitat projects.

More detail on specific management concerns and proposed conservation actions can be found within the following documents:

- Reynolds, R.T. 1983. Management of western coniferous forest habitats for nesting accipiter hawks. U.S.D.A. Forest Service General Technical Report RM-102. Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado. 7pp.
- Reynolds, R.T. 1989. Accipiters. pp. 92-101 *in* Proceedings of the Western Raptor Management Symposium and Workshop, Nat. Wildl. Fed. Sci. and Tech. Series no. 12.
- Ruediger B, Claar J, Gniadek S, Holt B, Lewis L, Mighton S, Naney B, Patton G, Rinaldi T, Trick J, and others. 2000. Canada lynx conservation assessment and strategy. Missoula (MT): USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, USDI National Park Service. 122 p. Online: <http://www.fs.fed.us/r1/wildlife/carnivore/Lynx/lcas.pdf>.

Rocky Mountain Aspen Forest and Woodland Ecological System

The Rocky Mountain Aspen Forest and Woodland ecological system is an important component of the boreal grouping previously discussed. However, the system is juxtaposed within the boreal grouping and also serves as a transition into other systems at lower elevations. Aspen provides important diversity in the landscape both as a vegetative component and as a habitat occupied by a rich diversity of wildlife species. In Wyoming, aspen typically occurs in groves from foothills to the subalpine zone. Many authors have noted the deteriorating condition and successional decline in acreage of aspen in the region (Bartos and Campbell 1998).

Aspen communities also form a key vegetative component in many Wyoming watersheds. Healthy aspen communities directly provide quality physical habitat for numerous native aquatic and terrestrial wildlife species. Loss of aspen also is directly linked to reduced watershed function in terms of water quantity and quality. The Wyoming Game and Fish Department's Strategic Habitat Plan (WGFD 2001) specifically identifies aspen communities as a high priority habitat type. However, many resource and land management agencies have reported significant declines in the amount and potentially the health of aspen complexes in many areas of the inter-mountain west. Although there are localized efforts in Wyoming to assess and treat watersheds to enhance/restore aspen communities – a statewide effort is needed to fully assess and understand the extent of the problem, as well as to develop a strategy to address the problem on a landscape scale. We hope to initiate a multi-agency partnership in 2006 to assess the needs of aspen regeneration on a statewide basis and to develop management needs on a long-term basis.

Proposed conservation actions for this habitat include:

1. Interject prescribed fire into management strategies to increase the presence of aspen systems;
2. In areas where fire cannot be used, encourage alternate treatments that would increase the presence of aspen systems; and

3. Encourage management of ungulates in aspen ecological systems to minimize over utilization of forage and allow stand regeneration.

More detail on specific management concerns and proposed conservation actions can be found within:

- Knight, D. H. 1994. Mountains and Plains: The Ecology of Wyoming Landscapes. Yale University. 338 p.
- Bartos, D.L. and R.B. Campbell, Jr. 1998. Decline of Aspen in the Interior West – Examples from Utah. Rangelands 20(1), 17-24.
- Campbell, R.B., and D.L. Bartos. 2001. Aspen Ecosystems: Objectives for Sustaining Biodiversity. USDA Forest Service Proceedings RMRS-P-18.

Rocky Mountain Ponderosa Pine Savanna and Ponderosa Pine Woodland Ecological Systems

These two specific ecological systems occupy lower elevations and are readily accessible to human activity, so they have lower habitat quality scores.

Wyoming’s Ponderosa Pine systems are utilized by the following bird and mammal SGCN:

Merlin	Lewis’s Woodpecker	Abert’s Squirrel
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To date, the development of specific conservation strategies for this community has been precluded by higher priority efforts. However, the conservation actions identified to date have emphasized efforts to maintain the distribution of these habitats and closely monitor ongoing and proposed land use changes in these systems.

Rocky Mountain Foothill Limber Pine –Juniper Woodland Ecological System

This ecological system occurs on various sites statewide, but the most significant stands occur in southwestern Wyoming. This system, which is used by a number of obligate SGCN, is often viewed by resource managers as one that needs to be treated to reduce the dominance of juniper. It is often believed that dominance of juniper pushes a landscape towards a more xeric condition by reducing the understory of more favorable herbaceous vegetation.

The Limber Pine – Juniper Woodland systems are utilized by the following bird and mammal SGCN:

Ash-throated Flycatcher	Bushtit	Scrub Jay	Juniper Titmouse
Scott’s Oriole	Cliff Chipmunk	Canyon Mouse	Pinyon Mouse

Proposed conservation actions include:

1. Work to develop a better understanding of where juniper treatments are needed to maintain other important community types and where juniper habitat needs to be maintained for the benefit of juniper obligates;

2. Inform resource managers about the location and value of this ecological system so it is not unknowingly included in prescribed treatment projects or automatically excluded from fire suppression plans without adequate consideration for its values;
3. Work cooperatively with resource managers to reduce treatment efforts in areas where juniper is not encroaching on other systems; and
4. Obtain/develop additional management criteria for this system to allow for a mix of habitat conditions that support the full slate of juniper obligate species.

To date, the development of specific conservation strategies for this community has been precluded by higher priority efforts. As Wyoming has a relatively small fraction of this habitat when considering its prevalence throughout the region, effective conservation efforts will require the cooperation of the BLM, the USFS, as well as state agencies in Colorado and Utah.

Riparian and Wetland Systems

Riparian and Wetland Systems include the following ecological systems:

1. North American Arid West Emergent Marsh;
2. Inter-Mountain Basins Playa;
3. Northwestern Great Plains Floodplains;
4. Rocky Mountain Foothill Riparian Woodland and Shrubland;
5. Rocky Mountain Subalpine Riparian Woodland; and
6. Rocky Mountain Subalpine Riparian Shrubland.

These systems are essential to the conservation of more wildlife species (including birds, mammals, amphibians, and mollusks) in Wyoming than any other community.

The following bird and mammal SGCN are known to utilize Wyoming's riparian and wetland habitats:

American Bittern	Northern Pintail	Little Brown Myotis
American White Pelican	Swainson's Hawk	Long-eared Myotis
Bald Eagle	Trumpeter Swan	Long-legged Myotis
Barrow's Goldeneye	Virginia Rail	Meadow Jumping Mouse
Black Tern	Western Grebe	Moose
Black-crowned Night Heron	White-faced Ibis	Northern Myotis
Canvasback	Willow Flycatcher	Pallid Bat
Caspian Tern	Yellow-billed Cuckoo	Preble's Shrew
Clark's Grebe	Swainson's Hawk	
Common Loon	Trumpeter Swan	Pygmy Shrew
Forster's Tern	Virginia Rail	River Otter
Franklin's Gull	Western Grebe	Silver-haired Bat
Great Blue Heron	Fringed Myotis	Spotted Bat
Sandhill Crane	Hayden's Shrew	Townsend's Big-eared Bat

Harlequin Duck
Lesser Scaup

Hoary Bat
Fringed Myotis

Water Shrew
Water Vole

Proposed conservation actions for these habitats include:

1. Develop cooperative programs and funding with the USFWS to facilitate progress on the Cokeville Meadows National Wildlife Refuge;
2. Work with partners to obtain funding and implement wetland development projects on a priority basis that were identified in the 2005 SWG *Summer Habitat Enhancement in the Green River Basin* report. Likewise, this effort will involve a continuation of research and monitoring of early spring nesting and winter habitat use by Trumpeter Swan and other wetland dependent SGCN;
3. Survey for areas that can be developed or enhanced through conservation easements, cooperative agreements (including land exchanges), or incentive programs for landowners, and pursue relevant financial grant opportunities;
4. Identify locations of colonial nesting waterbird sites for land managers and provide recommendations for management of water levels, emergent vegetation and human activity levels;
5. Provide evaluations and recommendations to private landowners, local governments, state and federal agencies on proposed projects that may affect these systems; and
6. Work with private landowners, local governments, the FWS and other State and Federal agencies to add natural disturbances back into the Snake River floodplain without impacting the significant values of the associated real estate.

More detail on specific management concerns and proposed conservation actions can be found within the following documents:

- McKinstry, M.C., W.A. Hubert, and S.H. Anderson, editors. 2004. Wetland and riparian areas of the intermountain West: ecology and management. University of Texas Press, Austin, Texas, USA.
- National Wetland Inventory maps & GIS layers.
- WGFD. 1995. Section Two: Wetland Component. Pages 81-109 in J.F. Mahoney, C. Colgan, and G. Thorson. State Comprehensive Outdoor Recreation Plan. Wyoming Parks & Cultural Resources Commission, Cheyenne, WY. 109pp.
- Wyoming Steering Committee. 2005. Coordinated Implementation Plan for Bird Conservation in Central and Western Wyoming (BCRs 10, 16, 18). Salt Lake City, UT. 38pp.
- Sec. 404, Clean Water Act (Title 33, Chapter 26, Subchapter I, § 1251)
- U.S. Army Corps of Engineers, Sec. 404.b.1 guidelines.

WYOMING’S STRATEGIC HABITAT PLAN

The WGFD’s habitat conservation efforts are coordinated via the Strategic Habitat Plan (WGFD 2001). Within that document, agency personnel considered a variety of factors to delineate and prioritize specific areas in the state important to the conservation and management of Wyoming’s wildlife. As areas were identified, five pieces of information were collected:

1. Specific description of each area’s location and extent;
2. The percentage of each area managed by public and private entities;
3. The wildlife species or assemblages that utilize each area;
4. The conditions that act as limiting factors on the species in each area; and
5. Conservation actions to address the identified limiting factors.

Although few of Wyoming’s bird and mammal SGCN were directly considered when the initial terrestrial habitat priorities were identified, many areas were selected based upon their value for all of Wyoming’s wildlife species.

Watershed priorities were identified using the distribution of fish and amphibian SGCN as a primary consideration. The fundamental concept in conserving native aquatic wildlife species in Wyoming involves maintaining and enhancing healthy watersheds. At the very base of this philosophy, is the understanding that healthy watersheds are a product of healthy and diverse vegetation communities. Wyoming manages for aquatic species on a watershed basis, and considers upland, riparian and stream channel function in an integrated manner in determining management actions. Such is the basis for identification of “priority watersheds” for the conservation of native aquatic wildlife.

Tables 39 thru 48 indicate the existing terrestrial habitat priorities (Map 7) and existing watershed priorities (Map 9). Specific details on each of these areas and the associated conservation actions can be found within the Strategic Habitat Plan (SHP).

Efforts are ongoing to more fully incorporate Wyoming’s CWCS information with the *Strategic Habitat Plan*. Once fully integrated, it will be possible to determine precisely which habitat types and SGCN occur within each of the terrestrial and aquatic habitat priorities.

Table 39

Priority	Terrestrial Areas	Watersheds
1	Bates Hole	Bates Hole Watershed
	North and South Fork of the Shoshone River watersheds	North Fork Shoshone Watershed
	Bear River Divide	Little Mt./Red Creek Watersheds
	Northern Wyoming Range	Salt River Corridor
	Whiskey Mtn. Bighorn Sheep Management Area	Lower Wind River/Boysen Res. Corridor
	Medicine Bow Pronghorn Herd Unit	Lower N. Laramie River Watershed
	Powder River Breaks	LaBarge Watershed
		Lower Clear Creek Watershed

Table 40

Priority	Terrestrial Areas	Watersheds
2	Thunder Basin	Niobrara/Van Tassel Creek Watershed
	Owl Creek/Meeteetse Mule Deer Herd Unit	Sunlight Creek Watershed
	Muddy Creek/Little Snake River	Muddy Creek (Little Snake River)
	Gros Ventre Drainage	Spring Creek (Snake River)
	Mesa – South of Pinedale	E. Fork Wind River Watershed
	Wind River/East Fork of the Wind River Management Area	Horse Creek Watershed (N. Platte)
	Platte Valley Mule Deer Herd Unit	Thomas Fork/Raymond Creek Watershed
	Sagebrush Steppe habitats in the Little Powder River and Belle Fourche watersheds	Powder River Watershed

Table 41

Priority	Terrestrial Areas	Watersheds
3	Laramie Range	South Fork Powder River Watershed
	Terrestrial Habitats within the Kirby Creek Watershed	Nowood/Greybull River Watershed
	Salt Wells/Little Bitter Creek	Upper Smith's Fork Watershed (Black's Fork)
	Lander Front	Snake River Corridor
	Shirley Mt. Mule Deer Herd Unit	U. Wind River Tributaries Watershed (North)
	Sagebrush Steppe habitats within the West Tongue River drainage	Chugwater Creek Watershed
		Smith's Fork Watershed (Bear) Little Bighorn/Middle Tongue Watershed

Table 42

Priority	Terrestrial Areas	Watersheds
4	Black Hills	LaBonte Creek Watershed
	Paint Rock/Ten Sleep Area	Lower Shoshone River Corridor
	Rock Creek Ridge/Dempsey Ridge	Fontenelle Creek Watershed
	Upper Green River Drainage	Greys River Watershed
	Badwater/Muskrat Creek	North Fork Popo Agie Watershed
	Sheep Mt. Mule Deer Herd Unit	Upper North Platte Watershed
	Sagebrush Steppe habitats within the Cheyenne River drainage	Cottonwood Creek Watershed
		Upper Tongue River Watershed

Table 43

Priority	Terrestrial Areas	Watersheds
5	Rattlesnake Hills	Middle North Platte River Corridor
	Terrestrial Habitats within the Crandell/Sunlight Watersheds	Lower Big Horn River Corridor
	Slate Creek Ridge/Miller Mt./Fort Hill	North Fork Little Snake Watershed
	Wind River Range west of the Continental Divide below conifer zone.	Flat Creek Watershed
	Government Draw	Little Popo Agie Watershed
	Laramie Peak Mule Deer Herd Unit	Pole Mt. Watershed
	Iron Mt. Mule Deer Herd Unit	Horse Creek Watershed (Green River)
	Goshen Rim Mule Deer Herd Unit	Big/Little Goose Creek Watershed
	Sagebrush Steppe habitats within the Salt River drainage	

Table 44

Priority	Terrestrial Areas	Watersheds
6	North Natrona	Horseshoe Creek Watershed
	Blue Mesa Sage Grouse Upland/Riparian Enhancement Project Area	Paintrock Creek Watershed
	Little Sandy Creek/Steamboat Mt.	Mill Creek Watershed (Big Sandstone)
	Buffalo Valley	Hoback River Watershed
	Ferris/Seminole Mtns.	Upper Sweetwater River Watershed
	Sagebrush Steppe habitats within the East Tongue River drainage	Lower Lodgepole Creek Watershed
		New Fork River Corridor
		Upper Clear Creek Watershed

Table 45

Priority	Terrestrial Areas	Watersheds
7	South Bighorn Mtns.	Lower Salt Creek Watershed
	Terrestrial Habitats within the Upper Nowood River Watershed	Kirby Creek Watershed
	Cedar Mt.	Upper Muddy Creek Watershed (Black's Fork)
	Terrestrial Habitats within the Salt River Watershed	Gros Ventre River Watershed
	Great Divide Basin	Lower Sweetwater River Watershed
	Sheridan Front Range	Sage Creek Watershed
		Tosi/Rock Creek Watershed
		North and Middle Fork Powder Watershed

Table 46

Priority	Terrestrial Areas	Watersheds
8	Terrestrial Habitats within the Cheyenne River/Antelope Creek Watershed	Lower North Platte/Rawhide Creek
	Interior of the Bighorn Basin	Lower Nowood River Watershed
	Terrestrial Habitats within the Black's Fork/Smith's Fork watershed	Upper Ham's Fork Watershed
	Terrestrial Habitats within the Hoback River Drainage	Buffalo Fork Watershed
	Beaver Rim	U. Wind River Tributaries (south)
	High elevation riparian and aspen communities within the Bighorn NF	Laramie Plains (amphibians)
		Green River Corridor
	Upper Crazy Woman Creek Watershed	

Table 47

Priority	Terrestrial Areas	Watersheds
9	Deer Creek Range	Muddy/Horse Creek Watershed (Sweetwater)
	Upper Greybull River	Upper Bighorn River Corridor
	Terrestrial Habitats within the Raymond Mt/Upper Smith's Fork Watershed	Sulphur Creek Watershed
	Greys River	Middle Fork Popo Agie Watershed
	Atlantic Rim	Irish Canyon Creek Watershed
	Buffalo/Kaycee Front Range	Little Missouri Watershed

Table 48

Priority	Terrestrial Areas	Watersheds
10	Ormsby	Pathfinder Reservoir/Miracle Mile Corridor
	West Slope of the Bighorn Mtns.	Big Sandy River Watershed
	Terrestrial Habitats within the Green River Corridor	Upper Wind River Corridor
	West Teton	Cheyenne River Watershed
	Terrestrial Habitats within the Snake River Watershed	
	Wind River Riparian Areas	
	Cottonwood-Willow Riparian habitats within the Powder River Drainage	

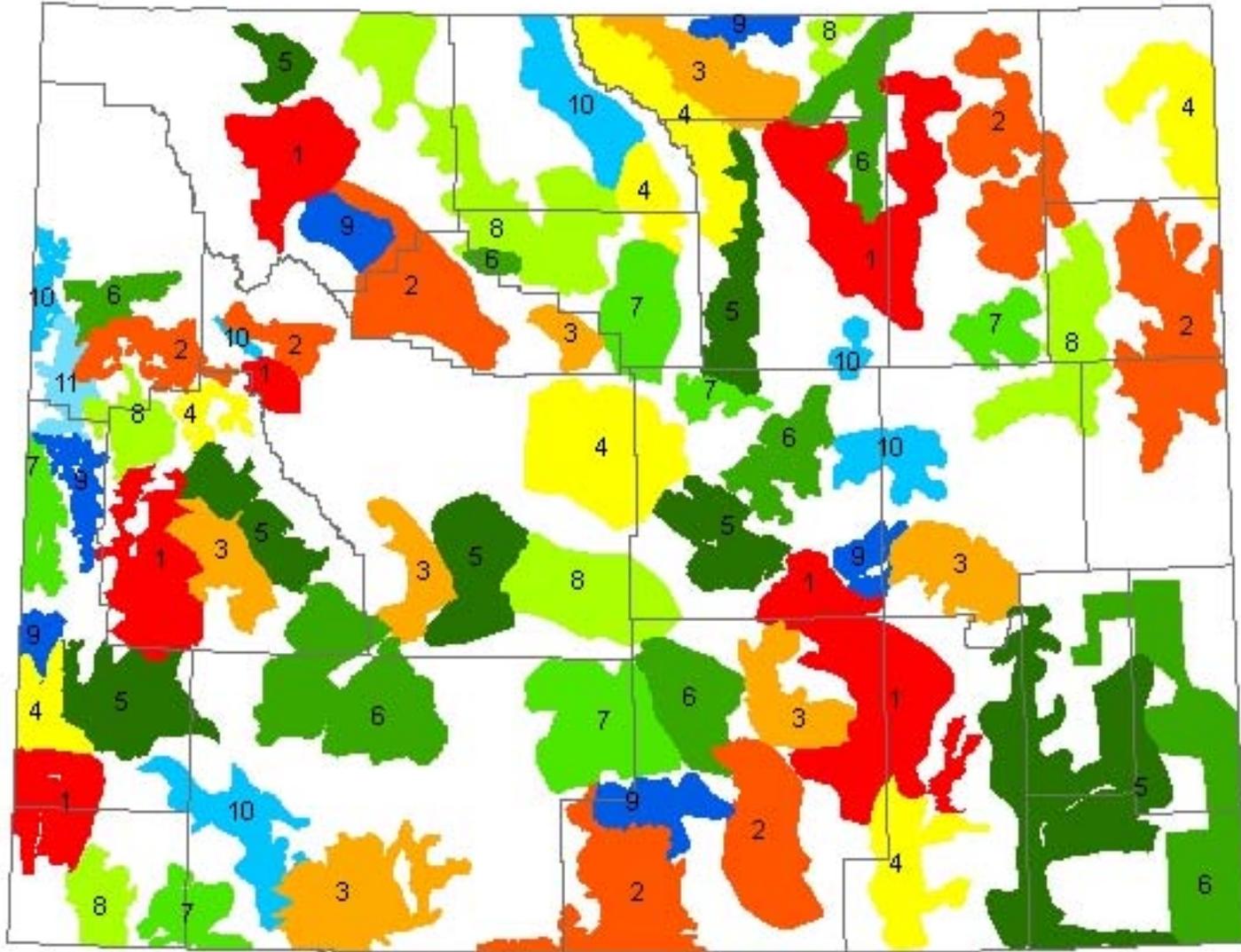
At the time of this writing, the SHP was being reviewed and updated. As part of this effort, an additional 32 areas (Table 49) are either being added to the SHP, or existing text on these areas is being refined to more directly address the needs of Wyoming's SGCN.

The following key habitat areas need to be incorporated within the Strategic Habitat Plan's Terrestrial Habitat Priorities (Map 8).

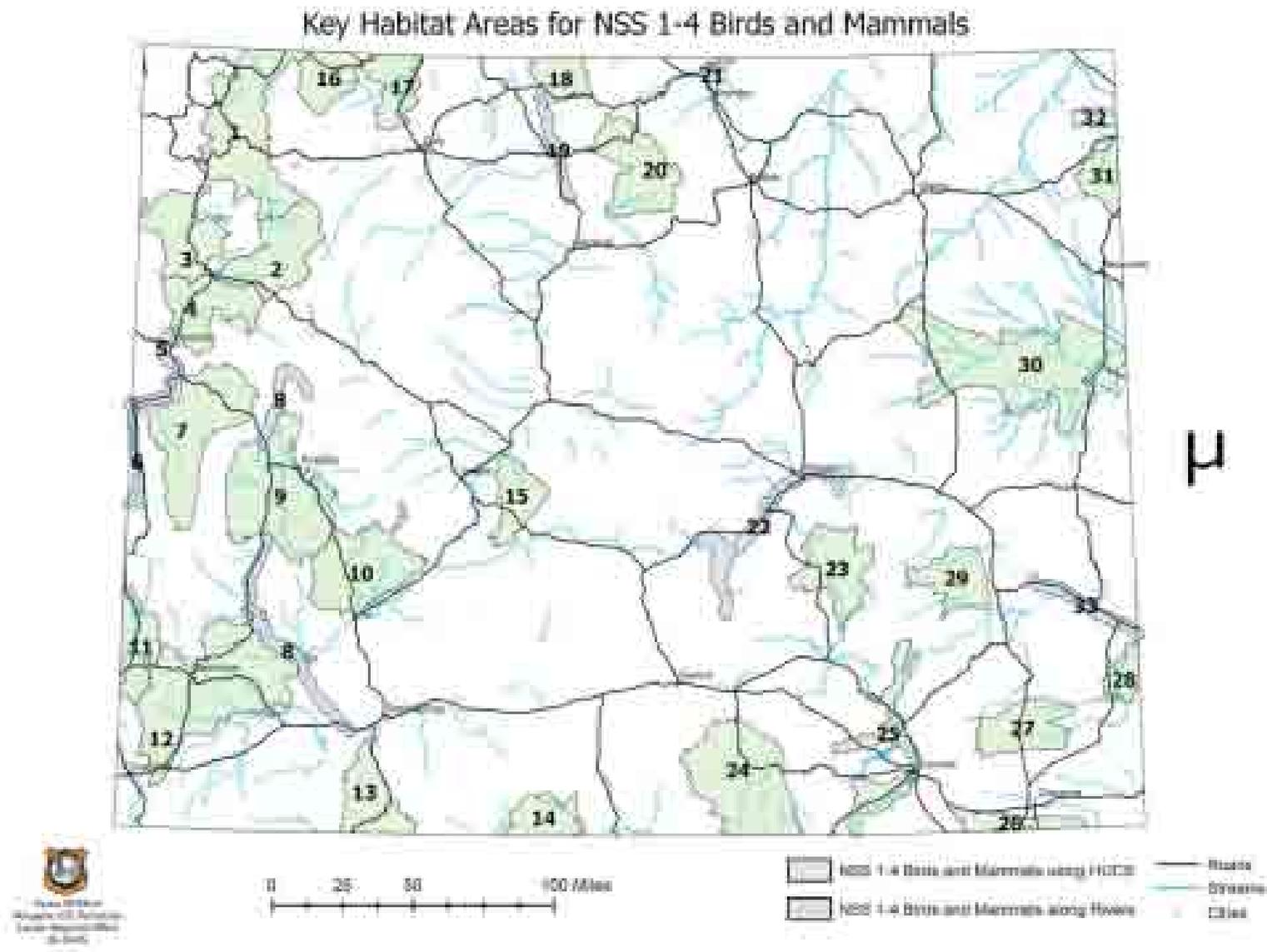
Table 49

Yellowstone	Thorofare	Grand Teton
Gros Ventre	Snake River	Salt River
Wyoming Range	Green River	Pinedale
Farson	Bear River	Kemmerer
Flaming Gorge	Powder Rim	Beaver Ck
Beartooth	Heart Mountain/ Chapman Bench	Yellowtail
Bighorn River	Medicine Lodge	Tongue River
North Platte River Casper	Bates Hole – Shirley Basin	Savery/Upper North Platte River
Laramie River	Crow Ck	Horse Ck
Hawk Springs	Laramie Peak	Thunder Basin
Black Hills	Lower North Platte	

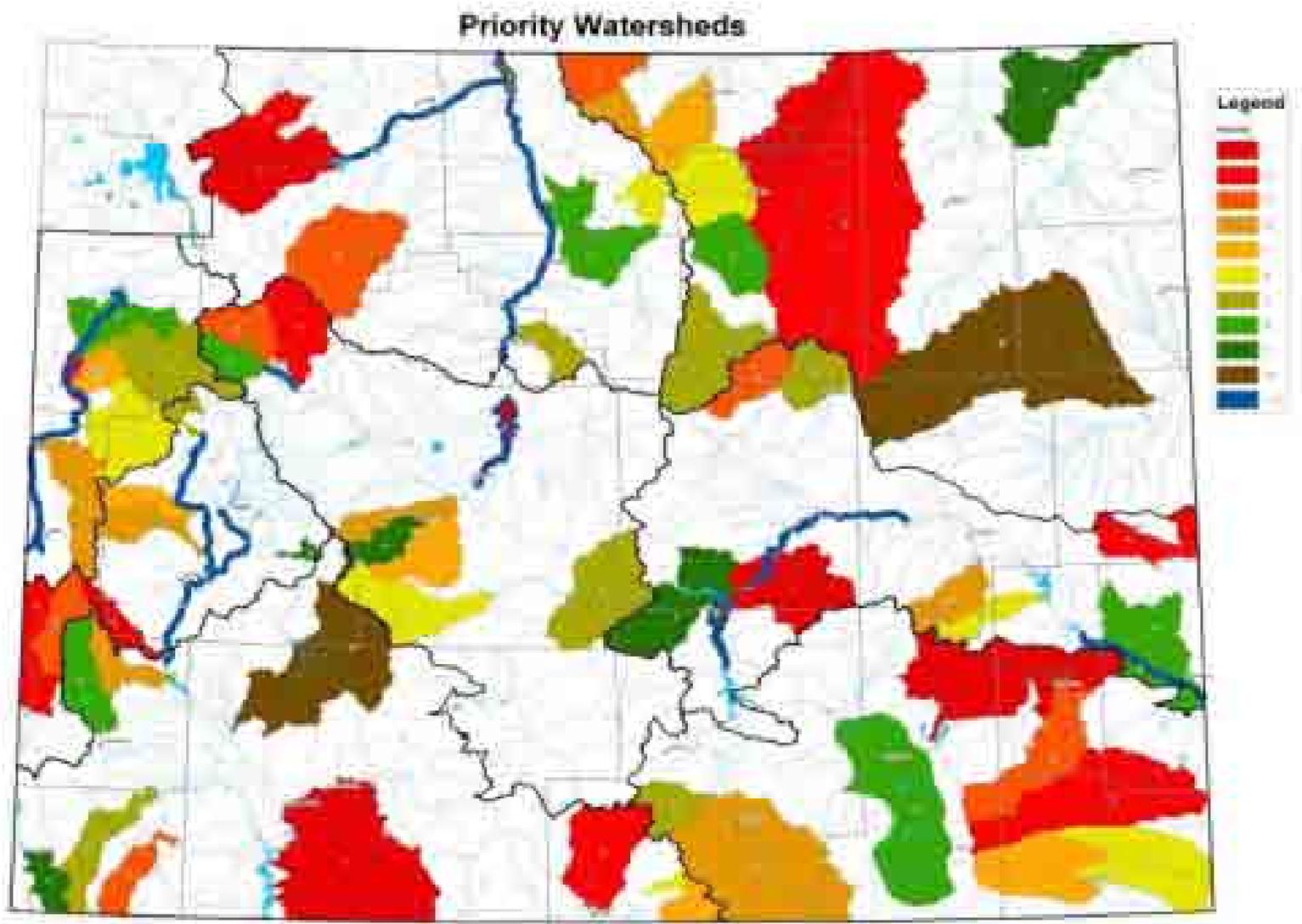
Map 7: Terrestrial Habitat Priorities



Map 8: Additional Terrestrial Habitat priorities



Map 9



MULTI-AGENCY CONSERVATION ACTIONS FOR SPECIFIC FISHES WITHIN WYOMING

Over the last 20 years, significant resources have been dedicated to multi-state conservation efforts directed at the Bonneville, Colorado River, and Yellowstone cutthroat trout. In more recent years, greater emphasis has been given to developing multi-agency conservation efforts for additional species. Generally, each effort involves a single species or subspecies. Interested entities sign onto a Conservation Agreement. These agreements generally state that the signatories agree to cooperate and coordinate conservation actions through a coordination team. Participants have included state fish and wildlife agencies, FWS, USFS, BLM, National Park Service, and Tribal Fish and Game agencies.

The coordination teams are responsible for developing a conservation strategy and meeting regularly to assess progress in its implementation. In addition to cutthroat trout mentioned above, the Department is cooperating in the development of conservation agreements and strategies for leatherside chub, roundtail chub, bluehead sucker and flannelmouth sucker. The latter three species are included within a single agreement due to their similar habitat needs and conservation status. The Department believes these efforts are beneficial to the agency and the relevant fish species and expects to participate in other agreements when deemed appropriate.

The species involved in these multi-agency conservation efforts include:

Arctic Grayling

This species is a focus of a multi-agency conservation plan. Copies of this plan can be obtained from the National Park Service – Yellowstone National Park. However, the State of Wyoming is not party to this effort due to lack of any authority for fish and wildlife management within Yellowstone National Park.

Bluehead Sucker, Flannelmouth Sucker and Roundtail Chub

Based upon an agreement signed in 2004, a multi-state conservation effort is being developed for these three species. The key aspects of this effort include:

1. Conducting drainage specific assessments. This ongoing project has been developed to collect baseline information on the abundance and distribution of these three species in the Green River drainage of Wyoming. Collecting this information is the first step toward developing a plan for the effective management of these species by the WGFD, Bureau of Reclamation (BOR) and BLM;
2. Funding two graduate student projects at the University of Wyoming, which will be initiated in 2005, to assess movement patterns and habitat associations of native bluehead and flannelmouth suckers as well as the introduced white sucker. All three species occur in the Big and Little Sandy Rivers in Wyoming, and these populations of the two native species are likely to become the focus of recovery efforts;

3. Conducting efforts to identify any refugia populations or habitats that may exist; and
4. Conducting studies to document the migration of species within drainage.

Bonneville Cutthroat Trout

This species is the focus of a multi-agency conservation agreement signed in 1999 by the WGFD, the Utah Division of Wildlife Resources, the Idaho Fish and Game Department, the FWS, and the USFS. Copies of this agreement can be obtained from the WGFD's Fish Division Administration in Cheyenne. Key aspects of this effort include:

1. Restoring specific watersheds with emphasis on improving riparian and upland habitats, and encouraging more compatible grazing management;
2. Conducting instream flow assessments and seeking water right filings. Work has been completed on 17 stream reaches with a total of 41 stream miles covered with instream flow filings; and
3. Researching passage restoration/screening of diversion structures in the mainstem system is a high priority and has been the focus of work conducted for the WGFD by the University of Wyoming the last several years.

Colorado River Cutthroat Trout

Working with the Colorado Division of Wildlife, Utah Division of Wildlife Resources, FWS, USFS and Ute Mountain Tribe, the WGFD will continue to implement the strategies outlined in within the multi-agency conservation plan. This agreement was last signed in 2001, and copies can be obtained from the WGFD's Fish Division Administration in Cheyenne. Key aspects of this effort include:

1. Ongoing restoration efforts in LaBarge Creek, Gilbert Creek, Little Snake River and Muddy Creek drainages. A total of 128 miles have either been restored or are in the process of being restored;
2. Conducting instream flow assessments and seeking water right filings. Work has been completed on 29 stream reaches with a total of 113 stream miles covered with instream flow filings. No additional work is planned at this time; and
3. Continuing to look for opportunities to work with allotment permittees and federal land management agencies to improve riparian and stream habitats.

Kendall Warm Springs Dace (federally listed as “endangered”)

This species is federally listed as endangered. Working with the USFS and the FWS, the WGFD will, when necessary, supplement the ongoing protection of existing habitat located on USFS managed lands.

Leatherside Chub

A multi-state conservation effort for this species is being developed, and is expected to be complete during the next year. Key aspects of this effort are expected to include:

1. Continuing a genetic analysis to determine potential for a taxonomic distinction of two species; and
2. Based upon that taxonomic determination, the development and implementation of additional conservation/restoration strategies.

Powder River Studies

Working with the University of Wyoming and the U.S. Geological Survey, the WGFD is participating in several ongoing or planned efforts to collect baseline and trend data on fish species within the Powder River. Details of these efforts can be obtained from the WGFD's Fish Division Administration in Cheyenne. Given the rapid pace of resource extraction this effort is a very high priority for the WGFD.

Sauger

Working with the FWS, the University of Wyoming, and the Wind River Reservation, the WGFD has participated, and continues to participate, in a variety of efforts focused on the sauger populations within the lower Bighorn River and the Wind River. Future efforts will involve:

1. Working to increase available habitat by addressing fish passage barriers at identified locations; and
2. Working to prevent introgression with walleye. Continued genetic testing of imported fry/fingerling.

Snake River Cutthroat Trout

The needs of this species are considered within the Yellowstone cutthroat multi-agency conservation efforts, which can be obtained from the WGFD's Fish Division Administration in Cheyenne. Key aspects of this effort include:

1. An on-going assessment of populations and habitat;
2. Continued genetic analysis to assess this fish's status as a distinct subspecies;
3. An assessment of whirling disease within Salt River watershed;
4. The completion of a multi-year study of Snake River cutthroat life history and habitat utilization in Salt River watershed; and

5. Restoration of spawning habitats within the Snake River's tributaries.

Yellowstone Cutthroat Trout

A multi-state conservation effort is being developed based on a multi-state conservation agreement signed in 2000. Copies of the agreement can be obtained from the WGFD's Fish Division Administration in Cheyenne, and the details of the conservation efforts are expected to be finalized during the next year. Key aspects of this effort are expected to include:

1. An on-going assessment of populations and habitat;
2. Continued genetic analysis to assess purity of isolated populations in basin;
3. Identifying stream reaches appropriate for instream flow water right filings, conducting studies, and seeking water rights filings; and
4. The removal of non-native species in high priority drainages.

Westslope Cutthroat Trout

This species is a focus of a multi-agency conservation plan. Copies of this plan can be obtained from the National Park Service of Yellowstone National Park. However, the State of Wyoming is not party to this effort due to lack of any authority for fish and wildlife management within Yellowstone National Park.

CONSERVATION ACTIONS FOR REPTILES AND AMPHIBIANS WITHIN WYOMING

The WGFD has statutory responsibility for the management of amphibians and reptiles. However, until recently, there has not been an ongoing dedicated program to address these species' needs. There have been several focused efforts on single species such as the Wyoming toad, boreal toad and midget faded rattlesnake. In 1998, the WGFD funded a project through the Wyoming Cooperative Research Unit that resulted in a report *Recommendations for the Development of an Amphibian and Reptile Conservation Program in the Wyoming Game and Fish Department, and a Tentative Status Assessment of Wyoming's Herptofauna* (Patton and Anderson, 1999). In 2001, funds were obtained for a project to: 1) refine amphibian and aquatic reptile distributional information; 2) identify specific breeding sites for future monitoring; and 3) develop a Department herpetological program. In 2004, the Department hired a permanent herpetologist. Over the next five years, the primary purpose of this position and their seasonal staff will be to continue to carry out the three objectives outlined above. As increased knowledge of Wyoming's herpetofauna becomes available, additional conservation actions will be developed.

CONSERVATION ACTIONS FOR CRUSTACEANS WITHIN WYOMING

A handful of biologists have a cursory knowledge about crustaceans in Wyoming. One relevant work is Hubert (1988).

The mode for the coming five years in regards to crustaceans will be “discovery”. Unless a significant amount of new funds become available to the Department, this effort will have to be led by other partners. Department field personnel are becoming more aware of the distribution of crustaceans during their routine surveys of aquatic systems, and are beginning to document observations. As increased knowledge of Wyoming’s crustaceans becomes available, additional conservation actions will be developed.

In regards to crayfish, a few conservation strategies are in place. These include:

- Chapter 10 Regulations: “Regulation For Importation, Possession, Confinement, Transportation, Sale And Disposition Of Live Wildlife” – Where the possession and/or importation of Rusty crayfish is prohibited;
- A recognized need to repeat the work of Hubert (1988) in the next five years;
- Chapter 46 Regulations: “Fishing Regulations” – Where the use and movement of bait between drainages is restricted; and

CONSERVATION ACTIONS FOR MOLLUSKS WITHIN WYOMING

A few field biologists have cursory knowledge on Wyoming’s mollusks. Relevant works include Beetle (1989) and Cvancara (2004).

The mode for the coming five years in regards to mollusks will be “discovery”. Unless a significant amount of new funds become available to the Department, this effort will have to be led by other partners. Department field personnel are becoming more aware of the distribution of mollusks during their routine surveys of aquatic systems, and are beginning to document observations.

Wyoming is fortunate that a handful of partners have initiated efforts relative to the identification and distribution of bivalves. Although their efforts are strictly done as volunteer “enthusiasts”, not only have they spent time on collecting specimens, they have also been gracious in helping to identify specimens collected by WGFD personnel during routine fisheries surveys. As increased knowledge of Wyoming’s mollusks becomes available, additional conservation actions will be developed.

PRIORITIZING THE USE OF STATE WILDLIFE GRANTS TO FUND CONSERVATION ACTIONS

Wildlife conservation efforts suffer from a perpetual lack of resources. As such, it is incumbent upon wildlife managers to work as efficiently as possible and achieve the greatest outcome for the effort and money expended. Although there are other funding sources, and State Wildlife Grants offer a significant opportunity to begin addressing the needs of Wyoming's SGCN, current allocations fall far short of the ultimate need. In order to achieve the most "bang for the buck", between 2005 and 2010, when Wyoming's CWCS is revised, the use of Wyoming's State Wildlife Grant money will be prioritized using the following guidelines:

1. One of the highest priorities of Wyoming's State Wildlife Grants will be to collect as much information as possible on the 235 SGCN for which there is insufficient data. Until these species can either be declared secure within Wyoming's borders or reclassified to another category, it will be impossible to act in a truly proactive manner in conserving all of Wyoming's wildlife;
2. Implementation of conservation strategies for SGCN that are federally listed may be funded using State Wildlife Grant monies;
3. Efforts that address the needs of multiple SGCN will be a higher priority than single species projects;
4. Efforts that will incorporate the human, financial, or technical resources of partners will be a higher priority than projects which are undertaken exclusively by the WGFD;
5. Projects directed at the SGCN for which Wyoming represents a small portion of their documented range will be a lower priority than projects directed at the SGCN for which Wyoming represents a large percentage of their documented range; and
6. The potential cost effectiveness of proposed projects will be used as a prioritization criterion.

Definitions of Conservation Action Codes Used in Tables 31 thru 37:

- InfD – Information on this species' distribution is required.
- InfG – Information on this species' genetic composition is required.
- InfH – Information on this species' habitat needs and/or habitat condition are needed.
- InfB – Information on this species' basic biology and/or life history are needed.
- InfP – Information on this species' population status are needed.
- InfM – Information on this species' movements and/or migrations are needed.
- MgmN – New management strategies need to be developed.
- MgmI – Existing management or monitoring strategies need to be implemented.
- BarP – Protective barriers need to be maintained or created to protect species' populations.
- HabC – Efforts are needed to improve this species' habitat connectivity.
- NonR – Nonnative species need to be removed.
- HabR – Efforts are needed to improve and/or restore this species' habitat.
- DisR – Efforts are needed to address disease issues.
- HabM – Efforts are needed to protect habitat via cooperative management.
- BrdC – Captive breeding efforts are needed.
- MonC – Existing monitoring efforts need to be continued.
- MonN – New monitoring strategies need to be developed or established.
- NatD – Research is needed to determine if the species is a native of Wyoming.
- RefF – Refugia sites for this species need to be found or established.
- HybR – Efforts are needed to address hybridization issues.
- IntR – Reintroduction efforts are needed.
- AccR – Efforts to restrict human access to specific sites need to be continued.
- EduP – Education efforts are required.
- ResH – Research is needed on the effects recreation and human activities have on this species.
- ResM – Research on species mortality is required.

Table 31: Conservation Actions for Mammals

Common Name	infB	infD	infG	infH	infM	infP	mgmI	mgmN	habC	habM	habR	monC	barP	nonR	disR	brdC	monN	natD	refF	hybR	intR	accR	eduP	resH	resM	grPL	Total
Abert's Squirrel	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Big Brown Bat	0	1	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	6
Bighorn Sheep	0	0	0	1	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	4
Black-footed Ferret	0	0	0	1	0	1	0	1	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	6
Black-tailed Prairie Dog	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3
Canada Lynx	0	1	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	5
Canyon Mouse	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Cliff Chipmunk	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Dwarf Shrew	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Fisher	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Fringed Myotis	0	1	0	1	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	7
Great Basin Pocket Mouse	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Grizzly Bear	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Hayden's Shrew	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Hispid Pocket Mouse	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Hoary Bat	0	1	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	6
Idaho Pocket Gopher	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Least Weasel	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4
Little Brown Myotis	0	1	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	6
Long-eared Myotis	0	1	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	6
Long-legged Myotis	0	1	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	6
Marten	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Meadow Jumping Mouse	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Moose	0	1	0	1	0	1	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	7
Northern Flying Squirrel	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Northern Myotis	0	1	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	6
Olive-backed Pocket Mouse	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Pallid Bat	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	5
Pinyon Mouse	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4

Conservation Actions: Mammals

Common Name	inFB	inFD	inFG	inFH	inFM	inFP	ingnl	ingnN	habC	habM	habR	monC	barP	nonR	disR	brdC	monN	natD	refE	hybR	inTR	accR	eduP	resH	resM	grPL	Total
Plains Harvest Mouse	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Plains Pocket Gopher	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Plains Pocket Mouse	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Prairie Vole	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Preble's Shrew	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Pygmy Rabbit	0	1	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Pygmy Shrew	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
River Otter	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Sagebrush Vole	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Silky Pocket Mouse	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Silver-haired Bat	0	1	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	6
Spotted Bat	0	1	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	6
Spotted Ground Squirrel	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Swift Fox	0	1	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	5
Townsend's Big-eared Bat	0	1	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	6
Uinta Ground Squirrel	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Vagrant Shrew	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Water Shrew	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Water Vole	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Western Heather Vole	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Western Small-footed Myotis	0	1	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	6
White-tailed Prairie Dog	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	5
Wolverine	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	6
Wyoming Ground Squirrel	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Wyoming Pocket Gopher	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Mammals Total	1	47	0	50	1	50	0	8	1	32	3	15	0	1	2	1	1	0	0	0	1	0	15	2	1	0	

Table 32: Conservation Actions for Birds

Common Name	infB	infD	infG	infH	infM	infP	mgmI	mgmN	habC	habM	habR	monC	barP	nonR	disR	brdC	monN	natD	refF	hybrR	intR	accR	eduP	resh	resM	grplL	Total
American Bittern	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
American Three-toed Woodpecker	0	0	0	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
American White Pelican	0	0	0	0	0	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	5
Ash-throated Flycatcher	0	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Bald Eagle	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	5
Barrow's Goldeneye	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Black-backed Woodpecker	0	1	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Black-crowned Night-Heron	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Black Rosy-Finch	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Black Tern	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Bobolink	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Boreal Owl	0	0	0	0	0	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Brewer's Sparrow	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Brown-capped Rosy Finch	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Burrowing Owl	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Bushtit	0	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Canvasback	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Caspian Tern	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Chestnut-collared Longspur	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Clark's Grebe	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Columbian Sharp-tailed Grouse	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Common Loon	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	4
Dickcissel	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Ferruginous Hawk	0	0	0	0	0	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Forster's Tern	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Franklin's Gull	0	0	0	0	0	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Grasshopper Sparrow	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Great Blue Heron	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Great Gray Owl	0	1	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Greater Sage-Grouse	0	0	0	1	0	1	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6

Conservation Actions: Birds

Common Name	inFB	inFD	inFG	inFH	inFM	inFP	mgnl	mgmN	habC	habM	habR	monC	barP	nonR	disR	brdC	monN	nadD	reff	hybR	intr	accR	edup	resh	resM	grpL	Total
Greater Sandhill Crane	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Harlequin Duck	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Juniper Titmouse	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Lark Bunting	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Lesser Scaup	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Lewis' Woodpecker	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Long-billed Curlew	0	1	0	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	6
McCown's Longspur	0	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Merlin	0	1	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Mountain Plover	0	1	0	1	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Northern Goshawk	0	1	0	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Northern Pintail	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Northern Pygmy-Owl	0	1	0	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Peregrine Falcon	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Pygmy Nuthatch	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Redhead	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Sage Sparrow	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Sage Thrasher	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Scott's Oriole	0	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Short-eared Owl	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Snowy Egret	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Swainson's Hawk	0	1	0	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Trumpeter Swan	0	0	0	1	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	6
Upland Sandpiper	0	1	0	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Virginia Rail	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Western Grebe	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Western Scrub-Jay	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
White-faced Ibis	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Willow Flycatcher	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Yellow-billed Cuckoo	0	0	0	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Birds Total	0	14	0	18	0	43	44	0	0	57	7	17	0	0	1	0	5	0	1	1							

Table 33: Conservation Actions for Reptiles

Common Name	inFB	inFD	inFG	inFH	inFM	inFP	mgnd	mgndN	habC	habM	habR	monC	barP	nonR	disR	brdC	monN	natD	refF	hybR	intr	accR	eduP	resH	resM	grpl	Total
Black Hills Redbelly Snake	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Bullsnake	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Cliff Tree Lizard	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Common Garter Snake	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Eastern Yellow-bellied Racer	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Great Basin Gophersnake	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Great Plains Earless Lizard	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Greater Short-horned Lizard	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Intermountain Wandering Gartersnake	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Many-lined Skink	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Midget Faded Rattlesnake	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Northern Plateau Lizard	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Northern Prairie Lizard	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Northern Sagebrush Lizard	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Ornate Box Turtle	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Pale Milksnake	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Plains Black-headed Snake	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Plains Gartersnake	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Plains Hog-nosed Snake	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Prairie Racerunner	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Prairie Rattlesnake	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Red-lipped Plateau Lizard	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Rubber Boa	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Smooth Green Snake	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Western Painted Turtle	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Western Spiny Softshell	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Reptiles Total	26	26	0	26	0	0	0	26	0																		

Table 34: Conservation Actions for Amphibians

Common Name	inFB	inFD	inFG	inFH	inFM	inFP	mgnd	mgmN	habC	habM	habR	monC	barP	nonR	disR	brdC	monN	natD	refF	hybR	intR	accR	eduP	resH	resM	grPL	Total
American Bullfrog	0	1	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	5
Boreal Chorus Frog	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Boreal Toad	0	1	0	1	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	5
Columbia Spotted Frog	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
Great Basin Spadefoot	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Great Plains Toad	1	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Northern Leopard Frog	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Plains Spadefoot	1	1	0	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Tiger Salamander	0	1	0	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	4
Wood Frog	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Woodhouse's Toad	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Wyoming Toad	1	0	0	1	0	1	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	6
Amphibians Total	8	10	0	10	0	6	0	10	1	1	0	0	0	0	5	1	0	1	0								

Table 35: Conservation Actions for Fishes

Common Name	inFB	inFD	inFG	inFH	inFM	inFP	mgnd	mgmN	habC	habM	habR	monC	barP	nonR	disR	brdC	monN	natD	refF	hybR	intR	accR	eduP	resH	resM	grPL	Total
Arctic Grayling	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Bigmouth Shiner	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	5
Black Bullhead	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2
Bluehead Sucker	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	6
Bonneville Cutthroat	0	1	1	0	0	1	1	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	7
Burbot	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	5
Central Stoneroller	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4
Channel Catfish	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Colorado River Cutthroat	0	1	1	0	0	1	1	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	7
Common Shiner	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4
Finescale Dace	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4
Flannelmouth Sucker	0	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	7

Conservation Actions: Fishes

Common Name	inFB	inFD	inFG	inFH	inFM	inFP	mgmI	mgmN	habC	habM	habR	monC	barP	nonR	disR	brdC	monN	natD	refF	hybR	inR	accR	eduP	resH	resM	grpl	Total
Flathead Chub	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	6
Goldeye	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	5
Hornyhead Chub	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	6
Iowa Darter	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	5
Kendall Warm Springs Dace	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Lake Chub	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	6
Leatherside Chub	1	1	0	0	0	1	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	7
Mottled Sculpin	1	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	7
Mountain Sucker	0	1	0	1	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	6
Mountain Whitefish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Orangethroat Darter	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	3
Paiute Sculpin	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	5
Pearl Dace	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4
Plains Minnow	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	6
Plains Topminnow	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4
Quillback	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4
River Carpsucker	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4
Roundtail Chub	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	6
Sauger	1	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	7
Shorthead Redhorse	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4
Shovelnose Sturgeon	1	1	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Snake River Cutthroat	0	1	1	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	6
Stonecat	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4
Sturgeon Chub	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	6
Suckermouth Minnow	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	6
Western Silvery Minnow	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	6
Westslope Cutthroat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellowstone Cutthroat	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	4
Fishes Total	16	32	10	25	7	32	7	0	1	0	6	2	2	0	0	0	30	1	2	3	11	1	0	0	0	0	

Table 36: Conservation Actions for Crustaceans

Common Name	infB	infD	infG	infH	infM	infP	mgntI	mgntN	habC	habM	habR	monC	barP	nonR	disR	brdC	monN	natD	refF	hybR	intR	accR	eduP	resH	resM	grpl	Total
Beavertail Fairy Shrimp	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Circumpolar Fairy Shrimp	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Colorado Fairy Shrimp	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Crenatethumb Fairy Shrimp	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Devil Crayfish	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Eastern Alkali Fairy Shrimp	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Ethologist Fairy Shrimp	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Gambelii Crayfish	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Giant Fairy Shrimp	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Greater Plains Fairy Shrimp	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Knobbedlip Fairy Shrimp	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Lemon Tadpole Shrimp	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Longtail Tadpole Shrimp	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Neglectus Crayfish	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
New Mexico Fairy Shrimp	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Pocked Pouch Fairy Shrimp	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Rock Pool Fairy Shrimp	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
San Francisco Brine Shrimp	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Versitle Fairy Shrimp	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Crustaceans Total	16	19	0	19	0	19	0																				

Table 37: Conservation Actions for Mollusks

Common Name	inFB	inFD	inFG	inFH	inFM	inFP	mgmI	mgmN	habC	habM	habR	monC	barP	nonR	disR	brdC	monN	nadD	refF	hybR	intr	accR	edup	resh	resM	grpL	Total
A Land Snail (Hells Canyon)	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Abbreviate Pondsnailed	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Ash Gyro	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Ashy Pebblesnailed	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Ashy Physa	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Bear Lake Springsnailed	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Berry's Mountain Snail	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
California Floater	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Callused Vertigo Snail	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Cave Physa	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Cloaked Physa	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Cooper's Rocky Mountain Snail	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Creeping Ancylied	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Cylindrical Papershell	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Disc Gyro	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Dusky Fossaria	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Fat-whorled Pondsnailed	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Fatmucket	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Fragile Ancylied	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Giant Floater	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Glass Physa	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Glossy Valvata	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Golden Fossaria	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Great Basin Rams-horn	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Green River Pebblesnailed	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Indecisive Vallonia	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Jackson Lake Springsnailed	0	0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	4
Keeled Mountain Snail	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Lance Aplexa	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Marsh Pondsnailed	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Marsh Rams-horn	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Meadow Rams-horn	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3

Conservation Actions: Mollusks

Common Name	inFB	inFD	inFG	inFH	inFM	inFP	mgmL	mgmN	habC	habM	habR	monC	barP	nonR	disR	brdC	monN	natD	refF	hybR	intr	accR	edup	resh	resM	grpL	Total
Mineral Creek Mountain Snail	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Morgan Creek Mountain Snail	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Mossy Valvata	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Mountain Marshsnail	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Mud Amnicola	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Mystery Vertigo Snail	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Niobrara Ambersnail	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Olive Physa	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Pewter Physa	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Plain Pocketbook	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Protean Physa	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Pumpkin Physa	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Pygmy Fossaria	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Pygmy Mountain Snail	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Ribbed Dagger	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Rock Fossaria	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Rocky Mountain Dusksnail	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Rocky Mountain Physa	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Rocky Mountain Snail	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Rotund Physa	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Rough Rams-horn	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Rustic Pondsnailed	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Sharp Sprite	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Sierra Ambersnail	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Slope Ambersnail	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Star Gyro	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Striate Disc	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Tadpole Physa	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Two-ridge Rams-horn	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Umbilicate Sprite	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Utah Physa	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Western Pearlshell	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2

Conservation Actions: Mollusks

Common Name	inFB	inFD	inFG	inFH	inFM	inFP	mgmI	mgmN	habC	habM	habR	monC	barP	nonR	disR	brdC	monN	nadD	refF	hybrR	intrR	accR	edupP	reshH	resM	grplL	Total
White Heel Splitter	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Widelip Pondsnaill	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Woodland Pondsnaill	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Wrinkled Marshsnail	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Mollusks Total	0	64	9	59	0	68	0	0	0	0	1	0	0	1	0												

SECTION V

MONITORING

As indicated within the Congressional guidelines, each state CWCS must describe how progress is monitored. Specifically, each CWCS must provide, “Descriptions of the proposed plans for monitoring species identified in Element #1 and their habitats, for monitoring the effectiveness of the conservation actions proposed in Element #4, and adapting these conservation actions to respond appropriately to new information or changing conditions”.

MONITORING WYOMING’S SGCN AND THEIR HABITATS

As evidenced within the species accounts and text related to Element #4, many of Wyoming’s SGCN are already the focus of considerable conservation attention. Monitoring the status of these species and the effectiveness of conservation actions are integral components of these efforts. However, for nearly 85 percent of Wyoming’s SGCN, the lack of baseline information (refer to Tables 31 to 37 in Section IV) eclipses all other issues and needs. The task of establishing baseline population status and subsequently monitoring the population trends of 235 SGCN is far beyond the WGFD’s capability. As with conservation actions (see Collection of Baseline Information, Section IV) the involvement and cooperation of partners will be an integral component of Wyoming’s monitoring strategy.

Fortunately, during Wyoming’s initial CWCS effort, some opportunities became apparent that could greatly facilitate these data collection and monitoring efforts. During March, 2005, the WGFD hosted a series of workshops (see Section VII and Appendix VIII) to review and refine the distribution maps for Wyoming’s SGCN. As a secondary effort related to monitoring, workshop participants were asked: “What’s happening now?”; “What needs to happen?”; and “Who needs to be involved?”.

WHAT’S HAPPENING NOW?

Birds:

Without question, birds are the most monitored taxa in Wyoming. Key efforts include the annual breeding bird surveys and strategies outlined within the *Wyoming Bird Conservation Plan* (Nicholoff, 2003). Additionally, the WGFD is involved in a variety of single species monitoring efforts related to raptors, waterfowl, and a few upland birds. Examples of efforts by partners include annual surveys of Audubon Wyoming’s Important Bird Areas, USFS monitoring of its avian Management Indicator Species, more geographically focused monitoring efforts by the Point Reyes Bird Observatory and Hawk Watch International, and various efforts made by mine and wind farm operators. More specific descriptions of monitoring activities conducted or proposed by the WGFD and Partners are described in Appendix VII.

Mammals:

Except for the Swift Fox, Moose, Sheep, Grizzly Bear, Prairie Dogs, Black-footed Ferret, some populations of Marten, and some populations of Lynx, the majority of Wyoming's mammalian SGCN are not truly monitored. A statewide plan is currently being developed for Wyoming's bats, White-tailed Prairie Dog distribution is being mapped in the Kemmerer area, and recent efforts related to the Meadow Jumping Mouse have provided baseline data. More specific descriptions of monitoring activities conducted or proposed by the WGFD and partners are described in Appendix VII.

Fish:

The majority of Wyoming's fish monitoring activities are conducted by the WGFD. In recent years, data collection and monitoring efforts have expanded to include previously overlooked waters and nongame fishes. Current efforts are focused on the Powder River, Green River, and Bear River drainages. Plans are in place to begin monitoring in the Bighorn and Wind River basins. Other entities working to monitor various fisheries include the U. S. Geological Survey, the University of Wyoming, the USFS, the FWS, and NPS. Finally, consultants for various industries are known to conduct fisheries-related work. More specific descriptions of monitoring activities conducted or proposed by the WGFD and partners are described in Appendix VII.

Reptiles and Amphibians:

Via the SWG program, the WGFD has been able to establish an initial program for the conservation and management of reptiles and amphibians. To date, efforts have focused on refining range maps for various species and conducting intensive inventories within the Green River and the Powder River basins. Within the Greater Yellowstone Area, the National Park Service monitors amphibians in order to develop population and distribution trends within Yellowstone National Park, Grand Teton National Park, and Bighorn Canyon National Recreation Area. The USFS, the University of Wyoming and a few private contractors are also known to be conducting amphibian-related research. More specific descriptions of monitoring activities conducted or proposed by the WGFD and partners are described in Appendix VII.

Invertebrates:

Working with two key volunteers, fisheries biologists within the WGFD have established an initial inventory program for mussels. Volunteers and WGFD personnel are conducting specimen collection. These specimens are being stored at the WGFD office in Casper, and the Wyoming Natural Diversity Database has developed a database to facilitate data storage and the generation of distribution maps. More specific descriptions of monitoring activities conducted or proposed by the WGFD and partners are described in Appendix VII.

There are no known programs to systematically inventory and monitor gastropods, fingernail clams, or any of Wyoming's crustaceans.

WHAT NEEDS TO HAPPEN?

Although participants at each workshop addressed this question, the responses were surprisingly similar. Each generated a list of necessary research and information, but two issues were identified as being vital if any additional data was to be collected. The first, and perhaps most important, involved the sharing of information. Wyoming lacks a consistent mechanism to allow members of the broader conservation community to share research findings or coordinate efforts to prevent the duplication of research. The second issue involved a general lack of human and financial resources to collect additional information. Wyoming's CWCS is intended to serve as a central plan to help entities direct their research attentions. The CWCS planning process will provide a regular opportunity for wildlife professionals to collaborate on SGCN, and State Wildlife Grants will provide some of the resources needed to collect baseline information and establish a more comprehensive set of monitoring programs.

WHO NEEDS TO BE INVOLVED?

By and large, each set of participants indicated any inventory and monitoring effort should be as inclusive of as many researchers as possible.

HOW WILL MONITORING OF WYOMING'S SGCN BE ACCOMPLISHED?

The WGFD plans to continue current SGCN monitoring. The effort to develop a CWCS has indicated a significant need for additional monitoring. Current and future monitoring efforts are described in Appendix VI and Appendix VII. Based on the workshop discussions, it is evident that many public and private entities are interested in participating in the implementation of Wyoming's CWCS efforts. During the first years of implementation, it will be incumbent upon WGFD personnel to expand reciprocal and cooperative monitoring strategies with partners for the conservation of Wyoming's SGCN.

MONITORING THE EFFECTIVENESS OF INDIVIDUAL CONSERVATION ACTIONS

The goal of each wildlife or fisheries project conducted by the WGFD is to maintain and perpetuate healthy wildlife populations. This can be accomplished at a variety of geographic and temporal scales, and it is this variability that leads to the various types of performance measures employed to assess overall effectiveness. For short-term projects, such as collecting baseline information, performance can be evaluated with simple measures (i.e. was the specified data collected, and was it reported in a format that will facilitate its use in future management efforts?). For other projects, such as individual habitat treatments implemented to benefit SGCN, the quantity and quality of the treatments must be assessed against the project goals and objectives. Finally, the WGFD works on long-term projects, such as habitat initiatives conducted on large geographic scales involving public and private partners, which may require decades before the ultimate benefits are realized.

In order to determine appropriate short-term, intermediate, and long-term effectiveness measures, the WGFD will utilize an adaptive decision making process. With 279 species, hundreds of conservation problems, variable funding, and many partners and key stakeholders, it is impractical to expect any agency could provide a comprehensive listing of effectiveness measures for all future projects. However, it is possible to provide insights on the process that will be used to generate new monitoring strategies and how appropriate effectiveness measures will be determined. Project-specific discussions will be included within specific project proposals, and this process will involve the following:

- **Identify Precise Project Goals**
This effort will identify how the project will be implemented what results are expected.
- **Identify WGFD Resources That Can Be Applied To The Project**
This discussion will identify the human and financial resources the WGFD will be able to allocate to the specific project and how long those resources will be committed.
- **Identify Partners And Resources They Can Apply To The Project**
As indicated throughout discussions of conservation actions (see Appendix II) the success of Wyoming's CWCS will depend upon the involvement of partners. This discussion will identify the human and financial resources partners will be able to allocate to the specific project and how long those resources will be committed.
- **Determine Appropriate Timeframes For Monitoring And Evaluation**
When working with biological systems, there is always a delay between project implementation and identification of results. The length of this delay can range from days to decades. Within this discussion, project managers will review available research and work with partners (if any) to determine an appropriate timeframe for short-term and intermediate monitoring. In essence, this discussion will determine how quickly project managers can expect to see results and how frequently those changes should be measured.
- **Determine Appropriate Monitoring Strategies And Effectiveness Measures**
Project managers and partners (if any) will review available research to determine the specific monitoring methodologies which will be used and the effectiveness measures that will provide a reasonable indication of how much progress is being made toward achieving the stated project objective. The available human and financial resources will be integral components of this discussion.
- **Determine Responsibility For Monitoring And Reporting On Effectiveness Measures**
Project managers and partners (if any) will work determine who will be responsible for conducting project monitoring and develop a format and schedule for reporting. If the project fails to achieve its specific goals, the report should hypothesize about the contributing conditions or circumstances and offer ideas on how those issues can be ameliorated. These reports can then be used to either prove the ultimate success of

the specific project or adapt project goals, methodologies, monitoring, of evaluation in response to new information.

It is WGFDs intention to utilize this methodology to evaluate the effectiveness of conservation actions implemented to address some aspect or issue identified within the CWCS. In CWCS-related efforts undertaken by partners, WGFD will work to be involved, at least in an advisory capacity in the project planning to ensure compatible performance measures are incorporated.

ADAPTING CONSERVATION ACTIONS IN RESPONSE TO NEW INFORMATION OR CHANGING CONDITIONS

There are two distinct aspects related to program adaptation in the face of new information or changing conditions. The first involves the modification of individual actions to accomplish conservation goals. The second involves the evaluation and adaptation of Wyoming's CWCS as experience is gained in the use of this new planning tool. Each are important, but neither, alone, is sufficient to facilitate the adaptive conservation of Wyoming's SGCN.

As indicated within Section VI, Wyoming's CWCS will be updated every five years, using a methodology similar to the initial Congressional guidelines. During the update process, the summary for each of Wyoming's SGCN will be reviewed in light of projects that have taken place during the intervening period. Again, working with partners to determine the comprehensive status of each species, it will be possible for the broader conservation community to evaluate historic efforts and guide future actions based on a broader base of information and experience.

The second facet associated with evaluating an individual CWCS must answer the fundamental question, "Is this process a more effective way to prioritize efforts and address the needs of Wyoming's SGCN?" In contrast to project level measures, this sort of evaluation will require a more expansive and collective review of how effective the WGFD and its partners were in working together to overcoming the problems identified for each of these species. Although somewhat qualitative in nature, in 2010, the following guidelines should provide an indication of how well Wyoming's CWCS performed and provide guidance on how it can be improved:

1. What percentage of Wyoming's SGCN are included within the 2010 CWCS because managers lack sufficient information to reclassify them as either a higher or lower status within Wyoming's borders relative to their status throughout the remainder of their range?
2. Which, if any, of Wyoming's SGCN identified during 2005 can be removed from this list during 2010?
3. Which, if any, of Wyoming's species were excluded from the 2005 list of SGCN must be included as a SGCN in 2010?

4. The percentage of SWG matching funds derived from all nonfederal sources (i.e. Wildlife and Natural Resources Trust Account, partners, private grants, etc.).
5. Which agencies, organizations, institutions, or individuals have contributed to addressing the conservation problems identified during 2005, and what was the nature of their participation?

SECTION VI

REVIEWING AND UPDATING WYOMING'S CWCS

As indicated within the Congressional guidelines, each state's CWCS must indicate how frequently their CWCS will be updated. Specifically, agencies must provide "Descriptions of procedures to review the Strategy/Plan at intervals not to exceed ten years".

Items 3 thru 6 identified in the CWCS Update section (see below) will be reviewed annually and Wyoming's entire CWCS will be updated on five-year intervals. Through the 1990s and the first five years of the 21st century, Wyoming's landscapes and wildlife resources were affected by significant natural and human-induced occurrences. Issues of drought, residential development, shifts in Wyoming's economy, invasive species, resource extraction, and shifts in the demographic characteristics of Wyoming's human population all have the potential to affect Wyoming's habitats and the wildlife resources they support. By updating this strategy every five years, the WGFD hopes it can continue to be proactive regarding Wyoming's SGCN, and provide valuable and timely services to the people of Wyoming in the management of their wildlife.

As indicated previously, the use of a CWCS is new to Wyoming. Over the next five years a number of lessons will undoubtedly be learned and will need to be incorporated into the 2010 iteration. Taking this caveat into account, it seems three levels of effort will be required to determine the modifications Wyoming's CWCS will require. These include the continuation of activities, a broad review of CWCS methods, and identifying the process which will be used to actually update Wyoming's CWCS.

ONGOING ACTIVITIES

Two ongoing activities will be necessary to improve Wyoming's CWCS in 2010. The first involves the Department's annual reporting process. It is here that the status of SWG projects will be recorded and the associated performance measures will be evaluated. When the CWCS is reviewed, these should provide important data points regarding the success or failure of agency efforts.

The second ongoing activity will involve greater coordination and communication between the WGFD and its various partners. During the March, 2005, CWCS workshops (see Appendix VIII) held in Casper, Wyoming, many participants indicated a need for a regular opportunity for interested parties to meet and share information about Wyoming's SGCN. As an example, it may be possible to include such opportunities in conjunction with the annual meetings of the Wyoming Chapter of the Wildlife Society and the Colorado-Wyoming Chapter of the American Fisheries Society. Beginning in 2006, efforts will be made to organize sessions at each of these meetings. At this point, it is impossible to determine if these sessions are feasible or if they would fully meet this need. However, if these sessions prove problematic or insufficient, attempts will be made to make other arrangements through other organizations or institutions.

REVIEW OF CWCS METHODS

As evidenced during the August, 2004, "One Year Out" Conference hosted by the International Association of Fish and Wildlife Agencies (IAFWA), individual states are using a variety of techniques and tools to develop their CWCS, and few states are attempting to coordinate their efforts with their neighbors. Given this diversity, it is likely some efforts will be more successful than others. During 2008 or 2009, it would be advantageous for the WGFD to conduct a review of as many of the CWCS documents as possible to determine if the methods used or products developed by other agencies would be beneficial to Wyoming and, if so, develop a mechanism to incorporate those improvements into Wyoming's CWCS. Given the high profile nature of this national effort, it is possible that such a review could be facilitated by the IAFWA, the Western Association of Fish and Wildlife Agencies, the Wildlife Management Institute, or some other institution or organization.

CWCS UPDATE

Barring some unforeseen circumstances, the process used to update Wyoming's CWCS will be very similar to the process used in its creation. As such, prior to October 1, 2010, the WGFD will work with its various partners to:

1. Review Wyoming's CWCS in light of ongoing activities and the multi-state review (see above);
2. Update Wyoming's list of SGCN;
3. Update information on the distribution and abundance of Wyoming's SGCN;
4. Update information on the habitats used by Wyoming's SGCN;
5. Describe the problems adversely affecting Wyoming's SGCN or their habitats;
6. Identify and describe the conservation actions necessary to conserve Wyoming's SGCN and their habitats;
7. Develop and describe plans for monitoring the effectiveness of the necessary conservation actions (see item 6);
8. Describe the procedures for developing future iterations of Wyoming's CWCS;
9. Describe plans for coordinating the development, implementation, review, and revision of the CWCS; and
10. Describe the public participation effort associated with the update of Wyoming's CWCS.

SECTION VII

COORDINATION

As indicated within the Congressional guidelines, each state CWCS must include a discussion of “Plans for coordinating the development, implementation, review and revision of the Wyoming CWCS with federal, state and local agencies and Indian tribes that manage significant land and water areas within the state or administer programs that significantly affect the conservation of identified species and habitats”.

The conservation of Wyoming’s rich and abundant wildlife resource is the statutory responsibility of the WGFD, except in those instances where that responsibility is specifically delegated to another entity. That said, it is imperative to recognize that wildlife conservation in Wyoming is much too large and important a task to be carried out entirely by one governmental agency. Many agencies, organizations, groups and individuals have important roles in wildlife conservation in Wyoming, and many of these have had and will continue to have significant roles in developing, implementing and updating this CWCS.

DEFINING ROLES

The process for defining roles in the development of the Wyoming CWCS is critical to its success. Many agencies, organizations, groups and individuals are concerned with the conservation of SGCN, and their contributions to the development of this strategy have been significant. The WGFD, as leader in the development in the CWCS, categorized these stakeholders in the following ways by virtue of their roles in the process:

Partners:

These are agencies, organizations, groups and individuals with data on SGCN or access to data on SGCN. They include:

- Wyoming Natural Diversity Database (WYNDD);
- The Nature Conservancy (TNC);
- Bureau of Land Management (BLM);
- U.S. Forest Service (USFS);
- National Park Service (NPS);
- U.S. Fish and Wildlife Service (FWS);
- Biodiversity Conservation Alliance (BCA);
- Audubon Wyoming;
- Dr. Paul Bartelt – Waldorf College;
- Dr. Chuck Peterson – Idaho State University;
- Dr. Debra Patla - Idaho State University;
- Dr. Brian Smith – Black Hills State University;
- Don Tipton – Rocky Mountain Vivarium; and
- Dr. Alan Cvancara.

Major Stakeholders:

These are agencies, organizations, groups and individuals who may not have significant data or access to data on SGCN, but who have a direct and significant stake in the outcome of the strategy and who were offered an opportunity to play a role in its development. They include:

- Wyoming Department of Agriculture;
- Petroleum Association of Wyoming;
- Wyoming Outdoor Council;
- Greater Yellowstone Coalition;
- Northern Arapaho Business Council;
- Shoshone Business Council;
- University of Wyoming – Institute for Environment and Natural Resources;
- Wyoming Mining Association;
- Wyoming Wool Growers Association;
- Wyoming Association of Conservation Districts;
- Wyoming Stock Growers Association; and
- Wyoming Farm Bureau.

Contact information for partners and major stakeholders is summarized in Appendix I. Contacts with other stakeholders are addressed in Section VIII – Public Participation.

THE PROCESS 2004-2005

Given these defined roles, the following process was conducted to involve both partners and major stakeholders in the development of the Wyoming CWCS:

1. On September 27, 2004, all partners and an initial list of stakeholders were sent a copy of Draft 1 of Wyoming's CWCS, which included a copy of the list of SGCN and a draft copy of Appendix I (now called Appendix II), the species accounts for all SGCN. Their review and comments were requested;
2. During the week of October 25 2004, the WGFD was contacted by various other organizations that wished to receive information on Wyoming's CWCS process. These groups were provided with a copy of the correspondence previously sent to partners and initial stakeholders, a copy of the species accounts, and a cover letter requesting they contact the WGFD if they had information they wished to contribute.
3. Throughout the fall of 2004, the WGFD contacted and met in person with many of the above partners and major stakeholders.. Those who could not be met in person were contacted by phone and e-mail. The purpose of these contacts was to inform them of the CWCS, provide them with information on its purpose and the schedule for its development;

4. From October 2004 through January 2005, the WGFD again contacted partners who indicated an interest in providing comments on the list and species accounts, to discuss that input and associated deadlines, etc. Many partners reviewed this list, compared it to their information and provide significant comment on the draft. In February, 2005, species accounts and other information on the CWCS were posted on the WGFD website.
5. In March 2005, the WGFD hosted a series of CWCS Workshops for WGFD staff and partners. These workshops were organized by taxa and were designed to capture pertinent data on key habitats and fine-tune the distribution, habitat association and monitoring information for these species. Summaries of these workshops are included, in Appendix VIII;
6. On May 10, 2005, Draft 2 of Wyoming's CWCS was posted on the Department's website.
7. On May 11, 2005, the draft CWCS was sent to all partners and major stakeholders with an invitation to comment on that draft. Many partners and major stakeholders were reviewed this draft document and provided significant comment on the draft;
8. From May 10 to May 20, 2005, seven public meetings were held in various locations around Wyoming to present Draft 2 of Wyoming's CWCS, answer public questions, and advise members of the public as to how they could comment upon this document;
9. On June 24, 2005 the final draft of Wyoming's CWCS was posted on the WGFD website. Partners and major stakeholders were invited to meet with WGFD personnel to discuss revisions made to Draft 2; and
10. On July 12, 2005, the final draft CWCS was presented to the Wyoming Game and Fish Commission for their approval. At that time, comments from partners and major stakeholders, along with the public, were invited.

THE PROCESS 2010

The WGFD and its partners see the development and implementation of the Wyoming CWCS as a continuous and adaptive process. As such, the process will continue through the next update of the strategy in 2010. WGFD will maintain contact with interested partners and major stakeholders through the life of this CWCS. These partners and major stakeholders will be involved in the ongoing implementation of this strategy. Periodic reports, both on specific projects and on the overall CWCS will be coordinated and provided by WGFD. No doubt, additional partners and major stakeholders will be added.

In 2009, the process for reviewing and updating the Wyoming CWCS will focus on the 2010 update. While it is impossible to provide specific detail on that process at this time, participants will:

1. Review the list of SGCN, and suggest removal of species that do not warrant a place on that list based on the best information available;
2. Update the species accounts for SGCN, based on the best information available;
3. Review the best available information for SGCN on:
 - Key habitats;
 - Problems and threats;
 - Conservation actions;
 - Monitoring; and
 - Update the CWCS accordingly;
4. Involve partners and major stakeholders in the review and updating of the CWCS;
5. Develop and implement a robust public participation process; and
6. Review the benefits of having a CWCS and determine if this is the best mechanism for conserving Wyoming's SGCN.

SECTION VIII

PUBLIC PARTICIPATION

As indicated within the Congressional guidelines, each state CWCS must include “An effective public participation process”.

There are over 800 species of mammals, birds, reptiles, amphibians, fish, crustaceans and mollusks in Wyoming. State law is quite clear on the question of the ownership of this wildlife. Wyoming Statute 23-1-103 states, “For the purpose of this act, all wildlife in Wyoming is the property of the state. It is the purpose of this act and the policy of the state to provide an adequate and flexible system for control, propagation, management, protection and regulation of all Wyoming wildlife.” State law vests this responsibility with the Wyoming Game and Fish Commission and the Wyoming Game and Fish Department.

The role of the public in the development of the Wyoming CWCS is especially crucial. Without the active involvement of the public, the WGFD cannot hope to conserve the 279 species covered in this strategy. Without their continued financial and political support, this effort cannot succeed. The WGFD, therefore, takes great pride in involving the public in the development and implementation of this CWCS.

As in the case of coordination with partners and major stakeholders, WGFD views public involvement as an ongoing, adaptive process with three major phases:

- Public outreach prior to strategy approval;
- Public involvement in strategy approval; and
- Public outreach throughout implementation and revision.

This section summarizes our efforts in each of the phases.

PUBLIC OUTREACH PRIOR TO STRATEGY APPROVAL

The goal of public outreach efforts prior to strategy approval was to introduce the public to the CWCS and make them aware of opportunities for their participation in its development.

With that goal in mind, a number of outreach tools were utilized:

- In January, 2005, WGFD produced radio and TV features that briefly explained the need for the CWCS and introduced viewers/listeners to the SGCN. These features were distributed to media outlets throughout the state.
- In February, the list of SGCN and species accounts were posted on the WGFD website.

- From January through May the state's only statewide newspaper featured coverage on the CWCS.
- In March, 2005, *Wyoming Wildlife* magazine featured a short article updating readers on the development of the CWCS.
- In April, 2005, a second installment of radio and TV features were produced, updating viewers/listeners on progress on the CWCS and noting the scheduled public meetings in May.
- In September, 2005, *Wyoming Wildlife* magazine will feature an in-depth article on Wyoming's SGCN and the CWCS.

PUBLIC INVOLVEMENT IN STRATEGY DEVELOPMENT

The goal of public outreach efforts in strategy development was to involve a broad segment of stakeholders, particularly in Wyoming, in review and revision of the draft CWCS.

With that goal in mind, a number of outreach and stakeholder involvement tools were utilized:

- In April, WGFD sent news releases to all major Wyoming print media outlets advising them of the schedule for upcoming public meetings.
- In May, an additional news release featuring a specific SGCN, the plains black-headed snake, was sent to all major Wyoming print media outlets, again advising the public of the upcoming meetings.
- In May, 2005, the Draft #2 of the CWCS was posted on the WGFD website. It was highlighted on the home page, and visitors were advised of opportunities for comment on the strategy.
- Partners and major stakeholders were contacted prior to the public meetings to encourage them to share information on these meetings in their newsletters, websites, etc.

Seven public meetings were held in May, 2005. A total of 43 people attended these meetings. Attendees were presented with a summary of the CWCS, and invited to review Draft #2 on the WGFD website and provide comments. Meeting dates, locations and attendance are summarized below:

May 10	Green River	G&F Office	2
May 11	Jackson	49er Inn	9
May 12	Lander	Lander Public Library	6
May 16	Laramie	Albany County Public Library	3
May 17	Cody	Holiday Inn	14
May 18	Sheridan	CTEL Hall at Sheridan College	3
May 19	Casper	G&F Office	6
Total attendance			43

Meetings were featured in several articles in the local media, with information on how to review and comment on the CWCS. Meeting summaries are included in Appendix IX.

- Comments on Draft #2 of the A total of 20 written responses were received on the draft CWCS. Changes to the text were made based on these comments. Comments are included in Appendix IX.
- On June 16-17, partners and stakeholders were invited to review the final draft and meet with the WGFD personnel responsible for preparing the CWCS to express any final concerns and provide any additional input prior to the presentation before the Wyoming Game and Fish Commission.
- The CWCS was presented for approval at the July 12, 2005 meeting of the Wyoming Game and Fish Commission. Comments on the strategy were again solicited. Ten comments were provided.

PUBLIC INVOLVEMENT IN STRATEGY IMPLEMENTATION AND REVISION

The goal of public outreach efforts in strategy implementation will be to keep stakeholders informed of significant developments and to prepare those stakeholders to make suggestions for meaningful revisions in the strategy when it is revised in 2010.

With that goal in mind, a number of outreach tools will be utilized:

- The September, 2005 issue of *Wyoming Wildlife* magazine will feature a special section on the CWCS and SGCN.
- The CWCS will remain on the WGFD website, to allow stakeholders to review it at their convenience, from 2005 through 2010.
- WGFD will produce regular news releases and video segments, featuring SGCN and activities related to the CWCS.
- WGFD will meet regularly with major stakeholders and partners to coordinate activities under the CWCS.

Literature Cited

Section I – Species of Greatest Conservation Need

- Aranjo M.B. and P.H. Williams 2001. The bias of complementarily hotspots toward marginal populations. *Conservation Biology* 15(6):1710.
- Beardmore, J. A. 1983. Extinction, survival, and genetic variation. Pages 125-151 in C. M. Schhonedwald-Cox, S. M. Chambers, B. MacBryde and L. Thomas, editors. *Genetics and conservation*. Benjamin/Cummings Publishing, London.
- Carson, H. L. 1959. Genetic conditions which promote or retard the formation of species. *Cold Spring Harbor Symposium in Quantitative Biology* 24:87-105.
- Caughley, G and A. Gunn. 1996. *Conservation Biology in Theory and Practice*. Blackwell Science. Cambridge Massachusetts.
- Comer, P., S. Menard, M. Tuffly, K. Kindscher, R. Rondeau, G. Jones, G. Steinuaer, R. Schneider, and D. Ode. 2003. *Upland and Wetland Ecological Systems in Colorado, Wyoming, South Dakota, Nebraska and Kansas*. Report and map to the National Gap Analysis Program. USGS, NatureServe, Arlington, Virginia.
- Crowe, D.M. 1986. *Furbearers of Wyoming*. Wyoming Game and Fish Department Cheyenne, Wyoming.
- Frankel, O. H. and M. E. Soule. 1981. *Conservation and evolution*. Cambridge University Press, Cambridge, England.
- Furrow F.B. and T. Amrijo Prewitt. 1995. Peripheral populations and range collapse. *Conservation Biology* 9(6): 1345.
- Furrow, F.B. 1995. Life in the margins: Emphasis on local species diversity has overshadowed an important aspect of reserve design. *Wild Earth* 5(3): 43-45.
- Gilpin, M. E. and M. E. Soule. 1986. Minimum viable populations: Processes of species extinction. Pages 19-34 in M.E. Soule, editor. *Conservation biology*. Sinauer Associates, Sunderland, Massachusetts.
- Lawton, J. H. 1993. Range, population abundance and conservation. *Trends in Ecology and Evolution* 8:409-413.
- Lesica P. and F.W. Allendorf 1995. When are peripheral populations valuable for conservation? *Conservation Biology* 9:753-60
- Levin, D. A. 1970. Developmental instability and evolution in peripheral isolates. *American Naturalist* 104:343-353.

- Lomolino, M.V., and R. Channell. 1995. Splendid isolation: Patterns of geographic range collapse in endangered mammals. *Journal of Mammalogy*: 76: 335-347.
- Mayr, E. 1954. Change of genetic environment and evolution. Pages 157-180 in J. Huxley, C. Hardy and E.B. Ford, editors. *Evolution as a process*. Allen & Unwin, London.
- Mayr, E. 1963. *Animal species and evolution* Harvard University Press, Cambridge, Massachusetts.
- Nielsen J.L.S., J.M. Scott and J.L. Aycrigg. 2001. Endangered species and peripheral populations: cause for conservation. (Letter to the editor.) *Endangered Species Update* 9/1/2001.
- Oakleaf, B., A.O. Cerovski, and B. Luce. 1996. *Nongame Bird and Mammal Plan*. Wyoming Game and Fish Department. Cheyenne, Wyoming.
- Peterson A.T. 2001. Endangered species and peripheral populations: cause for reflection. *Endangered Species Update* 18:30-1.
- Simpson, G. G. 1944. *Tempo and mode in evolution*. Columbia University Press, New York.
- Stebbins, G. L. and J. Major. 1965. Endemism and speciation in the California flora. *Ecological Monographs* 35:1-35.

Section II - Habitat

- Berelson, W.L., P. Caffrey, and J. Hamerlinck. 2001. *Creating Hydrologic Unit Boundaries for Wyoming: A Semi-Automated Approach*. Retrieved April 11, 2005 from <http://gis.esri.com/library/userconf/proc01/professional/papers/pap707/p707.htm>.
- Cleland, D.T., P.E. Avers, W.H. McNab, M.E. Jensen, R.G. Bailey, T. King, and W.E. Russel. 1997. National hierarchical framework of ecological units. Pages 181-200 in M.S. Boyce and A. Haney, editors. *Ecosystem management: Applications for sustainable forest and wildlife resources*. Yale University Press, New Haven, Connecticut. In *State of the Southern Rockies Ecoregion*. 2004. A report by the Southern Rockies Ecosystem Project, Denver, Colorado.
- Comer, P., D. Faber-Langendoen, R. Evans, S. Gawler, C. Josse, G. Kittel, S. Menard, M. Pyne, M. Reid, K. Schulz, K. Snow, and J. Teague. 2003. *Ecological Systems of the United States: A Working Classification of U.S. Terrestrial Systems*. NatureServe, Arlington, Virginia. 75pp.

- Copeland, H., J. Kiesecker, and J. Ward. 2005. *Habitat Quality and Vulnerability Assessment of Wyoming's Ecological Systems*. The Nature Conservancy, Wyoming Chapter, Lander, WY. 16pp.
- Patton, T. M.. 1997. *Distribution and Status of Fishes in The Missouri River Drainage in Wyoming: Implications For Identifying Conservation Areas*. PhD. Dissertation, University of Wyoming, Laramie.
- Patton, T. M. 2001. Application of a Modified Index of Centers of Density to Four Drainages within the Missouri River Drainage, Wyoming. Wyoming Game and Fish Department, Fish Division. 26pp.
- Wyoming Game and Fish Department. 2001. Strategic habitat plan. WGFD. 231 pp.

Section III – Problems/Threats

- Adamus, Paul. 2004. Classification, assessment, monitoring, and evaluation of riverine and palustrine wetland ecosystems. Pages 277-296 in M.C.McKinstry, W.A. Hubert, and S.H. Anderson, editors. *Wetland and riparian areas of the intermountain West: ecology and management*. University of Texas Press, Austin, Texas, USA.
- Baxter, G.T. and M.D. Stone. 1995. *Fishes of Wyoming*. Wyoming Game and Fish Department. 290 pp.
- Berkman, H.E. and C.F. Rabeni. 1987. Effect of siltation on stream fish communities. *Environmental Biology of Fishes* 18:285-294.
- Carlander. K.D. 1969. *Handbook of Freshwater Fishery Biology*. The Iowa State University Press, Ames, Iowa. 752 pp.
- Carlson, C.A. 1982. Review of selected literature on the upper Colorado River System and its fishes. *Proceedings of the Western American Fisheries Society*.
- Clarkson, R.W and M.R. Childs. 2000 Temperature effects of hypolimnial release dams on early life stages of Colorado River Basin big river fishes. *Copeia* 2000: 409-412.
- Comer, P., D. Faber-Langendoen, R. Evans, S. Gawler, C. Josse, G. Kittel, S. Menard, M. Pyne, M. Reid, K. Schulz, K. Snow, and J. Teague. 2003. *Ecological Systems of the United States: A Working Classification of U.S. Terrestrial Systems*. NatureServe, Arlington, Virginia. 75pp.

- Copeland, H., J. Kiesecker, and J. Ward. 2005. *Habitat Quality and Vulnerability Assessment of Wyoming's Ecological Systems*. The Nature Conservancy, Wyoming Chapter, Lander, WY. 16pp.
- Ehrhart, R.C., and P.L. Hansen. 2004. Management of riverine wetland habitats. Pages 87-104 in M.C.McKinstry, W.A. Hubert, and S.H. Anderson, editors. *Wetland and riparian areas of the intermountain West: ecology and management*. University of Texas Press, Austin, Texas, USA.
- Fausch, K.D., and K.R. Bestgen. 1997. Ecology of fishes indigenous to the central and southwestern Great Plains. Pages 131-166 in F.L. Knopf and F.B. Samson, editors. *Ecology and conservation of Great Plains vertebrates*. Springer-Verlag, New York.
- Hubert, W. 1994. Exotic fish. Pages 158--174 in T. L. Parrish, and S. H. Anderson, editors. *Exotic species manual*. Wyoming Game and Fish Department, Laramie, WY.
- Knight, D.H. 1994. *Mountains and plains: the ecology of Wyoming landscapes*. Yale University Press. 338 pp.
- Livingston, W. 2000. Maine's spruce-fir forest after the spruce budworm epidemic. Pp 26-30 in W.D. Ostrofsky and T.J. Dagon, Eds. *Fourth Annual Munsungon Conference Proceedings: Forest Health*. Maine Agricultural and Forest Experiment Station Miscellaneous Publication 742. University of Maine, Orono, Maine.
- Matthews, W.J. 1988. North American prairie streams as systems for ecological study. *Journal of the North American Benthological Society* 7:387-409.
- McKinstry, M.C., W.A. Hubert, and S.H. Anderson, editors. 2004. *Wetland and riparian areas of the intermountain West: ecology and management*. University of Texas Press, Austin, Texas, USA.
- Mitchum, D.L. 1995. *Parasites of Fishes in Wyoming*. Wyoming Game and Fish Dept., Cheyenne. 304 pp.
- Myers, T.J. and S. Swanson. 1995. Impact of deferred restoration grazing on stream characteristics in central Nevada: a case study. *North American Journal of Fisheries Management* 15:428-439.
- Paige, C and S.A.Ritter. 1999. *Managing birds in a sagebrush sea: managing sagebrush for bird communities*. Partners in Flight, Western Working Group. 51pp.

- Robinson, A.T. 1998. Dispersal of larval fishes in a regulated river tributary. *Transactions of the American Fisheries Society* 127: 729-786.
- Simon, J.R. 1946. Wyoming fishes. Wyoming Game and Fish Department Bull. 4. 129 pp. (revised 1951)
- Slawski, T.M., and T.J. Ehlinger. 1998. Fish habitat improvement in box culverts: management in the dark? *North American Journal of Fisheries Management* 18:676-685.
- Southern Rockies Ecosystem Project. 2004. The State of the Southern Rockies Ecoregion. Colorado Mountain Club Press. Golden, Colorado. 137 pp.
- USGS. 1995. Digital line graph 1:100,000 series transportation system data. 1993-1995. U. S. Geological Survey.
- Weitzel, D.L. 2002a. Conservation and Status Assessments for the Bluehead Sucker (*Catostomus discobolus*), Flannelmouth Sucker (*Catostomus latipinnis*), Roundtail Chub (*Gila robusta*), and Leatherside Chub (*Gila copei*): Rare Fishes West of the Continental Divide, Wyoming. Wyoming Game and Fish Department. Laramie.
- _____. 2002b. Conservation and Status Assessments for the Common Shiner (*Luxilus cornutus*), Hornyhead Chub (*Nocomis biguttatus*), Suckermouth Minnow (*Phenacobius mirabilis*), and Orangethroat Darter (*Etheostoma spectabile*): Rare Stream Fish Species of Platte River Drainages, Wyoming. Wyoming Game and Fish Department. Laramie.
- _____. 2002c. Conservation and Status Assessments for the Finescale Dace (*Phoxinus neogaeus*), Pearl Dace (*Margariscus margarita*), and Plains Topminnow (*Fundulus sciadicus*): Rare Native Fish Species of the Niobrara and Platte River Basins, Wyoming Game and Fish Department. Laramie.
- _____. 2002d. Conservation and Status Assessments for the Sturgeon Chub (*Macrhybopsis gelida*), Western Silvery Minnow (*Hybognathus argyritis*), and Goldeye (*Hiodon alosoides*): Rare Fish Species of the Upper Missouri River Drainage, Wyoming. Wyoming Game and Fish Department. Laramie.
- Wheeler, C.A. 1997. Current Distributions and Distributional Changes of Fishes in Wyoming West of the Continental Divide. M.S. Thesis, Department of Zoology and Physiology, University of Wyoming. 113 pp.
- Whittier, T.R. 1997. Cyprinid distribution in the Northeastern USA lakes: evidence of regional scale minnow biodiversity losses. *Canadian Journal of Fish and Aquatic Science* 54:1593-1607.

Section IV – Conservation Actions

- Bartos, D.L. and R.B. Campbell, Jr. 1998. Decline of Aspen in the Interior West – Examples from Utah. *Rangelands* 20(1), 17-24.
- Beetle, D., 1989. Checklist of recent Mollusca of Wyoming, USA. *Great Basin Naturalist*, 49: 637-45.
- Cvancara, A.M. 2004. Wyoming native species status: Freshwater mussels. Report submitted to Wyoming Game and Fish Department, Cheyenne, WY. 2pp.
- Hubert, W.A., 1988. Survey of Wyoming crayfishes. *Great Basin Naturalist*, 48: 370-372.
- Patton, T., and S. Anderson. 1999. Recommendations for the Development of an Amphibian and Reptile Conservation Program in the Wyoming Game and Fish Department, and a Tentative Status Assessment of Wyoming's Herpetofauna. Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, Laramie, WY.
- Reynolds, R.T. 1989. Accipiters. pp. 92-101 *in* Proceedings of the Western Raptor Management Symposium and Workshop, Nat. Wildl. Fed. Sci. and Tech. Series no. 12.
- Wyoming Game and Fish Department. 2001. Strategic habitat plan. WGFD. 231 pp.

Section V – Monitoring

- Nicholoff, S. H., compiler. 2003. Wyoming Bird Conservation Plan, Version 2.0. Wyoming Partners In Flight. Wyoming Game and Fish Department, Lander, WY.

Section VI – Reviewing and Updating

None

Section VII – Coordination

None

Section VIII – Public Participation

None

Other Citations:

Wyoming Steering Committee. 2005. Coordinated Implementation Plan for Bird Conservation in Central and Western Wyoming (BCRs 10, 16, 18). Intermountain West Joint Venture, Salt Lake City, UT. 38pp.

WGFD. 1995. Section Two: Wetland Component. Pages 81-109 in J.F. Mahoney, C. Colgan, and G. Thorson. State Comprehensive Outdoor Recreation Plan. Wyoming Parks & Cultural Resources Commission, Cheyenne, WY. 109pp.

Wyoming Steering Committee. 2005. Coordinated Implementation Plan for Bird Conservation in Central and Western Wyoming (BCRs 10, 16, 18). Salt Lake City, UT. 38pp.

Sec. 404, Clean Water Act (Title 33, Chapter 26, Subchapter I, § 1251)

U.S. Army Corps of Engineers, Sec. 404.b.1 guidelines.

Abert's Squirrel (*Sciurus aberti*)**Status: NSS3; NatureServe G5 S1****Abundance:** Rare

Introduction: The Abert's squirrel primarily inhabits Colorado, New Mexico, Arizona, and northern Mexico. In Wyoming, it occurs only near Harriman in the southeastern corner of the state. The Abert's squirrel is considered rare in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in distribution and habitat is restricted, although there is no ongoing significant loss.

Habitat: The Abert's squirrel relies on ponderosa pine for most of its life requirements, although it may also extend into mixed conifer and upper pinyon-juniper woodland. Suitable habitat consists of open, heterogeneous, uneven-aged stands, with clusters of even-aged groups connected by canopy corridors to provide secure travel routes. Although squirrels will use most trees in a heterogeneous stand for one or more of their life requirements, clusters of large trees (greater than 30 cm [12 in] diameter at breast height) provide the greatest benefits to squirrels.

Problems:

- Population status and trends of the Abert's squirrel are poorly known in Wyoming;
- There are no efforts to identify or maintain key habitats in Wyoming;
- Rangewide population declines are a result of a variety of forest management strategies that have altered the density, age, spacing, and overall structure of old growth ponderosa pine forests;
- Recent forest management practices have not been directed at reestablishing conditions that would increase habitat quality for Abert's squirrels; and
- Rural home development could affect the ability of the species to persist in certain areas. Along the Front Range of Colorado, the species has become rare where housing density is high in ponderosa pine forests, and it has been replaced by the fox squirrel. It is unknown whether the development displaced the Abert's squirrel, then the fox squirrel occupied those areas or whether the fox squirrel displaced the Abert's squirrel.

Conservation Actions:

- Conduct inventories for Abert's squirrels in all potential habitat in the state;
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area;
- Manage for large-diameter (greater than 30 cm [12 in] diameter at breast height), cone-producing ponderosa pines in areas where Abert's squirrels occur; and
- Manage Abert's squirrel habitat to provide open (370 to 620 trees per ha [150 to 250 per ac]), heterogeneous, uneven-aged stands, with clusters of even-aged groups connected by canopy corridors.

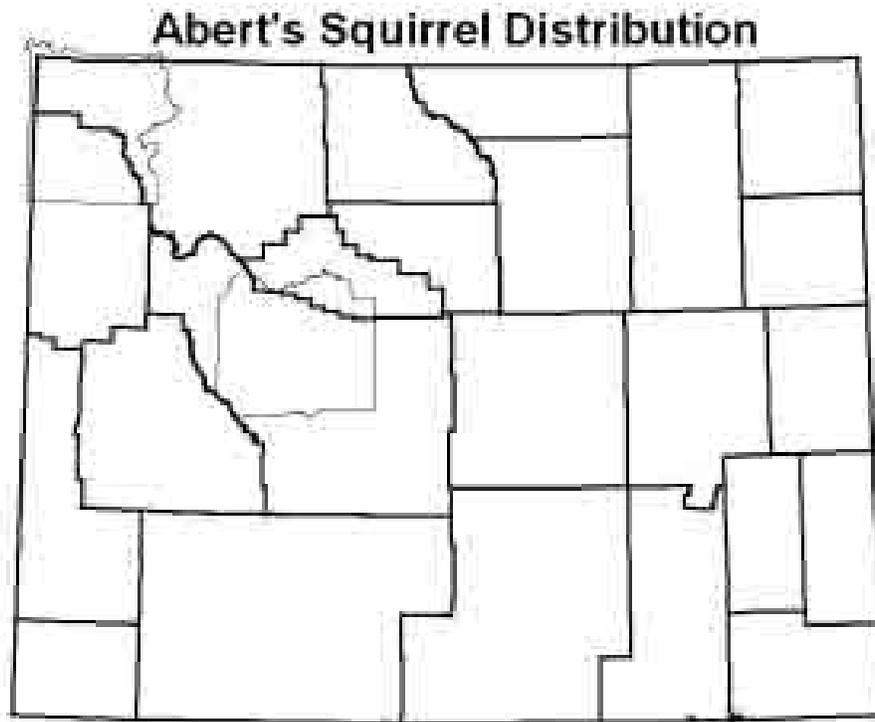
References and Additional Reading:

Keith JO. 2003. Abert's squirrel (*Sciurus aberti*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. Online:

<http://www.fs.fed.us/r2/projects/scp/assessments/abertsquirrel.pdf>.

Nash DJ, Seaman RN. 1977. *Sciurus aberti*. Mammalian Species 80:1-5. Sullivan J. 1995. *Sciurus aberti*. In: Fire effects information system. USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Online:

<http://www.fs.fed.us/database/feis/>.



Big Brown Bat (*Eptesicus fuscus*)**Status: NSS3; NatureServe G5 S5****Abundance:** Common

Introduction: The big brown bat inhabits most of North America from Alaska and southern Canada through Mexico and into South America. It is a year-round resident in Wyoming and is found throughout the state, from the eastern plains to over 3050 m (10,000 ft) in the mountains. The big brown bat is considered common in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because, although it is widely distributed, it is experiencing ongoing significant loss of habitat.

Habitat: The big brown bat occupies a wide variety of habitats and elevations, including cottonwood riparian woodlands, sagebrush-steppe, juniper woodlands, conifer forests, and aspen woodlands. It is better adapted to human habitation than most bat species, and can often be found in urban areas and around manmade structures. Although the big brown bat is well known for its tendency to roost in buildings, it also uses a wide variety of other manmade and natural roosts, including tree cavities, rock crevices, caves, abandoned mines, and bridges. During winter, it hibernates primarily in caves, buildings, and abandoned mines.

Problems:

- Population status, trends, and distribution of the big brown bat are unknown in Wyoming, precluding effective management;
- Roosting habitat has been lost in Wyoming and continues to be threatened by abandoned mine reclamation, removal of old buildings, and renewed mining;
- Recreational activities (such as spelunking and rock climbing) may impact roosting bats in caves, abandoned mines, and rock crevices;
- Timber harvest and the removal of snags may result in loss of roosting habitat; and
- Broad-scale insect control projects may impact the prey base of bats and other insectivores.

Conservation Actions:

- Continue to conduct inventories and monitoring to determine the population status and habitat requirements of the big brown bat in Wyoming;
- Work cooperatively with state and federal agencies, the Western Bat Working Group, the Wyoming Bat Working Group, and public and private entities to preserve existing bat habitats, identify potential habitats, and minimize the impacts of pesticides and other environmental contaminants;
- Educate the public about the ecological role of bats and their habitat requirements;
- Minimize disturbance of caves or abandoned mines where big brown bats (or other bats) are roosting;
- Protect abandoned mines where big brown bats (and other bats) roost from hard closure; and
- Manage big brown bat roosting areas to avoid conflicts with timber harvest activities. Retain all tall, large-diameter snags as potential roost sites for big brown bats and other snag-dependent species.

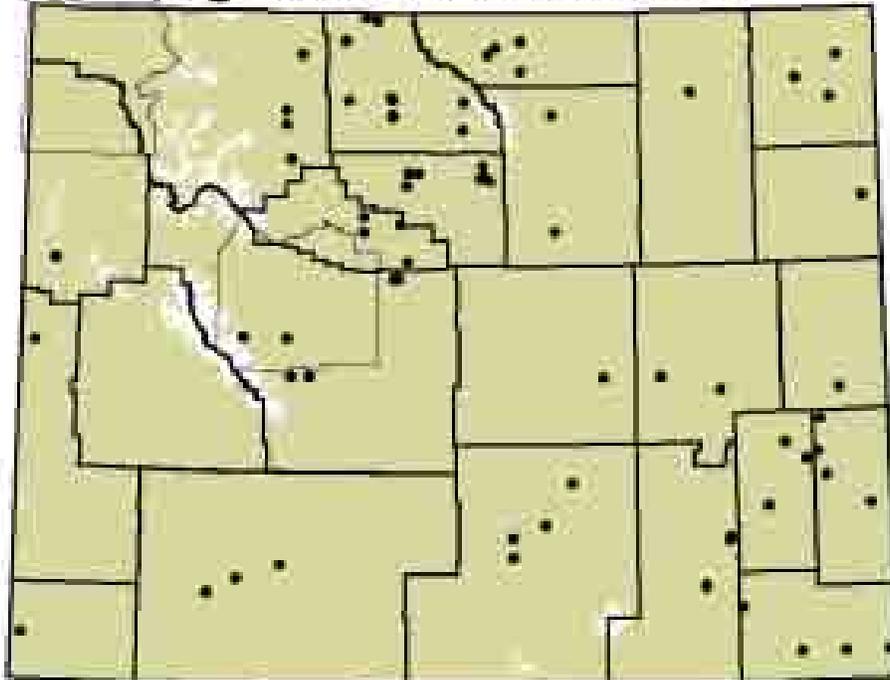
References and Additional Reading:

Kurta A, Baker RH. 1990. *Eptesicus fuscus*. Mammalian Species 356:1-10. Nicholoff SH, Grenier M. Wyoming bat conservation plan. Lander: Wyoming Game and Fish Department. Forthcoming.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Pierson ED, Wackenhut MC, Altenbach JS, Bradley P, Call P, Genter DL, Harris CE, Keller BL, Lengus B, Lewis L, and others. 1999. Species conservation assessment and strategy for Townsend's big-eared bat (*Corynorhinus townsendii townsendii* and *Corynorhinus townsendii pallescens*). Boise: Idaho Conservation Effort, Idaho Department of Fish and Game. 68 p.

Big Brown Bat Distribution



Bighorn Sheep (*Ovis canadensis*)**Status: NSS3; NatureServe G4 S3 S4****Abundance:** Common

Introduction: Bighorn sheep occupy portions of the Cascade and Sierra Nevada Ranges and throughout the Rocky Mountains, south of the Peace River in British Columbia to Mexico (Lawson and Johnson 1982). In Wyoming, the subspecies (*o. c. canadensis*) occurs in eight core, native herds in the northwest portion of the state, in the Absaroka, Teton, Gros Ventre, and Wind River Ranges. Seven herds which have been augmented or re-established via transplants occur in the Wyoming, Snowy, and Sierra Madre Ranges, near Laramie Peak, along the Lander Front, in the Seminoe/Ferris Mountains, and on the west slope of the northern Bighorn Mountains. Post-season 2003, the estimated statewide population (excluding Yellowstone National Park) of bighorn sheep was 5,865 (population objective = 8735). However, numbers of sheep in some herds cannot be determined, so this is a conservative estimate. The large, core, native herds of bighorn sheep in the northwest corner of the state account for over 90% of Wyoming's statewide total. Transplant herds in the previously-mentioned ranges account for the remaining 10% of Wyoming's statewide population.

Habitat: Bighorn sheep in Wyoming occupy a variety of seasonal ranges. In northwest Wyoming, they use primarily alpine tundra and associated rocky escape cover during the summer. In winter, they use lower elevation open, grassy benches and slopes. Bighorn sheep in central and southeastern Wyoming are non-migratory and use open, grassy areas associated with escape cover as year round habitat. Bighorn sheep evolved in open, high-visibility habitats that allowed efficient foraging and enhanced detection of predators. Conifer encroachment and vegetative succession in the absence of periodic fire (either naturally-ignited or prescribed) have diminished habitat quality for bighorn sheep in many parts of Wyoming, and throughout their range in the western U. S. and Canada.

Problems:

- Bighorn sheep are highly susceptible to diseases of domestic sheep, most notably Pasteurellosis, and to certain parasites, such as Psoroptes spp., mites which cause scabies, and Protostrongylus spp., lungworms;
- Bighorn sheep habitat quality and quantity is declining in certain locations due to loss of the natural fire cycle, invasion of exotic plants, changes in native plant composition on winter ranges, and effects of the recent drought; and
- Lamb/ewe ratios are low in some sheep herds, indicating a fecundity or lamb survival problem, which may possibly be related to nutrition (mineral deficiency?) or forage quality.

Conservation Actions:

- More bighorn sheep winter range vegetation studies are needed to document range condition and composition;
- Better data is needed on the composition and size of many bighorn sheep herds in the state;
- Efforts to separate bighorn sheep and domestic sheep need to continue. Separation of domestic and wild sheep is imperative for the long-term maintenance of healthy wild sheep populations in Wyoming;
- There is a need to improve bighorn sheep winter range for some herds; and

- There is a need to reverse conifer and shrub invasion of sheep habitats in many parts of Wyoming. Prescribed burning and management of naturally-occurring fires in important bighorn sheep habitats should be a high priority for federal land-management agencies (i.e. US Forest Service, Bureau of Land Management), as well as WGFD.

References and Additional Reading:

Lawson B, Johnson R. 1982. Mountain Sheep. *In* Chapman JA, Feldhamer GA, eds. *Wild Mammals of North America*. Baltimore (MD): The Johns Hopkins University Press. P 1036-1058.

Final Report and Recommendations from the Wyoming Statewide Bighorn/Domestic Sheep Interaction Working Group. 2004 (in press).



Black-footed Ferret (*Mustela nigripes*)**Status: NSS1; NatureServe G1 S1****Abundance:** Rare

Introduction: The black-footed ferret once occurred throughout the grasslands and basins of interior North America, from southern Canada to Texas. The black-footed ferret was believed to be extinct throughout North America when a small relic population was discovered in a prairie dog colony near Meeteetse, Wyoming, in 1981. Canine distemper and sylvatic plague decimated that population in 1986 and 1987. The 18 surviving ferrets were captured and became the founder population for federal captive breeding efforts initiated by the Wyoming Game and Fish Department (WGFD). These efforts were successful and have provided ferrets for reintroduction at nine sites in the western US. Currently only two reintroduced populations have been established and no longer require releases of captive-raised ferrets — one in western South Dakota and the other in southeastern Wyoming. Historical records of black-footed ferrets are known from nearly all sagebrush and grassland habitats in Wyoming; however the only population currently known in the state has been reintroduced into the Shirley Basin area near Medicine Bow. The black-footed ferret has low abundance in Wyoming and is considered rare. In 2004, a minimum of 88 ferrets were observed during a partial survey of Shirley Basin. The WGFD classifies the black-footed ferret as a Species of Special Concern with a Native Species Status of 1 (NSS1) because populations are greatly restricted, making extirpation possible, and there is ongoing significant loss of habitat.

Habitat: The black-footed ferret is found almost exclusively in prairie dog colonies in basin-prairie shrublands, sagebrush-grasslands, and grasslands. It is dependent on prairie dogs for food and all essential aspects of its habitat, especially prairie dog burrows where it spends most of its life underground.

Problems:

- Eradication of prairie dogs by humans directly coincided with the demise of the black-footed ferret;
- Epizootics of sylvatic plague and canine distemper minimize the potential for successful reintroduction under current management paradigms;
- Successful reintroduction efforts are limited by the availability of captive-raised ferrets; inadequate funding; and protocol that is cumbersome, cost-ineffective, and out-of-date;
- Funding has been inadequate to annually monitor the ferret population and habitat in Shirley Basin; and
- Prairie dog eradication efforts and the legitimate needs of many livestock producers limit the number of potential reintroduction sites for black-footed ferrets. Recent petitions to list prairie dogs under the Endangered Species Act have accelerated eradication efforts and disabled cooperative programs with private landowners.

Conservation Actions:

- Develop and maintain at least two wild black-footed ferret populations in Wyoming, including the population in Shirley Basin. Continue to monitor the Shirley Basin ferret population, the status of its habitat, and diseases;
- Evaluate prairie dog habitat annually in order to analyze and predict how many black-footed ferrets Wyoming's prairie dog towns can support;
- Evaluate the potential and need for future translocations into the Shirley Basin/Medicine Bow Management Area to minimize the loss of genetic diversity in the ferret population;
- Develop a cooperative management program for prairie dogs and associated grassland species in Wyoming;
- Continue to coordinate with the US Fish and Wildlife Service (USFWS) to determine the availability of captive-raised ferrets and assist in developing a streamlined, cost-effective reintroduction program in Wyoming;
- Identify additional reintroduction approaches and sites in Wyoming; and
- Evaluate the potential to utilize the captive breeding and conditioning facilities at the Tom Thorne/Beth Williams Research Center after the USFWS moves its operation to another facility.

References and Additional Reading:

- Ballou JD, Oakleaf R. 1989. Demographic and genetic captive breeding recommendations for black-footed ferrets. In: Seal US, Thorne ET, Bogan MA, Anderson SH, eds. Conservation biology and the black-footed ferret. New Haven (CT): Yale Univ Pr. p 247-67.
- Black-footed Ferret Advisory Team. 1990. A cooperative management plan for black-footed ferrets at Meeteetse. Cheyenne: Wyoming Game and Fish Department. 45 p.
- Caughley G, Gunn A. 1996. Conservation biology in theory and practice. Cambridge (MA): Blackwell Science. 459 p.
- Grenier M, Van Fleet L. Spotlighting for free ranging black-footed ferrets in the Shirley Basin/Medicine Bow Management Area, Wyoming. In: Cerovski AO, ed. Threatened, endangered, and nongame bird and mammal investigations: annual completion report. Cheyenne: Wyoming Game and Fish Department. Forthcoming.
- Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

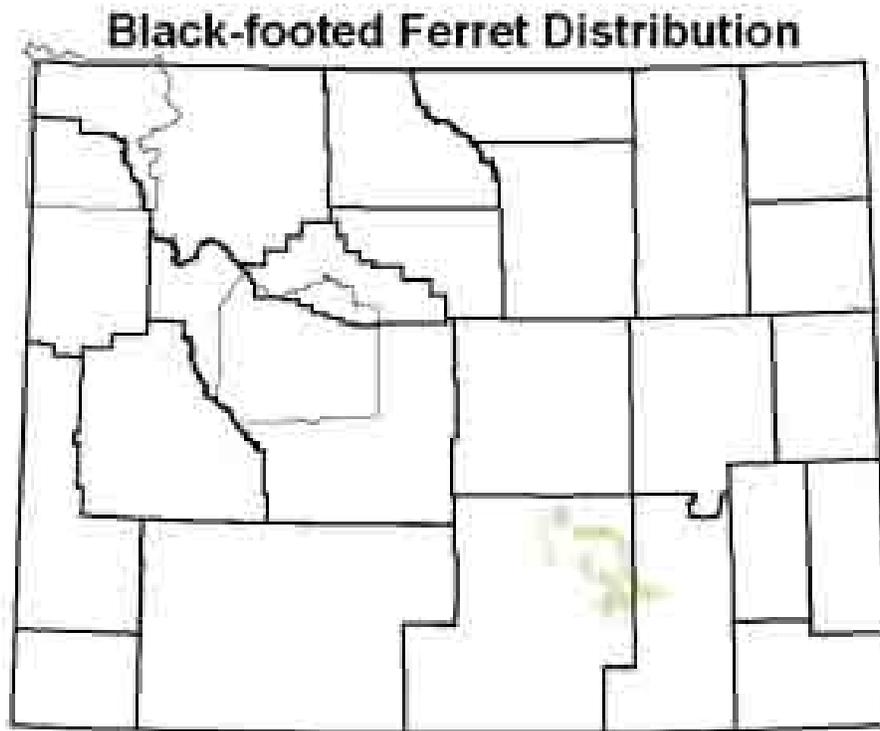
Oakleaf B, Luce B, Thorne ET, Biggins D, Torbit S. 1992. Black-footed ferret reintroduction in Wyoming: project description and 1992 protocol. Wyoming Game and Fish Department, US Fish and Wildlife Service, and Bureau of Land Management. 55 p.

Shirley Basin/Medicine Bow Black-footed Ferret Working Group. 1991. A cooperative management plan for black-footed ferrets, Shirley Basin/Medicine Bow, Wyoming. Cheyenne: Wyoming Game and Fish Department. 84 p.

Seal US, Thorne ET, Bogan MA, Anderson SH, eds. 1989. Conservation biology and the black-footed ferret. New Haven (CT): Yale Univ Pr.

Thorne ET, Oakleaf B. 1991. Species rescue for captive breeding: black-footed ferret as an example. In: Beyond captive breeding. Symp Zool Soc London 62:241-61.

Wyoming Game and Fish Department. 1987. A strategic plan for the management of black-footed ferrets in Wyoming.



Black-tailed Prairie Dog (*Cynomys ludovicianus*) Status: NSS3; NatureServe G3 G4 S2

Abundance: Common

Introduction: Historically, the black-tailed prairie dog occurred throughout the Great Plains states from Canada to Mexico and west to southeastern Arizona, although it is now uncommon or extirpated from much of its former range. In Wyoming, it occurs in the eastern third of the state. The black-tailed prairie dog is considered common in Wyoming, although its abundance fluctuates with activity levels of sylvatic plague and the extent of control efforts by landowners. Mapping conducted by the Wyoming Game and Fish Department (WGFD) between 1982 and 1987 indicated a minimum of 53,055 ha (131,000 ac) of black-tailed prairie dog colonies with a statewide estimate ranging up to 82,620 ha (204,000 ac). Mapping of colonies using color infrared photographs from the 2001/2002 National Aerial Photography Program documented over 92,675 ha (229,000 ac) of black-tailed prairie dog colonies. Comparisons with 1994 Digital Ortho Quarter Quads indicated that black-tailed prairie dog acreage had remained stable from 1994 through 2001. However, aerial surveys in 2003 to document the status of all known colonies indicated that a significant portion (approximately 47%) of the prairie dog acreage was impacted by sylvatic plague and/or control efforts. Data indicate that both factors are affecting prairie dog abundance in Wyoming at greater levels in 2002 than in 2000 prior to the listing of the species as warranted but precluded by the U.S. Fish and Wildlife Service. In 2004, as a result of conservation efforts by the western states and the Prairie Dog Conservation Team, the species was removed from the Candidate List. The WGFD classifies the black-tailed prairie dog as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are declining, although extirpation is not imminent, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The black-tailed prairie dog inhabits dry, flat, open, shortgrass and mixed-grass grasslands with low, relatively sparse vegetation, including areas overgrazed by cattle. It constructs extensive burrow systems in fine to medium textured upland soil types. Because the black-tailed prairie dog provides food and unique habitat features that are important to many other wildlife species, it is considered a keystone species of prairie grasslands.

Problems:

- Population trends and status are not well documented. Current trend data have not been readily available to the general public and resource managers;
- There are extreme differences of opinions concerning acceptable statewide population objectives and appropriate management responses if objectives are not maintained;
- Prairie dogs have been targets of intensive eradication programs and conservation efforts may be poorly understood and not supported;
- Sylvatic plague has the potential to have substantial negative impacts on prairie dog populations. There are currently no effective management approaches to mitigate the spread of plague; and
- Listed as a pest under Wyoming's Weed and Pest Act, and recreational shooting is currently not regulated or monitored by the WGFD.

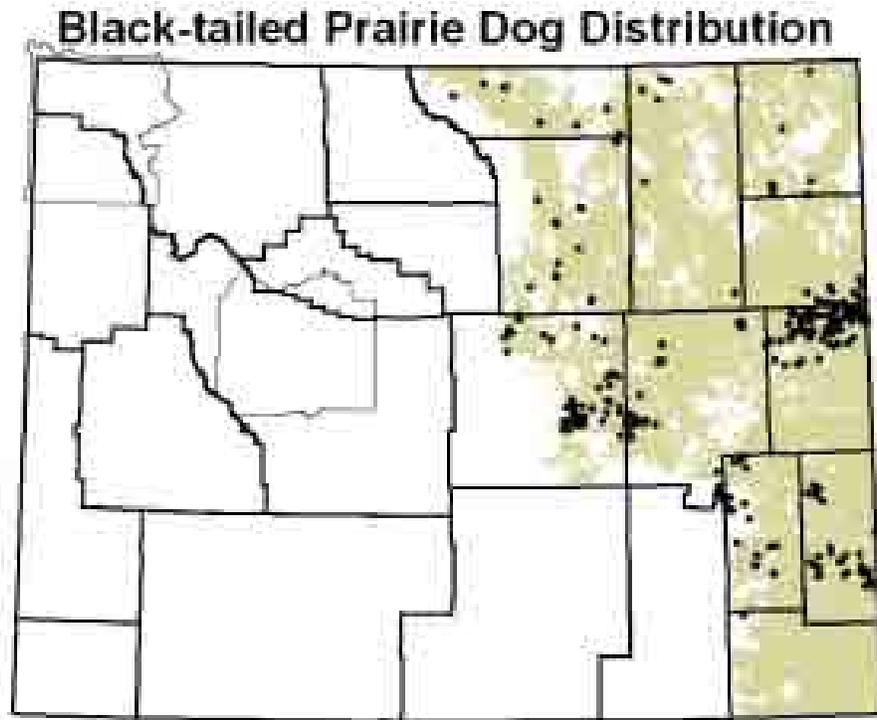
Conservation Actions:

- Continue inventories and monitoring as recently developed and recommended by Grenier and others (2005);
- Maintain at least 219,000 acres of black-tailed prairie dog colonies with at least 100,000 healthy acres as described in Grenier and others (2005);
- If monitoring data show that objectives are not being met, provide information to the Wyoming Game and Fish Commission to allow them to evaluate and consider an appropriate response, such as regulating shooting pressure, or implementing a memorandum of understanding with the Wyoming Board of Agriculture, The Wyoming Weed and Pest Council, and the WGFD that limits the distribution of toxicants and their participation in control programs;
- As part of a planned grassland conservation program, provide assistance and incentives to landowners to conserve prairie dogs and their habitat. Normal safeguards provided by the Wyoming Weed and Pest Act of 1973 should give assurance to adjacent landowners that they will not be impacted by increasing prairie dog populations;
- Develop education programs in schools and public forums about the ecological value of prairie dogs and their role as keystone species to build a support base for developing and implementing an effective management program; and
- Give priority and special management attention to prairie dog complexes of at least 2000 ha (5000 ac), as these are integral to the black-tailed prairie dog's ecology and are important habitats for many associated or dependent species.

References and Additional Reading:

- Grenier M, Oakleaf B, Taylor K, Hymas M. Mapping and estimates of black-tailed prairie dogs in Wyoming, an estimate of hectares. In: Cerovski AO, ed. Threatened, endangered, and nongame bird and mammal investigations: annual completion report. Cheyenne: Wyoming Game and Fish Department. Forthcoming.
- Hoogland JL. 2003. Black-tailed prairie dog. In: Feldhamer GA, Thompson BC, Chapman JA, eds. Wild mammals of North America: biology, management, and conservation. 2d ed. Baltimore: Johns Hopkins Univ Pr. p 232-47.
- NatureServe. 2004. NatureServe explorer: an online encyclopedia of life. Version 1.8. Arlington (VA): NatureServe. Online <http://www.natureserve.org/explorer>.
- Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.
- Van Pelt WE. 1999. The black-tailed prairie dog conservation assessment and strategy. Fifth draft. Phoenix: Arizona Game and Fish Department, Nongame and Endangered Wildlife Program. 61 p. Online: <http://www.r6.fws.gov/btprairiedog/conasstrat.htm>.

Wyoming Black-tailed Prairie Dog Working Group. 2001. Wyoming black-tailed prairie dog management plan. Final draft. 53 p.



Canada Lynx (*Lynx canadensis*)

Status: NSS1; NatureServe G5 S1

Abundance: Rare

Introduction: The Canada lynx occurs throughout the boreal forests of Alaska and Canada and extends south into portions of the Continental United States. In Wyoming, it occurs in the western mountains on the Bridger-Teton, Shoshone, and Targhee national forests, and Grand Teton and Yellowstone national parks. It has also been documented in the Uinta, Bighorn, and Laramie mountain ranges as well. The Canada lynx is considered rare in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 1 (NSS1) because there is ongoing significant loss of habitat and extirpation appears possible.

Habitat: The Canada lynx inhabits mountain regions, primarily at elevations between 2356 and 2869 m (7730 to 9413 ft) and on slopes of 8 to 12%. It usually occurs in extensive tracts of dense coniferous forest, primarily Engelmann spruce and subalpine fir. It feeds primarily on snowshoe hares, especially during winter, and the prime consideration for lynx is habitat for snowshoe hares. Older forests with a substantial understory of conifers or small patches of shrubs and young trees provide good quality lynx foraging habitat. The most important component of denning habitat is large woody debris, especially dense tangles of fallen trees and root wads. Such preferred habitat is relatively limited in Wyoming and occurs primarily in multiple use areas of the Shoshone and Bridger-Teton National Forests. The National Parks and designated wilderness areas in Wyoming tend to be marginal lynx habitat as they are either dominated by dry even aged lodgepole pine forests, or too steep and high elevation.

Problems:

- Records indicate a reduction in abundance between the early 1970s and 1996 throughout the species' historic range in Wyoming. Surveys specifically for lynx document a continued decline from 1996 through 2002;
- Documented declines and continued significant loss of habitat suggest that the lynx could be extirpated in Wyoming in as few as 10 years;
- Most lynx habitat parameters have not been adequately quantified in Wyoming;
- Existing suitable lynx habitat in Wyoming is very patchy and is primarily outside of wilderness areas;
- Lynx habitat occurs on US Forest Service lands that receive the greatest pressure for increased snowmobile access, logging, and other habitat-altering uses;
- Extensive clearcutting occurred in Wyoming in the late 1970s and 1980s, and many of these forest openings are not regenerating into suitable lynx/snowshoe hare habitat;
- Human activity and competitors, like the coyote and bobcat, have increased in lynx winter habitat. Plowed roads and packed trails may allow other predators to travel and hunt in deep snow; and
- There is disagreement over the size of historical populations in Wyoming.

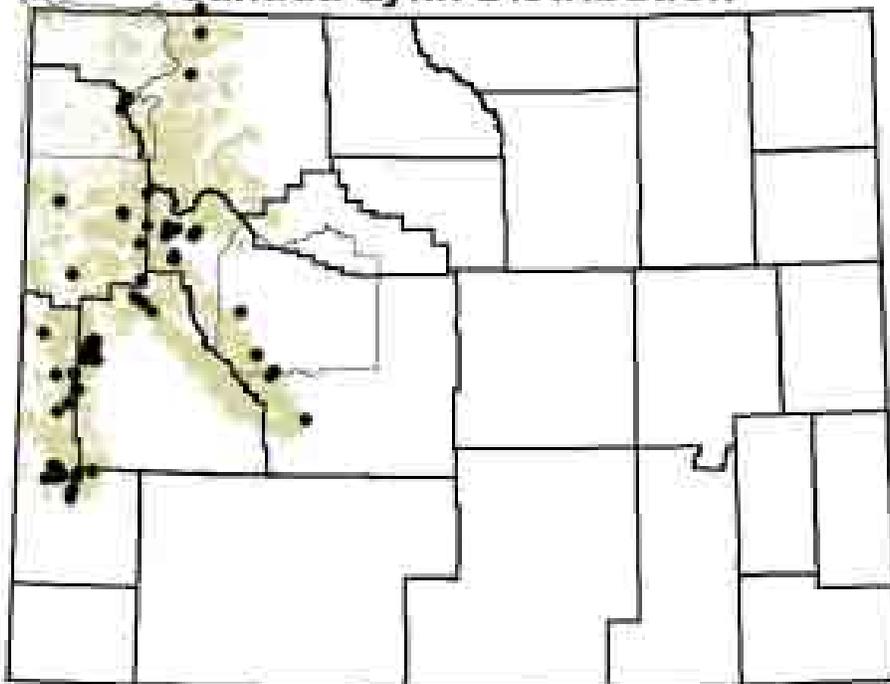
Conservation Actions:

- Continue efforts to define and monitor the population status, trends, and distribution of lynx in Wyoming;
- Continue to research and quantify habitat parameters for lynx in Wyoming;
- Continue research on impacts of recreational activities in lynx habitat;
- Work cooperatively with the Bridger-Teton, Targhee, and Shoshone national forests to conduct surveys for lynx in all potential habitat, particularly in potential timber sale areas;
- Manage recreational activities in lynx habitat to minimize packed snow trails outside of designated concentrated use areas; and
- Design vegetation treatments, fire management plans, and grazing regimes in lynx habitat that mimic and restore natural landscape patterns and disturbance processes, retain and recruit old growth and woody debris, maintain habitat connectivity, and maintain the native composition of herbaceous plant and shrub communities.

References and Additional Reading:

- Anderson EM, Lovallo MJ. 2003. Bobcat and lynx. In: Feldhamer GA, Thompson BC, Chapman JA, eds. *Wild mammals of North America: biology, management, and conservation*. 2d ed. Baltimore: Johns Hopkins Univ Pr. p 758-86.
- Laurion T, Oakleaf B. 1998. Wyoming lynx inventories. In: *Threatened, endangered, and nongame bird and mammal investigations: annual completion report*. Wyoming Game and Fish Department. p 169-87.
- Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.
- Ruediger B, Claar J, Gniadek S, Holt B, Lewis L, Mighton S, Naney B, Patton G, Rinaldi T, Trick J, and others. 2000. Canada lynx conservation assessment and strategy. Missoula (MT): USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, USDI National Park Service. 122 p. Online: <http://www.fs.fed.us/r1/wildlife/carnivore/Lynx/lcas.pdf>.
- Ruggiero LF, Aubry KB, Buskirk SW, Koehler GM, Krebs CJ, McKelvey KS, Squires JR. 1999. Ecology and conservation of lynx in the United States. Gen Tech Rep RMRS-GTR-30WWW. Fort Collins (CO): USDA Forest Service, Rocky Mountain Research Station. Online: http://www.fs.fed.us/rm/pubs/rmrs_gtr30.html.
- Ruggiero LF, Aubry KB, Buskirk SW, Lyon LJ, Zielinski WJ, tech eds. 1994. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. Gen Tech Rep RM-254. Fort Collins (CO): USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. 184 p. Online: http://www.fs.fed.us/rm/pub_rm/rm_gtr254.pdf.
- Tumlison R. 1987. *Felis lynx*. *Mammalian Species* 269:1-8.

Canada Lynx Distribution



Canyon Mouse (*Peromyscus crinitus*)

Status: NSS3; NatureServe G5 S1

Abundance: Rare

Introduction: The canyon mouse occurs from Oregon south to northwestern Mexico and east to Colorado and Wyoming. In Wyoming, it is probably confined to isolated patches of habitat that occur on bluffs and tabletop mesas in Sweetwater County, southwestern Wyoming. The canyon mouse is considered rare in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in distribution, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The canyon mouse occurs exclusively in rocky habitats, such as cliffs, boulders, and talus. In Wyoming, it inhabits limber pine or juniper habitats with sandy soils and sandstone rock outcrops. It digs burrows in loose sand or occupies natural rock shelters and crevices.

Problems:

- Population status, trends, and distribution of the canyon mouse are unknown in Wyoming, precluding effective management. It is difficult to survey because of its scattered, low-density populations; and
- There are no efforts to identify key habitats in Wyoming.

Conservation Actions:

- Conduct inventories for canyon mice in all potential habitat in the state;
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated areas; and
- Management of juniper in southwestern Wyoming should not favor one of the juniper obligates to the detriment of others. Instead, management should be coordinated to provide a mosaic of juniper woodland conditions.

References and Additional Reading:

Johnson DW, Armstrong DM. 1987. *Peromyscus crinitus*. Mammalian Species 287:1-8.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Rompola KM. 2000. Small mammals of a juniper woodland and sagebrush-grassland mosaic in southwestern Wyoming. MSc thesis. Laramie: Univ Wyoming.

Wilson DE, Ruff S. 1999. The Smithsonian book of North American mammals. Washington: Smithsonian Inst Pr. 750 p.

Canyon Mouse Distribution



Cliff Chipmunk (*Tamias dorsalis*)

Status: NSS3; NatureServe G5 S1

Abundance: Rare

Introduction: The cliff chipmunk inhabits the southwestern US, from southern Idaho south into northern Mexico. In Wyoming, it was formerly abundant along the Green River, but the flooding of Flaming Gorge Reservoir destroyed most of its habitat, confining it to an area of rock outcrops near Sage Creek in Sweetwater County, southwestern Wyoming. The cliff chipmunk is considered rare in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in distribution, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The cliff chipmunk occupies steep, rocky hillsides, rock outcrops, cliffs, and talus slopes in juniper woodlands. It nests deep in crevices of cliffs, rocky bluffs, and underground burrows.

Problems:

- Population status, trends, and distribution of the cliff chipmunk are unknown in Wyoming, precluding effective management; and
- There are no efforts to identify key habitats in Wyoming.

Conservation Actions:

- Conduct inventories for cliff chipmunks in all potential habitat in the state;
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area; and
- Management of juniper in southwestern Wyoming should not favor one of the juniper obligates to the detriment of others. Instead, management should be coordinated to provide a mosaic of juniper woodland conditions.

References and Additional Reading:

Hart EB. 1992. *Tamias dorsalis*. Mammalian Species 399:1-6.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Rompola KM. 2000. Small mammals of a juniper woodland and sagebrush-grassland mosaic in southwestern Wyoming. MSC thesis. Laramie: University of Wyoming.

Wilson DE, Ruff S. 1999. The Smithsonian book of North American mammals. Washington: Smithsonian Inst Pr. 750 p.

Cliff Chipmunk Distribution



Dwarf Shrew (*Sorex nanus*)

Status: NSS3; NatureServe G4 S4

Abundance: Rare

Introduction: The dwarf shrew is distributed locally from Montana and South Dakota south to Arizona and New Mexico. It probably occurs throughout most of Wyoming except the Bighorn Mountains, the basins of northeastern Wyoming, and the southeastern grasslands. The dwarf shrew is considered rare in Wyoming, and probably occurs in relatively small, isolated populations. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in numbers, and habitat is vulnerable, although there is no ongoing loss of habitat.

Habitat: The dwarf shrew occupies a variety of habitats, from alpine tundra through subalpine forests and rock-slides, and, at lower elevations, from montane forests and foothills to arid shortgrass prairie. It appears to be relatively tolerant of arid situations and often occurs at greater distances from permanent water than other small shrews. It often inhabits rocky areas such as talus slopes, especially in alpine and subalpine habitats.

Problems:

- Population status, trends, and distribution of the dwarf shrew are unknown in Wyoming, precluding effective management;
- There are no efforts to identify or maintain key habitats in Wyoming; and
- Sampling and identification of shrews requires special methods, equipment, and experience to be successful and scientifically useful.

Conservation Actions:

- Conduct inventories for dwarf shrews in all potential habitat in the state;
- Provide methodology and technical assistance to encourage participation by US Forest Service and Bureau of Land Management biologists; and
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area.

References and Additional Reading:

Clark TW, Harvey AH, Dorn RD, Genter DL, Groves C, eds. 1989. Rare, sensitive, and threatened species of the Greater Yellowstone Ecosystem. Northern Rockies Conservation Cooperative, Montana Natural Heritage Program, The Nature Conservancy, and Mountain West Environmental Services. 153 p.

Hoffman RD, Owen JG. 1980. *Sorex tenellus* and *Sorex nanus*. Mammalian Species 131:1-4.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Wilson DE, Ruff S. 1999. The Smithsonian book of North American mammals. Washington: Smithsonian Inst Pr. 750 p.

Dwarf Shrew Distribution



Abundance: Rare

Introduction: The fisher occurs only in North America, throughout northern coniferous and mixed forests of Canada and into the Northern Rockies in the West, from Minnesota to Upper Michigan and Wisconsin in the Midwest, and throughout most of the forested regions of the northeastern states. Fishers are generalized predators with a diet of small to medium sized birds and mammals, and also consume deer carrion and fruit. When abundant, porcupines and snowshoe hare are the preferred prey. Although sightings of the fisher are reported in most mountain ranges, few documented records exist for Wyoming and are limited to the extreme northwestern part of the state. Unlike other forest carnivores, such as the lynx or wolverine, even historical records (pre-1970) are lacking and limited to one specimen in the Bighorn Mountains, 1964. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in numbers and distribution, and its habitat is restricted.

Habitat: The fisher inhabits coniferous forests, aspen, and cottonwood-riparian areas. Older forests with a substantial understory of tree sizes and shapes, small patches of shrubs, snags, fallen trees, and limbs close to the ground provide good fisher foraging habitat. Fishers also prefer large diameter logs or snags for natal and maternal dens.

Problems:

- Population, status, trends, and distribution of the fisher are unknown, precluding effective management;
- There are no efforts to identify key habitats in Wyoming; and
- Populations may be limited in some areas by timber harvesting (including firewood cutting) and high-intensity fires in spruce-fir forests.

Conservation Actions:

- Conduct inventories for fishers in all potential habitat in the state;
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area;
- Maintain structurally-diverse forests with abundant snags, downed timber, and herbaceous vegetation in areas where fishers occur; and
- Manage fisher habitat to reduce conflicts with timber harvesting.

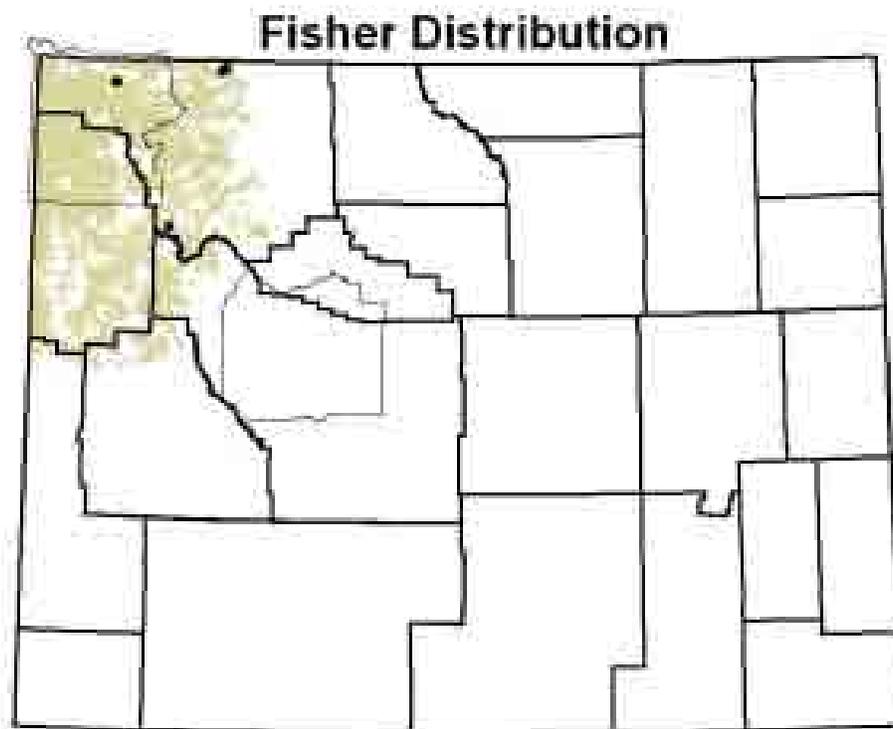
References and Additional Reading:

Clark TW, Harvey AH, Dorn RD, Genter DL, Groves C, eds. 1989. Rare, sensitive, and threatened species of the Greater Yellowstone Ecosystem. Northern Rockies Conservation Cooperative, Montana Natural Heritage Program, The Nature Conservancy, and Mountain West Environmental Services. 153 p.

Powell, RA, Buskirk SW, Zielinski WJ. 2003. Fisher and marten. In: Feldhamer GA, Thompson BC, Chapman JA, eds. Wild mammals of North America: biology, management, and conservation. 2s ed. Baltimore: Johns Hopkins Univ Pr. P 635-649.

Ruggiero LF, Aubry KB, Buskirk SW, Lyon LJ, Zielinski WJ, tech eds. 1994. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. Gen Tech Rep RM-254. Fort Collins (CO): USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. 184 p.

Wilson DE, Ruff S. 1999. The Smithsonian book of North American mammals. Washington: Smithsonian Inst Pr. 750 p.



Fringed Myotis (*Myotis thysanodes*)**Status: NSS2; NatureServe G4 G5 S2****Abundance:** Rare

Introduction: The fringed myotis inhabits most of the western United States from British Columbia south to southern Mexico. It probably occurs in suitable habitat over much of Wyoming. However, there have been no current sightings of the fringed myotis in the northwestern portion of the state, where there are several historical records. Although its winter range is poorly known, it is probably a year-round resident in Wyoming. The fringed myotis is considered rare in Wyoming. There have been fewer than 20 specimens of this species documented in the state, and it is possible that populations have become smaller and more isolated in recent decades. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 2 (NSS2) because populations are restricted in distribution and there is ongoing significant loss of habitat. Of all the populations in Wyoming, the Black Hill population is considered to be of special concern due to its restricted distribution.

Habitat: The fringed myotis is found in a wide range of habitats, including coniferous forests, woodlands, grasslands, and shrublands, although it is probably most common in xeric woodlands, such as juniper, ponderosa pine, and Douglas-fir. It typically forages over water, along forest edges, or within forests and woodlands. During summer, it uses a variety of roosts, including rock crevices, tree cavities, caves, abandoned mines, and buildings. During winter, it hibernates in caves, abandoned mines, and buildings.

Problems:

- Population status, trends, and distribution of the fringed myotis are unknown in Wyoming, precluding effective management;
- Roosting habitat has been lost in Wyoming and continues to be threatened by abandoned mine reclamation, removal of old buildings, and renewed mining;
- The fringed myotis is extremely sensitive to disturbance at roost sites, particularly maternity colonies. Recreational activities (such as spelunking and rock climbing) may impact roosting bats in caves, abandoned mines, and rock crevices;
- Timber harvest and the removal of snags may result in loss of roosting habitat; and
- Broad-scale insect control projects may impact the prey base of bats and other insectivores.

Conservation Actions:

- Continue to conduct inventories and monitoring to determine the population status and habitat requirements of the fringed myotis in Wyoming;
- Work cooperatively with state and federal agencies, the Western Bat Working Group, the Wyoming Bat Working Group, and public and private entities to preserve existing bat habitats, identify potential habitats, and minimize the impacts of pesticides and other environmental contaminants;
- Educate the public about the ecological role of bats and their habitat requirements;
- Minimize disturbance of caves or abandoned mines where fringed myotis (or other bats) are roosting;
- Protect abandoned mines where fringed myotis (and other bats) roost from hard closure; and

- Manage fringed myotis roosting areas to avoid conflicts with timber harvest activities. Retain all tall, large-diameter snags as potential roost sites for fringed myotis and other snag-dependent species.

References and Additional Reading:

Keinath DA. Species assessment for fringed myotis (*Myotis thysanodes*). Laramie: Wyoming Natural Diversity Database. Forthcoming.

Nicholoff SH, Grenier M. Wyoming bat conservation plan. Lander: Wyoming Game and Fish Department. Forthcoming.

O'Farrell MJ, Studier EH. 1980. *Myotis thysanodes*. Mammalian Species 137:1-5.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Pierson ED, Wackenhut MC, Altenbach JS, Bradley P, Call P, Genter DL, Harris CE, Keller BL, Lengus B, Lewis L, and others. 1999. Species conservation assessment and strategy for Townsend's big-eared bat (*Corynorhinus townsendii townsendii* and *Corynorhinus townsendii pallescens*). Boise: Idaho Conservation Effort, Idaho Department of Fish and Game. 68 p.

Schmidt CA. 2003a. Conservation assessment for the fringed bat in the Black Hills National Forest, South Dakota and Wyoming. Custer (SD): USDA Forest Service, Black Hills National Forest. 20 p. Online www.fs.fed.us/r2/scp/species_assessment_reports.shtml.

Fringed Myotis Distribution



Great Basin Pocket Mouse (*Perognathus parvus*)

Status: NSS3; NatureServe G5 S2

Abundance: Rare

Introduction: The Great Basin pocket mouse occurs throughout the Great Basin from south-central British Columbia south to southern California and northern Arizona. It occurs only in the southwestern corner of Wyoming and is considered rare. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in distribution, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The Great Basin pocket mouse is found in arid and semiarid habitats. It is strongly associated with sandy habitats where sagebrush is dominant, and primarily occupies steppe and arid open shrub and woodland habitats. It also may be abundant locally in rocky areas.

Problems:

- Population status, trends, and distribution of the Great Basin pocket mouse are unknown, precluding effective management;
- There are no efforts to identify key habitats in Wyoming; and
- May be impacted by management strategies in shrub-grasslands, that reduce grass production and seed set.

Conservation Actions:

- Conduct inventories for Great Basin pocket mice in all potential habitat in the state; and
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area.

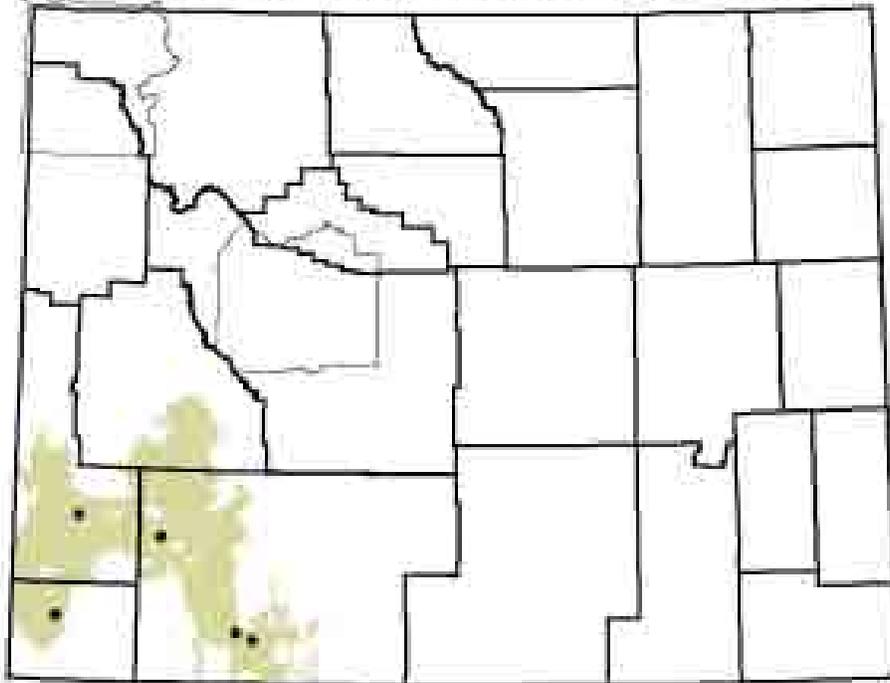
References and Additional Reading:

Howard JL. 1996. *Perognathus parvus*. In: Fire effects information system. USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Online: <http://www.fs.fed.us/database/feis/>.

Verts BJ, Kirkland GL. 1988. *Perognathus parvus*. Mammalian Species 320:1-4.

Wilson DE, Ruff S. 1999. The Smithsonian book of North American mammals. Washington: Smithsonian Inst Pr. 750 p.

Great Basin Pocket Mouse Distribution



Grizzly Bear (*Ursus arctos*)**Status: NSS3; NatureServe G4 T3 T4 S1****Abundance:** Rare

Introduction: Grizzly bears are long-lived, with lifespans in excess of 25 years in un hunted populations. They are omnivores with a diet consisting of a wide variety of vegetative material, ants, small mammals, ungulates, and on occasion domestic livestock. Bears in the Yellowstone Ecosystem also extensively utilize white bark pinecone nuts, cutthroat trout, and army cutworm moths. Male and female average home range is 874 km² and 281 km², respectively. In Yellowstone the average age of first female reproduction is six years. Litter size averages two cubs at three-year intervals. Breeding occurs in the late spring through mid summer. The fertilized ova develop to the blastocyst stage and then are implanted in November. Gestation averages six to eight weeks. Cubs are born in the den.

Habitat: Grizzly bears use a wide variety of habitats, probably due to their omnivorous feeding habits. In the Greater Yellowstone area bears are currently restricted to higher elevation habitats in Northwestern Wyoming, Southern Montana, and Eastern Idaho. Grizzly Bears are very sensitive to human disturbances, especially roads. Open road densities are closely monitored to assure that adequate secure habitat is provided. The Yellowstone population has increased from a low of approximately 200 bears in the late 1960s to over 600 now. Bears continue to increase in numbers and are expanding their occupied habitat primarily due to very restricted human caused mortalities.

Problems:

- As bears expand into areas outside the Recovery Area where human activities are more intense human caused mortalities will increase. Conflicts involving grizzly bears and outdoor recreationists and grizzly bears in residential areas are of particular concern;
- Potential loss of habitat and some important food sources (white bark pines) may affect population survivorship; and
- Adequate food and garbage storage regulations need to be addressed in areas on the fringe of bear distribution.

Conservation Actions:

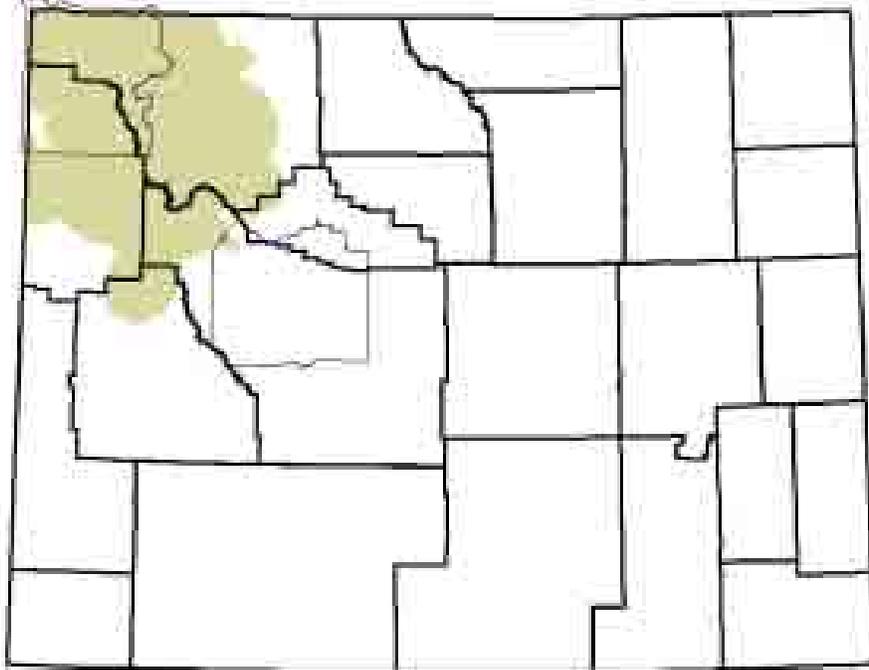
- Assessment of suitable areas for future bear occupancy;
- Assess potential source-sink issues;
- Identify potential impacts of highway improvement projects;
- Document the rate of loss for potential food sources;
- Monitor population parameters in areas with higher human use compared to core areas; and
- Identify appropriate mortality regimes to stabilize the population when all suitable areas are occupied.

References and Additional Reading:

Grizzly Bear Chapter of Wild Mammals of North America: Biology, Management, and Conservation, 2003.

Wyoming Grizzly Bear Management Plan. Wyoming Game & Fish Dept., 2003. Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area, Interagency Conservation Strategy Team, 2003.

Grizzly Bear Distribution



Hayden's Shrew (*Sorex haydeni*)

Status: NSS4; NatureServe G4 S3

Abundance: Rare

Introduction: The Hayden's shrew inhabits the northern Great Plains of central North America, from southern Alberta, Saskatchewan, and Manitoba south to northern Kansas and Missouri. In Wyoming, it occurs in the Black Hills and the Bighorn Mountains. The Hayden's shrew is considered rare in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because populations are restricted in distribution and habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The Hayden's shrew inhabits grasslands, prairies, marshes, riparian areas, and wet meadows. In the Black Hills, it is locally abundant in wet areas, although it is sometimes found in rocky, drier pine habitats, and appears to favor areas with at least some open grassland. It nests under logs or rocks or in crevices.

Problems:

- Population status, trends, and distribution of the Hayden's shrew are unknown, precluding effective management;
- There are no efforts to identify or maintain key habitats in Wyoming; and
- Sampling and identification of shrews requires special methods, equipment, and experience to be successful and scientifically useful.

Conservation Actions:

- Conduct inventories for Hayden's shrews in all potential habitat in the state;
- Provide methodology and technical assistance to encourage participation by US Forest Service and Bureau of Land Management biologists; and
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area.

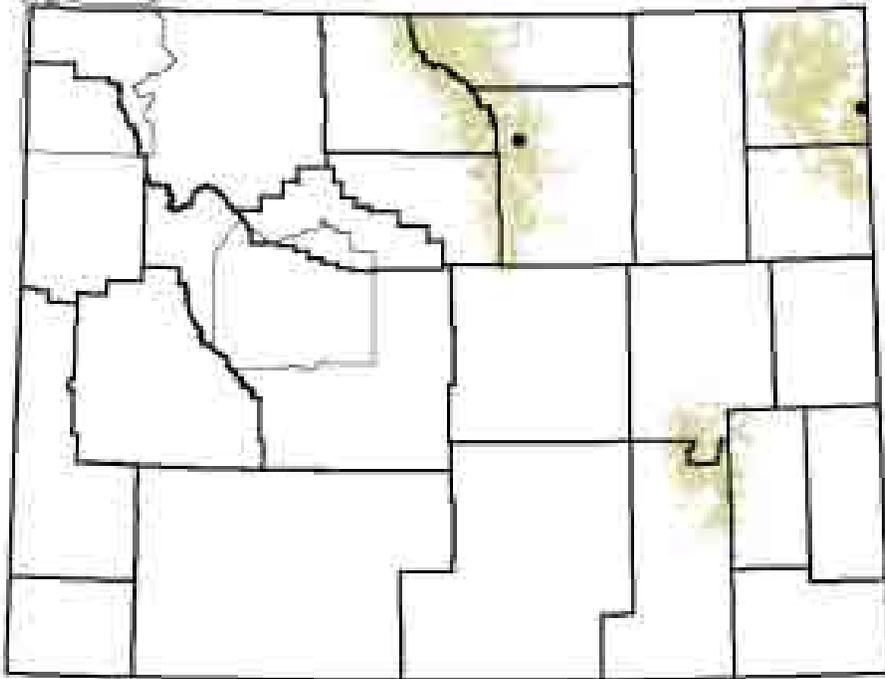
References and Additional Reading:

Cerovski AO, Grenier M, Oakleaf B, Van Fleet L, Patla S. 2004. Atlas of birds, mammals, amphibians, and reptiles in Wyoming. Lander: Wyoming Game and Fish Department, Nongame Program. 206 p.

Clark TW, Stromberg MR. 1987. Mammals in Wyoming. Lawrence (KS): Univ Kansas, Museum Nat Hist. 314 p.

Wilson DE, Ruff S. 1999. The Smithsonian book of North American mammals. Washington: Smithsonian Inst Pr. 750 p.

Hayden's Shrew Distribution



Hispid Pocket Mouse (*Chaetodipus hispidus*)**Status: NSS3; NatureServe G5 S2****Abundance:** Rare

Introduction: The hispid pocket mouse occurs from southern North Dakota south through the Great Plains to Arizona, central Mexico, and western Louisiana. It is mainly distributed east and southeast of Wyoming, although it is known to occur in southeastern and northeastern Wyoming. The hispid pocket mouse is considered rare in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in distribution, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The hispid pocket mouse inhabits a variety of dry, grassland habitats. Across much of its range it is most common in shortgrass and open bunchgrass prairie with sparse or moderate vegetation, although in eastern Wyoming it is tolerant of a wide variety of grassland vegetation and soil types. It apparently is not dependent on sandy soils as are other plains pocket mice and can be found in rocky or gravelly areas with heavy soils.

Problems:

- Population status, trends, and distribution of the hispid pocket mouse are unknown, precluding effective management; and
- There are no efforts to identify key habitats in Wyoming.

Conservation Actions:

- Conduct inventories for hispid pocket mice in all potential habitat in the state; and
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area.

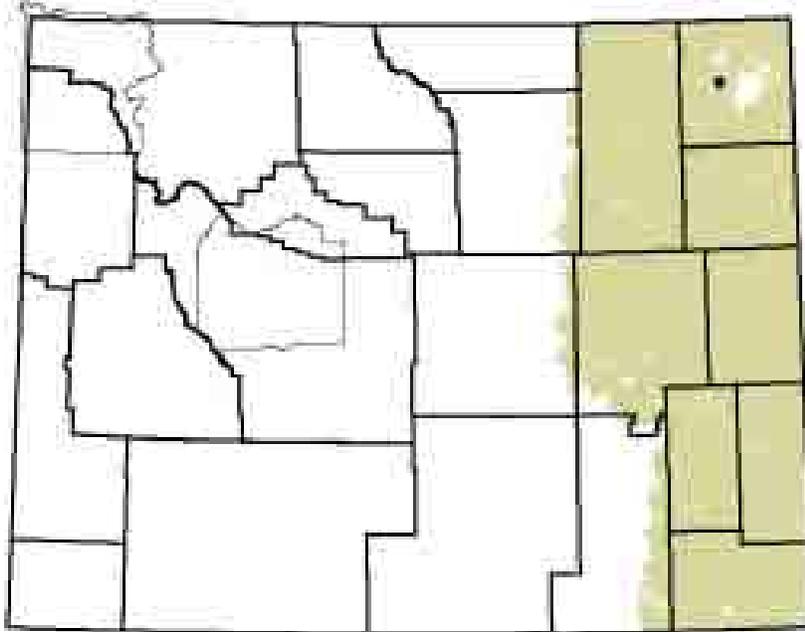
References and Additional Reading:

Cerovski AO, Grenier M, Oakleaf B, Van Fleet L, Patla S. 2004. Atlas of birds, mammals, amphibians, and reptiles in Wyoming. Lander: Wyoming Game and Fish Department, Nongame Program. 206 p.

NatureServe. 2004. NatureServe explorer: an online encyclopedia of life. Version 1.8. Arlington (VA): NatureServe. Online <http://www.natureserve.org/explorer>. Paulson DD. 1988. *Chaetodipus hispidus*. Mammalian Species 320:1-4.

Wilson DE, Ruff S. 1999. The Smithsonian book of North American mammals. Washington: Smithsonian Inst Pr. 750 p.

Hispid Pocket Mouse Distribution



Hoary Bat (*Lasiurus cinereus*)**Status: NSS4; NatureServe G5 S4****Abundance:** Rare

Introduction: The hoary bat is the most widespread of all American bats. It occurs throughout the United States, north to the limit of trees in Canada, and south to Argentina and Chile. It is also found in Hawaii and the Galapagos Islands. During summer, males occur primarily in mountainous regions of western North America, whereas females occupy more eastern areas. It winters in southern California, the southeastern US, and probably much of Mexico. In Wyoming, it occurs statewide during summer; both sexes occupy the Black Hills and surrounding areas of the Great Plains. The hoary bat is considered rare in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because, although it is widely distributed, it may be sensitive to human disturbance.

Habitat: The hoary bat is highly associated with forested habitats, both deciduous and coniferous. It can be found in montane forests, cottonwood riparian forests, shelterbelts, tree rows, juniper woodlands, and urban parks. Diverse forest habitats with a mixture of forest and small open areas that provide edges are ideal habitat. The hoary bat roosts primarily in the foliage of both deciduous and coniferous trees.

Problems:

- Population status, trends, and distribution of the hoary bat are unknown in Wyoming, precluding effective management;
- May be impacted by degradation, fragmentation, and loss of forest habitats; and
- Broad-scale insect control projects may impact the prey base of bats and other insectivores.
- May be vulnerable to wind turbines; the hoary bat was the most commonly found bat during searches at a wind power facility in south-central Wyoming.

Conservation Actions:

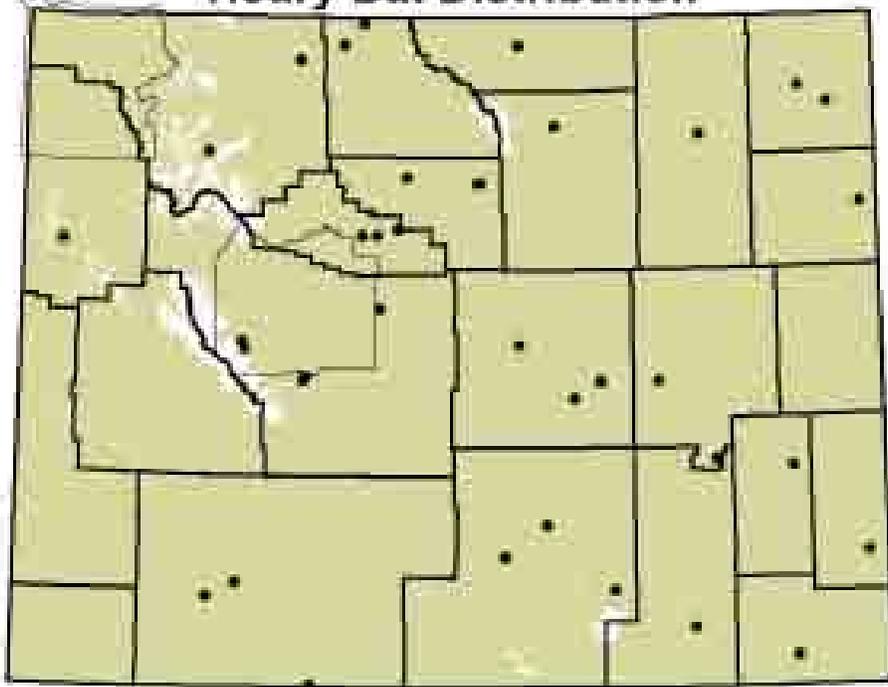
- Continue to conduct inventories and monitoring to determine the population status and habitat requirements of the hoary bat in Wyoming;
- Work cooperatively with state and federal agencies, the Western Bat Working Group, the Wyoming Bat Working Group, and public and private entities to preserve existing bat habitats, identify potential habitats, and minimize the impacts of pesticides and other environmental contaminants;
- Educate the public about the ecological role of bats and their habitat requirements; and
- Manage hoary bat roosting areas to avoid conflicts with timber harvest activities.

References and Additional Reading:

Nicholoff SH, Grenier M. Wyoming bat conservation plan. Lander: Wyoming Game and Fish Department. Forthcoming.

Shump KA, Shump AU. 1982b. *Lasiurus cinereus*. Mammalian Species 185:1-5. Tuttle MD. 1995. The little-known world of hoary bats. Bats 13(4):3-6.

Hoary Bat Distribution



Idaho Pocket Gopher (*Thomomys idahoensis*)

Status: NSS3; NatureServe G4 S2

Abundance: Uncommon

Introduction: The Idaho pocket gopher occurs from central Idaho through southern and western Montana, and in a separate area in southwestern Wyoming and closely adjacent areas of southeastern Idaho and northeastern Utah. The Idaho pocket gopher is considered uncommon in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in distribution, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The Idaho pocket gopher is found in shallow, stony soils in open sagebrush, sagebrush-grassland, and mountain meadow habitats.

Problems:

- Population status, trends, and distribution of the Idaho pocket gopher are unknown, precluding effective management; and
- Habitat needs of the Idaho pocket gopher are poorly known and there are no efforts to identify key habitats in Wyoming.

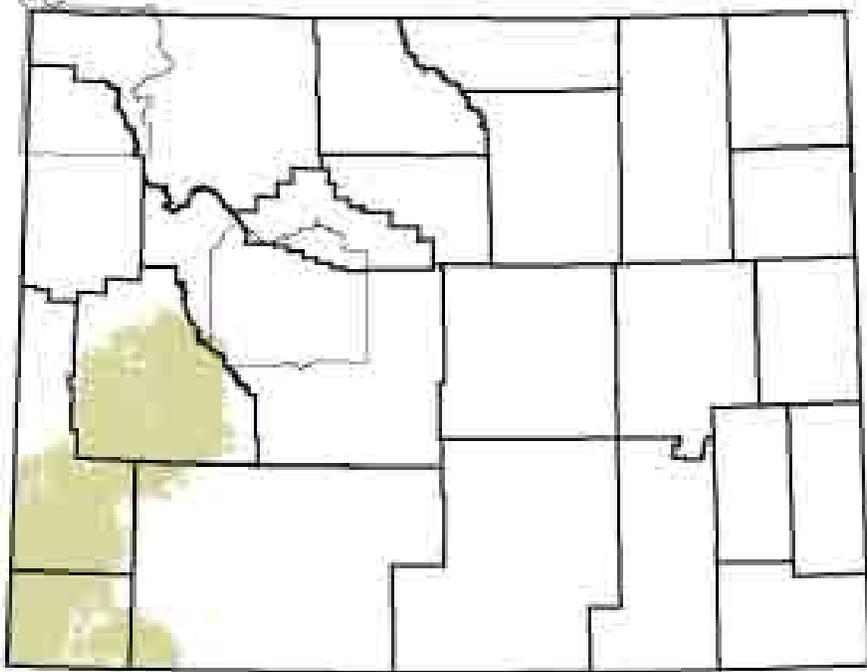
Conservation Actions:

- Conduct inventories for Idaho pocket gophers in all potential habitat in the state; and
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area.

References and Additional Reading:

- Clark TW, Stromberg MR. 1987. Mammals in Wyoming. Lawrence (KS): Univ Kansas, Museum Nat Hist. 314 p.
- Cerovski AO, Grenier M, Oakleaf B, Van Fleet L, Patla S. 2004. Atlas of birds, mammals, amphibians, and reptiles in Wyoming. Lander: Wyoming Game and Fish Department, Nongame Program. 206 p.
- Wilson DE, Ruff S. 1999. The Smithsonian book of North American mammals. Washington: Smithsonian Inst Pr. 750 p.

Idaho Pocket Gopher Distribution



Least Weasel (*Mustela nivalis*)

Status: NSS3; NatureServe G5 S1

Abundance: Rare

Introduction: The least weasel occurs naturally in Eurasia and North America and has been introduced in other areas of the world as well. In North America, it occurs from Alaska across Canada and southward in the US to Kansas and the Appalachian Mountains. In Wyoming, it occurs primarily east of the Bighorn Mountains. The least weasel is considered rare in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in distribution, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The habitat of the least weasel varies geographically, but in general it inhabits meadows, marshes, farmlands, and grassy fields, and avoids forests. In Wyoming, it inhabits rolling gentle ridges dominated by sagebrush and grasses that are divided by riparian habitats of willows and cottonwoods. It occupies a burrow made by a vole or mole.

Problems:

- Population status, trends, and distribution of the least weasel are unknown, precluding effective management;
- There are no efforts to identify key habitats in Wyoming; and
- The species is inherently difficult to survey.

Conservation Actions:

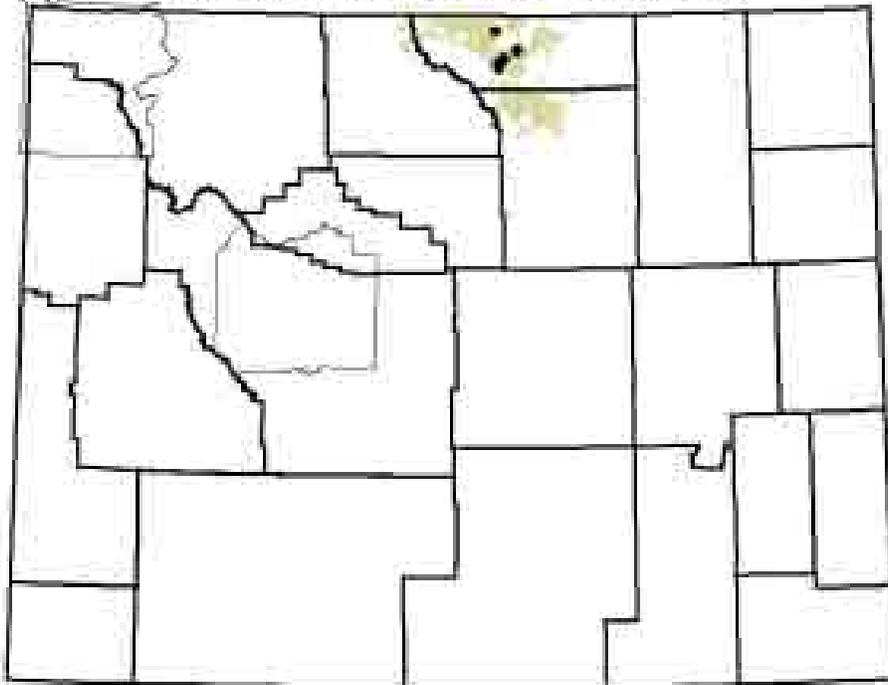
- Develop effective survey methods for the least weasel in Wyoming;
- Conduct inventories for least weasels in all potential habitat in the state; and
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area.

References and Additional Reading:

Clark TW, Stromberg MR. 1987. Mammals in Wyoming. Lawrence (KS): Univ Kansas, Museum Nat Hist. 314 p.

Sheffield SR, King CM. 1994. *Mustela nivalis*. Mammalian Species 454:1-10. Wilson DE, Ruff S. 1999. The Smithsonian book of North American mammals. Washington: Smithsonian Inst Pr. 750 p.

Least Weasel Distribution



Little Brown Myotis (*Myotis lucifugus*)**Status: NSS3; NatureServe G5 S5****Abundance:** Common

Introduction: The little brown myotis inhabits most of North America from Alaska and northern Canada to central Mexico. It is a year-round resident in Wyoming and is found throughout the state. The little brown myotis is considered common in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because, although it is widely distributed, it is experiencing ongoing significant loss of habitat.

Habitat: The little brown myotis occupies coniferous forest, riparian areas in the mountains and lower valleys, woodlots, shelterbelts, and urban areas up to about 3350 m (11,000 ft) in Wyoming. It is seldom found far from open water and is usually absent from hot, arid lowlands. It primarily forages over water but also forages in open woodlands and forest openings. During summer, the little brown bat exploits a wide variety of natural and manmade roost sites, including buildings, tree cavities, loose tree bark, bridges, rock crevices, caves, and abandoned mines. It is one of the species most commonly found in human structures. During winter, it hibernates primarily in caves and abandoned mines.

Problems:

- Population status, trends, and distribution of the little brown myotis are unknown in Wyoming, precluding effective management;
- Roosting habitat has been lost in Wyoming and continues to be threatened by abandoned mine reclamation, removal of old buildings, and renewed mining;
- Recreational activities (such as spelunking and rock climbing) may impact roosting bats in caves, abandoned mines, and rock crevices;
- Timber harvest and the removal of snags may result in loss of roosting habitat; and
- Broad-scale insect control projects may impact the prey base of bats and other insectivores.

Conservation Actions:

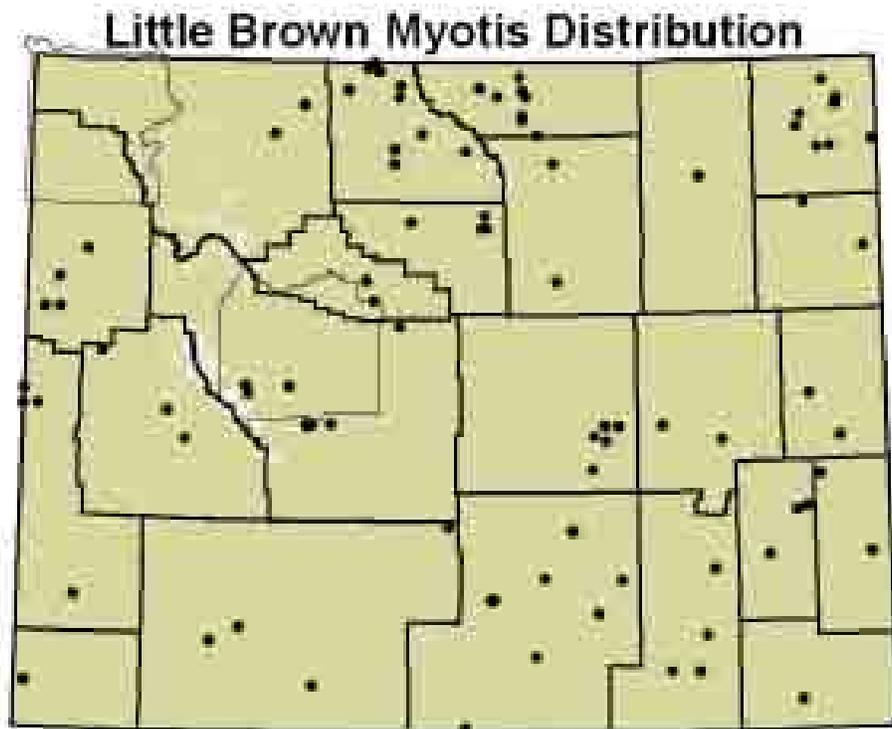
- Continue to conduct inventories and monitoring to determine the population status and habitat requirements of the little brown myotis in Wyoming;
- Work cooperatively with state and federal agencies, the Western Bat Working Group, the Wyoming Bat Working Group, and public and private entities to preserve existing bat habitats, identify potential habitats, and minimize the impacts of pesticides and other environmental contaminants;
- Educate the public about the ecological role of bats and their habitat requirements;
- Minimize disturbance of caves or abandoned mines where little brown myotis (or other bats) are roosting;
- Protect abandoned mines where little brown myotis (and other bats) roost from hard closure; and
- Manage little brown myotis roosting areas to avoid conflicts with timber harvest activities. Retain all tall, large-diameter snags as potential roost sites for little brown myotis and other snag-dependent species.

References and Additional Reading:

Fenton MB, Barclay RMR. 1980. *Myotis lucifugus*. Mammalian Species 142:1-8. Nicholoff SH, Grenier M. Wyoming bat conservation plan. Lander: Wyoming Game and Fish Department. Forthcoming.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Pierson ED, Wackenhut MC, Altenbach JS, Bradley P, Call P, Genter DL, Harris CE, Keller BL, Lengus B, Lewis L, and others. 1999. Species conservation assessment and strategy for Townsend's big-eared bat (*Corynorhinus townsendii townsendii* and *Corynorhinus townsendii pallescens*). Boise: Idaho Conservation Effort, Idaho Department of Fish and Game. 68 p.



Long-eared Myotis (*Myotis evotis*)**Status: NSS2; NatureServe G4 S4****Abundance:** Uncommon

Introduction: The long-eared myotis inhabits most of western North America from British Columbia and Alberta, south to Baja California, and east to northeastern Arizona and western South Dakota. Although it is scattered throughout most of the state at elevations between 1525 and 2990 m (5000 and 9800 ft), the long-eared myotis is considered uncommon. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 2 (NSS2) because populations are restricted in distribution and there is ongoing significant loss of habitat.

Habitat: The long-eared myotis primarily inhabits coniferous forest and woodland, including juniper, ponderosa pine, and spruce-fir. It typically forages over rivers, streams, and ponds within the forest-woodland environment. During summer, it roosts in a wide variety of structures, including cavities in snags, under loose bark, stumps, buildings, rock crevices, caves, and abandoned mines. During winter, it probably hibernates primarily in caves and abandoned mines.

Problems:

- Population status, trends, and distribution of the long-eared myotis are unknown in Wyoming, precluding effective management;
- Roosting habitat has been lost in Wyoming and continues to be threatened by abandoned mine reclamation, removal of old buildings, and renewed mining;
- Recreational activities (such as spelunking and rock climbing) may impact roosting bats in caves, abandoned mines, and rock crevices;
- Timber harvest and the removal of snags may result in loss of roosting habitat; and
- Broad-scale insect control projects may impact the prey base of bats and other insectivores.

Conservation Actions:

- Continue to conduct inventories and monitoring to determine the population status and habitat requirements of the long-eared myotis in Wyoming;
- Work cooperatively with state and federal agencies, the Western Bat Working Group, the Wyoming Bat Working Group, and public and private entities to preserve existing bat habitats, identify potential habitats, and minimize the impacts of pesticides and other environmental contaminants;
- Educate the public about the ecological role of bats and their habitat requirements;
- Manage long-eared myotis roosting areas to avoid conflicts with timber harvest activities. Retain all tall, large-diameter snags as potential roost sites for long-eared myotis and other snag-dependent species;
- Minimize disturbance of caves or abandoned mines where long-eared myotis (or other bats) are roosting; and
- Protect abandoned mines where long-eared myotis (and other bats) roost from hard closure.

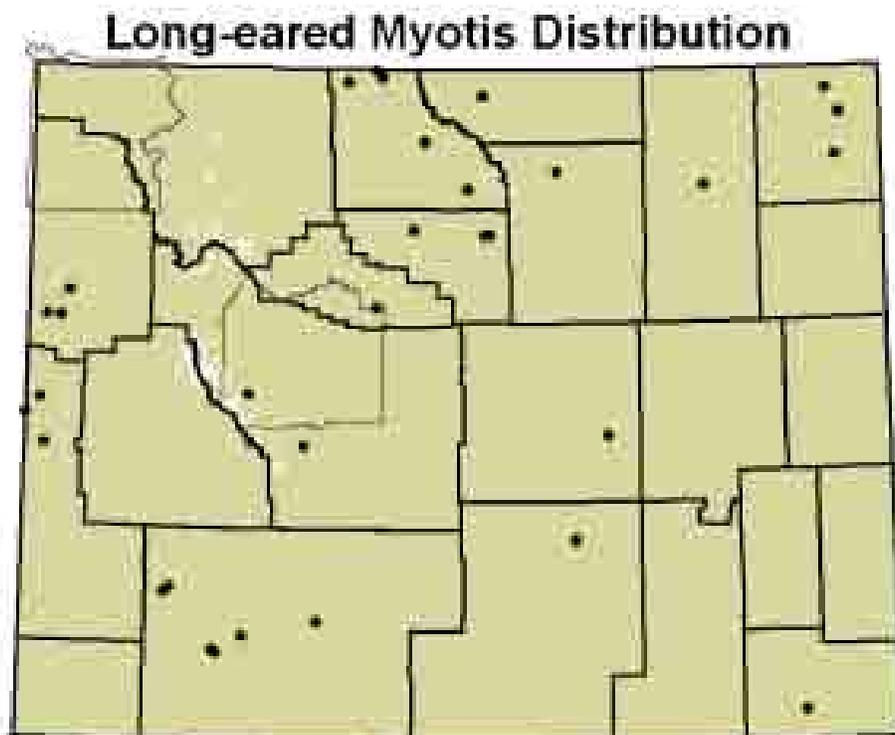
References and Additional Reading:

Manning RW, Jones JK. 1989. *Myotis evotis*. Mammalian Species 329:1-5. Nicholoff SH, Grenier M. Wyoming bat conservation plan. Lander: Wyoming Game and Fish Department. Forthcoming.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Pierson ED, Wackenhut MC, Altenbach JS, Bradley P, Call P, Genter DL, Harris CE, Keller BL, Lengus B, Lewis L, and others. 1999. Species conservation assessment and strategy for Townsend's big-eared bat (*Corynorhinus townsendii townsendii* and *Corynorhinus townsendii pallescens*). Boise: Idaho Conservation Effort, Idaho Department of Fish and Game. 68 p.

Schmidt CA. 2003b. Conservation assessment for the long-eared myotis in the Black Hills National Forest, South Dakota and Wyoming. Custer (SD): USDA Forest Service, Black Hills National Forest. 22 p. Online www.fs.fed.us/r2/scp/species_assessment_reports.shtml.



Long-legged Myotis (*Myotis volans*)**Status: NSS2; NatureServe G5 S3B****Abundance:** Unknown

Introduction: The long-legged myotis inhabits most of western North America from Alaska, British Columbia, and Alberta; south to Baja California and central Mexico; and east to the western edge of the Great Plains and central Texas. In Wyoming, it occurs in suitable habitat throughout most of the state. The abundance of the long-legged myotis is unknown in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 2 (NSS2) because populations are restricted in distribution and there is ongoing significant loss of habitat.

Habitat: The long-legged myotis inhabits open, mature forest with standing dead trees, including montane and subalpine forest and ponderosa pine and juniper woodlands, primarily from 1500 to more than 3300 m (5000 to 11000 ft). It usually forages over open areas such as campgrounds and small forest clearings; over vegetated riparian areas; and within, above, and under the forest canopy. During summer, it roosts in tree cavities, buildings, rock crevices, caves, abandoned mines, and under loose bark. During winter, it hibernates primarily in caves and abandoned mines.

Problems:

- Population status, trends, and distribution of the long-legged myotis are unknown in Wyoming, precluding effective management;
- Timber harvest and the removal of snags may result in loss of roosting habitat;
- Roosting habitat has been lost in Wyoming and continues to be threatened by abandoned mine reclamation, removal of old buildings, and renewed mining;
- Recreational activities (such as spelunking and rock climbing) may impact roosting bats in caves, abandoned mines, and rock crevices; and
- Broad-scale insect control projects may impact the prey base of bats and other insectivores.

Conservation Actions:

- Continue to conduct inventories and monitoring to determine the population status and habitat requirements of the long-legged myotis in Wyoming;
- Work cooperatively with state and federal agencies, the Western Bat Working Group, the Wyoming Bat Working Group, and public and private entities to preserve existing bat habitats, identify potential habitats, and minimize the impacts of pesticides and other environmental contaminants;
- Educate the public about the ecological role of bats and their habitat requirements;
- Manage long-legged myotis roosting areas to avoid conflicts with timber harvesting activities. Retain all tall, large-diameter snags as potential roost sites for long-legged myotis and other snag-dependent species;
- Minimize disturbance of caves or abandoned mines where long-legged myotis (or other bats) are roosting; and
- Protect abandoned mines where long-legged myotis (and other bats) roost from hard closure.

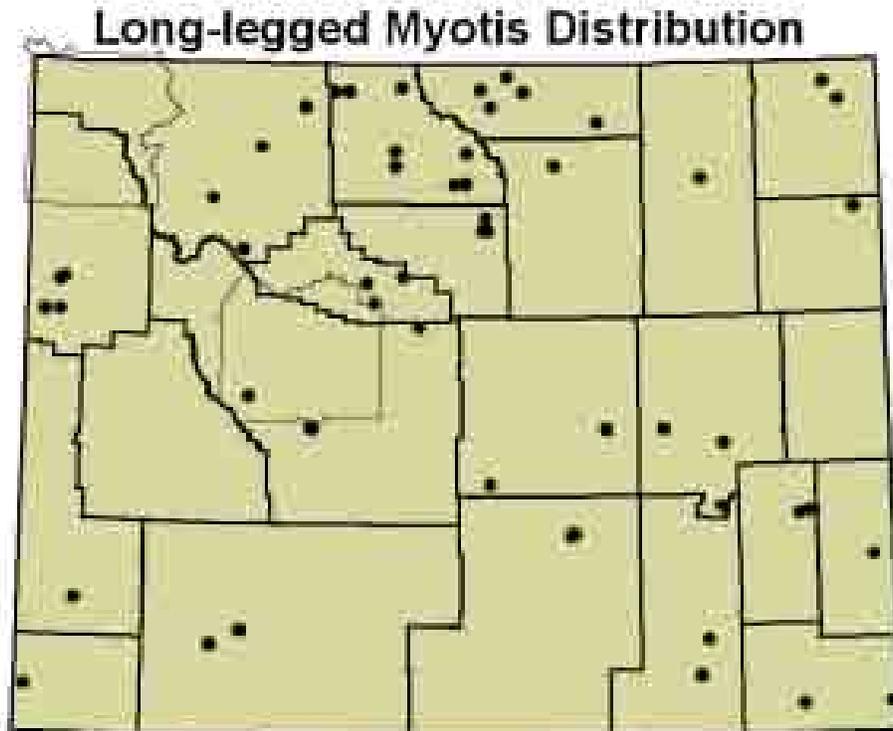
References and Additional Reading:

Nicholoff SH, Grenier M. Wyoming bat conservation plan. Lander: Wyoming Game and Fish Department. Forthcoming.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Pierson ED, Wackenhut MC, Altenbach JS, Bradley P, Call P, Genter DL, Harris CE, Keller BL, Lengus B, Lewis L, and others. 1999. Species conservation assessment and strategy for Townsend’s big-eared bat (*Corynorhinus townsendii townsendii* and *Corynorhinus townsendii pallescens*). Boise: Idaho Conservation Effort, Idaho Department of Fish and Game. 68 p.

Schmidt CA. 2003c. Conservation assessment for the long-legged myotis in the Black Hills National Forest, South Dakota and Wyoming. Custer (SD): USDA Forest Service, Black Hills National Forest. 20 p. Online www.fs.fed.us/r2/scp/species_assessment_reports.shtml. Warner RM, Czaplewski NJ. 1984. *Myotis volans*. Mammalian Species 224:1-4.



Marten (*Martes americana*)

Status: NSS4; NatureServe G5 S3

Abundance: Uncommon

Introduction: The marten occurs across most of North America from Alaska through much of forested Canada, into the northeastern US, and south along the major mountain ranges in the western US. It inhabits the mountains of western, south-central, and north-central Wyoming. The marten is considered uncommon in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because population status and trends are unknown, although they are suspected to be stable, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat. Due to its isolated status, the marten population in the Black Hills is considered to be at greater risk than the remainder of Wyoming's marten population.

Habitat: The marten inhabits mature and old-growth conifer and mixed stands, including spruce-fir, lodgepole pine, and various deciduous forests. It usually selects mesic stands that are characterized by at least 30 to 50% crown closure, living branches on the lower boles of trees, abundant coarse woody debris, herbaceous cover, and lengthy fire-return intervals. The marten usually avoids large openings in the forest, such as clear cuts, but it will use riparian areas, meadows, forest edges, and rocky alpine areas, especially for foraging. It occupies a den in a tree cavity, rotten log, or underground.

Problems:

- Population status, trends, and distribution of the marten are unknown, precluding effective management;
- There are no efforts to identify key habitats in Wyoming; and
- Populations may be limited in some areas by timber harvesting (including firewood cutting) and high-intensity fires in spruce-fir forests.

Conservation Actions:

- Conduct inventories for martens in all potential habitat in the state;
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area;
- Maintain structurally-diverse mature and old-growth spruce-fir forests with abundant snags, downed timber, and herbaceous vegetation in areas where martens occur; and
- Manage marten habitat to reduce conflicts with timber harvesting.

References and Additional Reading:

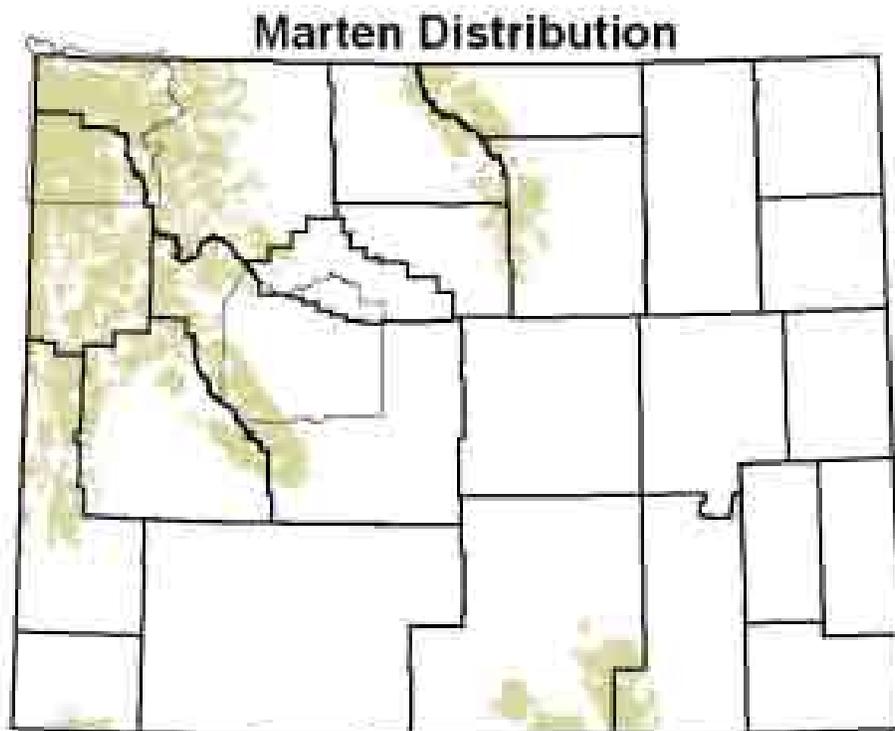
Buskirk SW, Harestad AS, Raphael MG, Powell RA, eds. 1994. Martens, sables, and fishers: biology and conservation. Ithaca (NY): Cornell Univ Pr. Clark TW, Anderson E, Douglas C, Strickland M. 1987. *Martes americana*. Mammalian Species 289:1-8.

Clark TW, Harvey AH, Dorn RD, Genter DL, Groves C, eds. 1989. Rare, sensitive, and threatened species of the Greater Yellowstone Ecosystem. Northern Rockies Conservation Cooperative, Montana Natural Heritage Program, The Nature Conservancy, and Mountain West Environmental Services. 153 p.

Powell RA, Buskirk SW, Zielinski WJ. 2003. Fisher and marten. In: Feldhamer GA, Thompson BC, Chapman JA, eds. Wild mammals of North America: biology, management, and conservation. 2d ed. Baltimore: Johns Hopkins Univ Pr. p 635-649.

Ruggiero LF, Aubry KB, Buskirk SW, Lyon LJ, Zielinski WJ, tech eds. 1994. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. Gen Tech Rep RM-254. Fort Collins (CO): USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. 184 p. Online: http://www.fs.fed.us/rm/pub_rm/rm_gtr254.pdf.

Ruggiero LF, Pearson DE, Henry SE. 1998. Characteristics of American marten den sites in Wyoming. J Wildl Manage 62:663-73.



Meadow Jumping Mouse (*Zapus hudsonius*) Status: NSS5; NatureServe G5 S3

Abundance: Common

Introduction: The meadow jumping mouse has one of the largest distributions of any mouse. It can be found from Alaska, across to the east coast of Canada, and south to Georgia. It is found primarily in the eastern half of Wyoming. Recent inventories indicate that it is more widespread and abundant in Wyoming than originally thought. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 5 (NSS5). The species is ranked as a NSS5 with population trends unknown but thought to be stable and habitat is not restricted.

Habitat: The meadow jumping mouse prefers marshy meadows, moist grasslands and riparian shrub communities. It avoids heavily wooded areas. Grassy fields or shrubby areas near streams or wetlands at low elevations are the preferred habitats (Cerovski *et al* 2004).

Problems:

- Population densities and trends are not well known;
- Human encroachment along rivers, streams, and lakes is having an impact on meadow jumping mouse habitat; and
- The recent highly controversial debate over the existence of *Z. h. preblei*, and the petition filed to list it under the Endangered Species Act, have created animosity toward jumping mice.

Conservation Actions:

- The information collected about meadow jumping mice in eastern Wyoming resulting in the delisting *Z. h. preblei* should continue to be supplemented to more clearly define the status and distribution of this species;
- Monitor population densities and trends. If monitoring data show that populations are declining, provide information to the WGFD Commission to allow them to evaluate and consider an appropriate response; and
- Cooperate with private landowners and land managers to conserve riparian habitats.

References and Additional Reading:

Cerovski, A. O., M.Grenier, B. Oakleaf, L. Van Fleet, and S.Patla. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming, Wyoming Game and Fish Dept. Nongame Program. 206pp.

Whitaker, J.O. 1972. *Zapus hudsonius*. in Mammalian Species, 11:1-7. American Society of Mammalogists.

Meadow Jumping Mouse Distribution



Moose (*Alces alces shirasi*)

Status: NSS3; NatureServe G5 S5

Abundance: Common

Introduction: The moose has a circumpolar distribution that coincides generally with the boreal forests of the northern hemisphere. In North America, its distribution is across much of Canada below the Arctic, northern New England, and extending down the Rocky Mountains to northern Colorado. Moose are believed to have entered Wyoming from Montana and Idaho within the past 150 years. There is no archaeological evidence of moose populations in Wyoming prior to the 1800s. Moose occupy the mountain ranges of northwestern and western Wyoming, as well as the Bighorn Mountains in north central Wyoming and the Snowy Range and Sierra Madre Mountains in southeastern Wyoming. Moose began to occupy portions of the Wind River Range during the 1930s. They were translocated from northwest Wyoming to establish new populations elsewhere in the state. Twenty-nine moose were captured in the Jackson area and released in the Bighorns in 1948, 1950, 1974 and 1987. Twelve moose were translocated from Jackson to North Park, Colorado in 1979. Another 12 moose were transplanted to the Upper Laramie River in Colorado in 1987. The moose population in the Snowy Range and Sierra Madre Mountains is a recent addition to the state resulting from northward expansion of the introduced population in northern Colorado across the Wyoming state line.

The moose population in Wyoming is comprised of 13 herds. The 2003 post-hunt population is estimated at 10,020 animals and the statewide population trend is downward. However, the population estimates for a full half of Wyoming's herds are not reliable. Moose occur at relatively low densities distributed throughout many herd units and occupy habitats that make collecting adequate survey data difficult. The statewide moose population objective is 14,630.

Habitat: Wyoming moose occupy habitats within the state that are generally similar to, but somewhat drier than, those within the rest of the species' range in North America. Wyoming moose use Engelmann spruce, Douglas and subalpine fir, and lodgepole pine forests plus associated habitats. The associated habitats include lacustrine and palustrine riparian communities, especially those dominated by willow; mixed mountain shrub communities; and aspen. Wyoming moose generally summer at higher elevation in conifer forests and winter in willow habitats and deciduous habitats generally adjacent conifer stands. Movement from summer range to winter range typically involves descending to lower elevations where the snow pack is shallower and mobility is greater.

Problems:

- Moose populations are widely distributed at relatively low densities, making data collection difficult;
- Habitat prediction models have not been developed for herd units, leaving carrying capacities and habitat relationships unknown;
- Moose populations are experiencing significant declines in some areas of the state. Preliminary indications are that low reproductive rates may be the fundamental problem and that habitat (nutrition) could be the primary cause;
- Willow habitats appear to be declining in both quality and quantity;

- Large carnivore predation has the potential to reduce moose populations in some areas of the state;
- Non- hunting mortality (i.e. vehicle collisions, poaching, mistaken identity during hunting) may be contributing to reduced populations in certain areas;
- Reliable and economically feasible census techniques are lacking, making reliable population estimates and corresponding harvest strategies difficult;
- The impacts of diseases (West Nile Virus, Chronic Wasting Disease, pinkeye) and parasites are largely unknown;
- Conflicts with winter recreation and urban expansion continue to increase habitat fragmentation and decrease habitat effectiveness; and
- The amounts of available forage may be limiting carrying capacities in some localized areas.

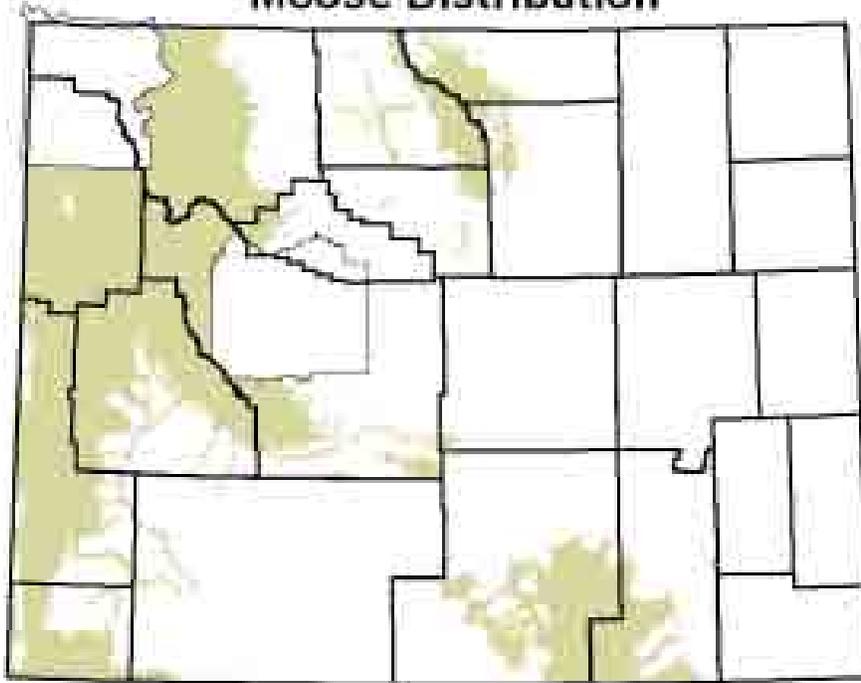
Conservation Actions:

- Initiate a research study in northwest Wyoming to determine population numbers; mortality factors; habitat requirements/relationships; reproductive success, etc;
- Initiate a research study in the Snowy Range that will ultimately result in a habitat prediction model, including the investigation of habitat selection and general movement patterns;
- Review literature for census techniques;
- Determine methods to improve data collection needs
- Improve willow habitat through controlled burns, fertilization, protection from livestock grazing, etc;
- Investigate effects of disease on moose populations; and
- Investigate the relationship of moose harvest data (hunter success rates, days/animal harvested) and moose population numbers and trend.

References and Additional Reading:

- Brimeyer D. 2004. Moose *in* Handbook of Biological Techniques. S. Tessmann, ed. Wyoming Game and Fish Department. Cheyenne, WY.
- Walker D. 2004. Personal Communication. Wyoming Assistant State Archaeologist. Caody J. 1982. Pages 902-922 *in* Chapman J. and Feldhamer G., eds. Wild Mammals of North America. The Johns Hopkins University Press. 1147pp.
- Franzmann A. and Schwartz C. 1998. Ecology and management of the north american moose. Smithsonian Institution Press. Washington, DC. 733pp.

Moose Distribution



Northern Flying Squirrel (*Glaucomys sabrinus*)

Status: NSS4; NatureServe G5 S4

Abundance: Uncommon

Introduction: The northern flying squirrel occurs from Alaska through most of Canada, southward to the mountains of southern California, the southern Rocky Mountains, western South Dakota, the Great Lakes region, and the southern Appalachians. In Wyoming, it occurs primarily in the western mountain ranges, although there are isolated populations in the Black Hills and Sweetwater County. The northern flying squirrel is considered uncommon in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because populations are restricted in distribution and habitat is vulnerable, although there is no ongoing significant loss of habitat. Of all Wyoming populations, the Black Hills population of northern flying squirrels is considered to be of special concern due to its isolation and relictual nature of the Black hills.

Habitat: The northern flying squirrel inhabits coniferous, deciduous, mixed, and riparian forests and woodlands. It prefers cool, moist, mature forests with abundant standing and down snags, and is often most abundant near wetlands or streams. It prefers cavities in mature trees as den sites, although it also uses leaf nests and underground burrows. Although the northern flying squirrel occurs in stands of varying age, understory density, and composition, old-growth forests are most ideally-suited to its gliding form of locomotion, use of cavities for nesting, and reliance on wood-borne fungi and lichens for food.

Problems:

- Population status, trends, and habitat needs of the northern flying squirrel are poorly known in Wyoming; and
- There are no efforts to identify or maintain key habitats in Wyoming.

Conservation Actions:

- Conduct inventories for northern flying squirrels in all potential habitat in the state;
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area;
- Manage for open, mature and old-growth forest with abundant standing and down snags in areas where northern flying squirrels occur; and
- Manage northern flying squirrel habitat to minimize conflicts with timber harvesting.

References and Additional Reading:

Clark TW, Stromberg MR. 1987. Mammals in Wyoming. Lawrence (KS): Univ Kansas, Museum Nat Hist. 314 p.

US Fish and Wildlife Service. 1990. Appalachian northern flying squirrels (*Glaucomys sabrinus fuscus* and *Glaucomys sabrinus coloratus*) recovery plan. Newton Corner (MA): US Fish and Wildlife Service, Region 5. 53 p. Online:

http://ecos.fws.gov/docs/recovery_plans/1990/900924c.pdf.

Northern Myotis (*Myotis septentrionalis*)**Status: NSS2; NatureServe G4 SNR****Abundance:** Rare

Introduction: The northern myotis inhabits eastern North America from Manitoba across southern Canada to Newfoundland, south to northern Florida, and west to Wyoming. In Wyoming, it is restricted to the Black Hills, the Bighorn Mountains, and possibly the Bear Lodge Mountains in the northeastern corner of the state. The northern myotis is considered rare in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 2 (NSS2) because populations are restricted in distribution and there is ongoing significant loss of habitat.

Habitat: The northern myotis primarily inhabits forested regions. In Wyoming, it can be found in wooded riparian zones in badlands and prairies to higher elevation conifer and deciduous woodlands. During summer, it roosts in crevices and cavities of trees, under loose bark, and occasionally in buildings. During winter, it usually hibernates in caves and abandoned mines.

Problems:

- Population status, trends, and distribution of the northern myotis are unknown in Wyoming, precluding effective management;
- Timber harvest and the removal of snags may result in loss of roosting habitat;
- Roosting habitat has been lost in Wyoming and continues to be threatened by abandoned mine reclamation, removal of old buildings, and renewed mining;
- Recreational activities (such as spelunking and rock climbing) may impact roosting bats in caves, abandoned mines, and rock crevices; and
- Broad-scale insect control projects may impact the prey base of bats and other insectivores.

Conservation Actions:

- Continue to conduct inventories and monitoring to determine the population status and habitat requirements of the northern myotis in Wyoming;
- Work cooperatively with state and federal agencies, the Western Bat Working Group, the Wyoming Bat Working Group, and public and private entities to preserve existing bat habitats, identify potential habitats, and minimize the impacts of pesticides and other environmental contaminants;
- Educate the public about the ecological role of bats and their habitat requirements;
- Manage northern myotis roosting areas to avoid conflicts with timber harvest activities. Retain all tall, large-diameter snags as potential roost sites for northern myotis and other snag-dependent species;
- Minimize disturbance of caves or abandoned mines where northern myotis (or other bats) are roosting; and
- Protect abandoned mines where northern myotis (and other bats) roost from hard closure.

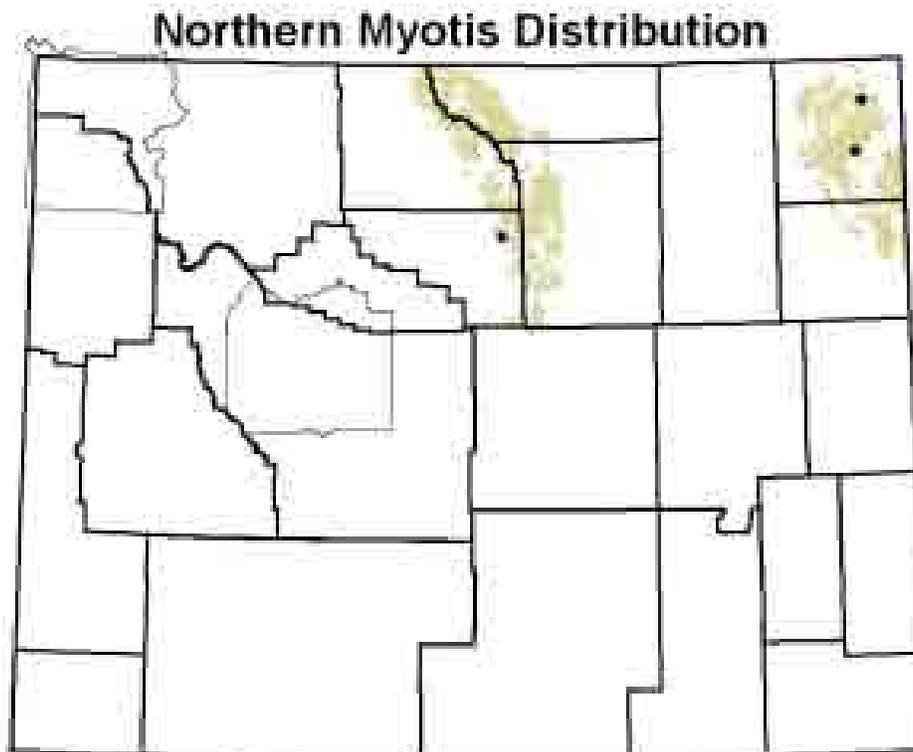
References and Additional Reading:

Caceres MC, Barclay RMR. 2000. *Myotis septentrionalis*. Mammalian Species 634:1-4.
Nicholoff SH, Grenier M. Wyoming bat conservation plan. Lander: Wyoming Game and Fish Department. Forthcoming.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Pierson ED, Wackenhut MC, Altenbach JS, Bradley P, Call P, Genter DL, Harris CE, Keller BL, Lengus B, Lewis L, and others. 1999. Species conservation assessment and strategy for Townsend's big-eared bat (*Corynorhinus townsendii townsendii* and *Corynorhinus townsendii pallescens*). Boise: Idaho Conservation Effort, Idaho Department of Fish and Game. 68 p.

Schmidt CA. 2003d. Conservation assessment for the northern myotis in the Black Hills National Forest, South Dakota and Wyoming. Custer (SD): USDA Forest Service, Black Hills National Forest. 19 p. Online www.fs.fed.us/r2/scp/species_assessment_reports.shtml.



Olive-backed Pocket Mouse (*Perognathus fasciatus*) Status: NSS3; NatureServe G5 S4

Abundance: Common

Introduction: The olive-backed pocket mouse is a resident of the northern Great Plains and adjacent intermountain basins, from southern Alberta, Saskatchewan, and Manitoba south to northeastern Utah, southern Colorado, and eastern South Dakota. It is distributed across most of the eastern 2/3 of Wyoming. The olive-backed pocket mouse is considered common in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in distribution, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The olive-backed pocket mouse occupies a variety of arid and semiarid upland habitats, primarily sparsely vegetated grasslands and sagebrush-grasslands. It prefers loose sandy to clay soils for burrowing.

Problems:

- Population status, trends, and distribution of the olive-backed pocket mouse are unknown, precluding effective management; and
- There are no efforts to identify key habitats in Wyoming.

Conservation Actions:

- Conduct inventories for olive-backed pocket mice in all potential habitat in the state; and
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area.

References and Additional Reading:

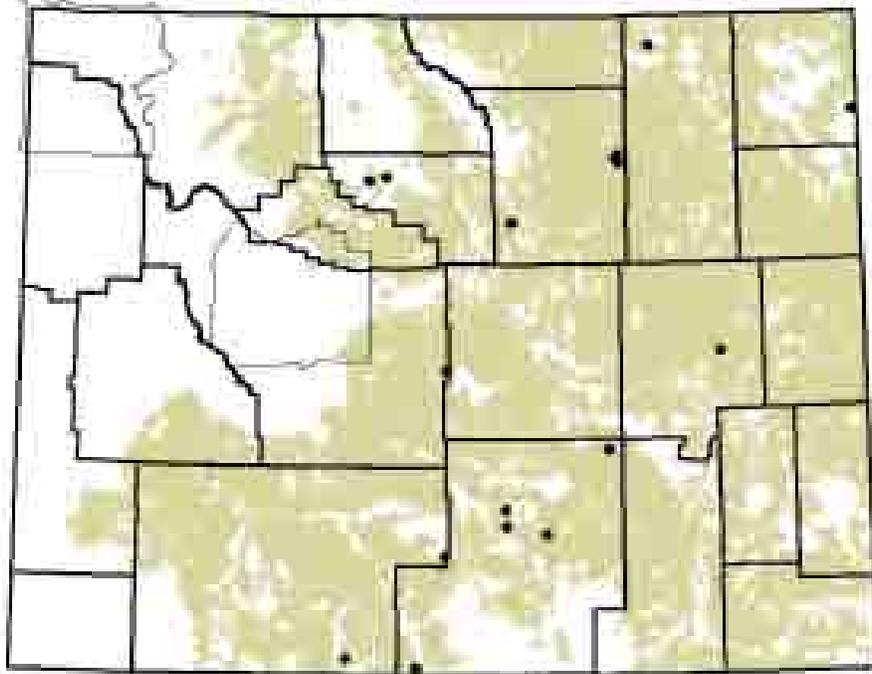
Cerovski AO, Grenier M, Oakleaf B, Van Fleet L, Patla S. 2004. Atlas of birds, mammals, amphibians, and reptiles in Wyoming. Lander: Wyoming Game and Fish Department, Nongame Program. 206 p.

Manning RW, Jones JK. 1988. *Perognathus fasciatus*. Mammalian Species 303:1-4.

NatureServe. 2004. NatureServe explorer: an online encyclopedia of life. Version 1.8. Arlington (VA): NatureServe. Online <http://www.natureserve.org/explorer>.

Wilson DE, Ruff S. 1999. The Smithsonian book of North American mammals. Washington: Smithsonian Inst Pr. 750 p.

Olive-backed Pocket Mouse Distribution



Pallid Bat (*Antrozous pallidus*)**Status: NSS2; NatureServe G5 S1****Abundance:** Rare

Introduction: The pallid bat inhabits western North America from southern British Columbia to central Mexico and east to Kansas and Oklahoma. Although records of this species are patchy in Wyoming, it probably inhabits suitable habitat statewide, most commonly in the lower elevations of the eastern plains and basins of the state. Although it is a year-round resident in much of its range, it probably migrates out of Wyoming during winter. The pallid bat is considered rare in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 2 (NSS2) because populations are restricted in distribution and there is ongoing significant loss of habitat.

Habitat: The pallid bat generally inhabits low desert shrublands, juniper woodlands, and grasslands, and occasionally cottonwood-riparian zones in those habitats. It is most common in low, arid regions with rocky outcroppings, particularly near water. During summer, it usually roosts in rock crevices and buildings, but also uses rock piles, tree cavities, shallow caves, and abandoned mines.

Problems:

- Population status, trends, and distribution of the pallid bat are unknown in Wyoming, precluding effective management. It is an extremely difficult species to inventory and monitor;
- The pallid bat is sensitive to human disturbance and even minimal human presence has led to the permanent abandonment of night and maternity roosts;
- Roosting habitat has been lost in Wyoming and continues to be threatened by abandoned mine reclamation, removal of old buildings, and renewed mining;
- Recreational activities (such as spelunking and rock climbing) may impact roosting bats in caves, abandoned mines, rock crevices, and cliffs, often resulting in the abandonment of young and roosts; and
- Broad-scale insect control projects may impact the prey base of bats and other insectivores.

Conservation Actions:

- Continue to conduct inventories and monitoring to determine the population status and habitat requirements of the pallid bat in Wyoming;
- Work cooperatively with state and federal agencies, the Western Bat Working Group, the Wyoming Bat Working Group, and public and private entities to preserve existing bat habitats, identify potential habitats, and minimize the impacts of pesticides and other environmental contaminants;
- Educate the public about the ecological role of bats and their habitat requirements;
- Minimize disturbance of cliffs, rock crevices, caves, or abandoned mines where pallid bats (or other bats) are roosting; and
- Protect abandoned mines where pallid bats (and other bats) roost from hard closure.

References and Additional Reading:

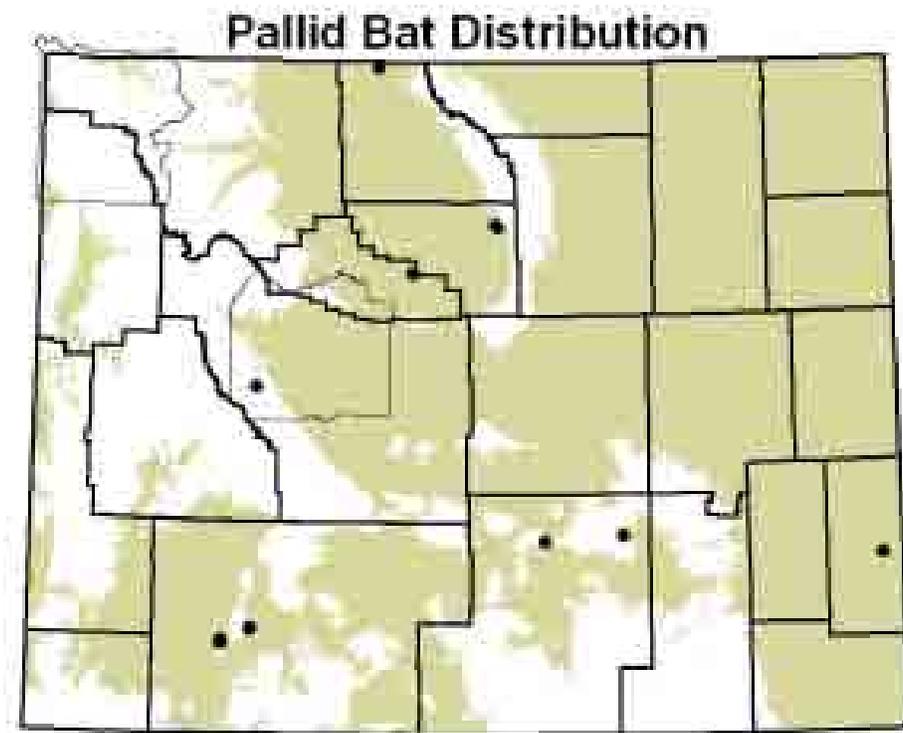
Hermanson JW, O'Shea TJ. 1983. *Antrozous pallidus*. Mammalian Species 213:1-8.

Nicholoff SH, Grenier M. Wyoming bat conservation plan. Lander: Wyoming Game and Fish Department. Forthcoming.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Pierson ED, Wackenhut MC, Altenbach JS, Bradley P, Call P, Genter DL, Harris CE, Keller BL, Lengus B, Lewis L, and others. 1999. Species conservation assessment and strategy for Townsend's big-eared bat (*Corynorhinus townsendii townsendii* and *Corynorhinus townsendii pallescens*). Boise: Idaho Conservation Effort, Idaho Department of Fish and Game. 68 p.

Vaughan TA, O'Shea TJ. 1976. Roosting ecology of the pallid bat, *Antrozous pallidus*. J Mammal 57(1):19-42.



Pinyon Mouse (*Peromyscus truei*)

Status: NSS3; NatureServe G5 S1

Abundance: Rare

Introduction: The pinyon mouse occurs from central Oregon, east to eastern Colorado and the panhandle of Texas, and south to southern Mexico. In Wyoming, it occurs only in the southwestern corner of the state; it is probably confined to suitable habitat along Flaming Gorge Reservoir and isolated mesas elsewhere in southern Sweetwater County. The pinyon mouse is considered rare in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in distribution, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The pinyon mouse inhabits open stands of juniper grasslands and shrub-steppe where shrubs are not dense. It often occurs among rocks or on rocky slopes. It nests in a hollow juniper tree or rock crevice.

Problems:

- Population status, trends and distribution of the pinyon mouse are unknown in Wyoming, precluding effective management. It is difficult to survey because of its scattered, low-density populations; and
- There are no efforts to identify key habitats in Wyoming.

Conservation Actions:

- Conduct inventories for pinyon mice in all potential habitat in the state;
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area; and
- Management of manipulation of juniper in southwestern Wyoming should not favor one of the juniper obligates to the detriment of others. Instead, management should be coordinated to provide a mosaic of juniper woodland conditions.

References and Additional Reading:

Hoffmeister DF. 1981. *Peromyscus truei*. Mammalian Species 161:1-5.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Rompola KM. 2000. Small mammals of a juniper woodland and sagebrush-grassland mosaic in southwestern Wyoming. MSc thesis. Laramie: Univ Wyoming.

Wilson DE, Ruff S. 1999. The Smithsonian book of North American mammals. Washington: Smithsonian Inst Pr. 750 p.

Pinyon Mouse Distribution



Plains Harvest Mouse (*Reithrodontomys montanus*)

Status: NSS3; NatureServe G5 S2

Abundance: Rare

Introduction: The plains harvest mouse inhabits the Great Plains from southwestern South Dakota and southeastern Montana south to southeastern Arizona, Mexico, and Texas. It occurs in the eastern third of Wyoming. The plains harvest mouse is considered rare in Wyoming. Throughout its range, it is often the least abundant member of the rodent community. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in distribution, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The plains harvest mouse primarily inhabits well-vegetated grasslands and weedy fields. In Wyoming, it is most frequent in grama grasslands, although it also occupies sagebrush-grasslands, buffalo grass, and mixed grasslands. It is most abundant in areas where the amount of bare soil surface is less than 40%, where vegetation height is 2.5 to 25 cm (1 to 10 in), and with loamy sand soil. It often uses rock outcrops for shelter.

Problems:

- Population status, trends, and distribution of the plains harvest mouse are unknown, precluding effective management; and
- There are no efforts to identify key habitats in Wyoming.

Conservation Actions:

- Conduct inventories for plains harvest mice in all potential habitat in the state; and
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area.

References and Additional Reading:

Cerovski AO, Grenier M, Oakleaf B, Van Fleet L, Patla S. 2004. Atlas of birds, mammals, amphibians, and reptiles in Wyoming. Lander: Wyoming Game and Fish Department, Nongame Program. 206 p.

NatureServe. 2004. NatureServe explorer: an online encyclopedia of life. Version 1.8. Arlington (VA): NatureServe. Online <http://www.natureserve.org/explorer>.

Wilkins KT. 1986. *Reithrodontomys montanus*. Mammalian Species 257:1-5.

Wilson DE, Ruff S. 1999. The Smithsonian book of North American mammals. Washington: Smithsonian Inst Pr. 750 p.

Plains Pocket Mouse (*Perognathus flavescens*)

Status: NSS3; NatureServe G5 S2

Abundance: Rare

Introduction: The plains pocket mouse inhabits the Great Plains and intermountain basins from Minnesota southwest to Texas and southern New Mexico. It is mainly distributed east and southeast of Wyoming, although it is known to occur in southeastern Wyoming and the Bighorn Basin. The plains pocket mouse is considered rare in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in distribution, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The plains pocket mouse inhabits sand dunes, sagebrush-grassland, yucca-grassland, and grama grassland in Wyoming. It generally occurs in areas with sandy or sandy-loam soil, with sparse vegetation, and where the height of the dominant vegetation exceeds 50 cm (20 in).

Problems:

- Population status, trends, and distribution of the plains pocket mouse are unknown, precluding effective management; and
- There are no efforts to identify key habitats in Wyoming.

Conservation Actions:

- Conduct inventories for plains pocket mice in all potential habitat in the state; and
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area.

References and Additional Reading:

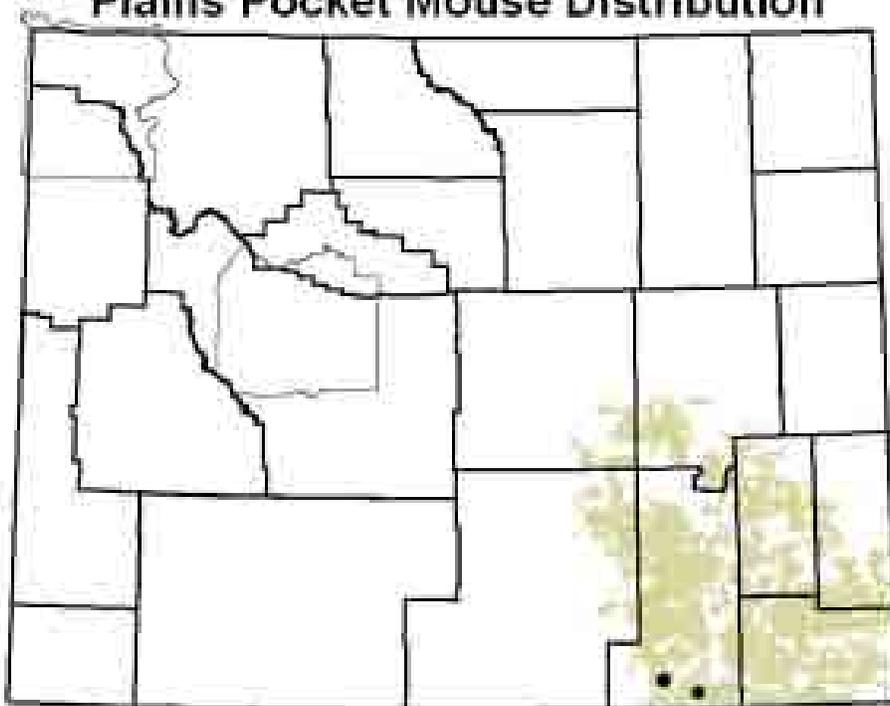
Cerovski AO, Grenier M, Oakleaf B, Van Fleet L, Patla S. 2004. Atlas of birds, mammals, amphibians, and reptiles in Wyoming. Lander: Wyoming Game and Fish Department, Nongame Program. 206 p.

Monk RR, Jones JK. 1996. *Perognathus flavescens*. Mammalian Species 525:1-4.

NatureServe. 2004. NatureServe explorer: an online encyclopedia of life. Version 1.8. Arlington (VA): NatureServe. Online <http://www.natureserve.org/explorer>.

Wilson DE, Ruff S. 1999. The Smithsonian book of North American mammals. Washington: Smithsonian Inst Pr. 750 p.

Plains Pocket Mouse Distribution



Prairie Vole (*Microtus ochrogaster*)

Status: NSS3; NatureServe G5 S5

Abundance: Common

Introduction: The prairie vole is found throughout the prairie states of the United States, from western West Virginia to northern Oklahoma, and north into Alberta. It inhabits the eastern 2/3 of Wyoming. The prairie vole is considered common in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in distribution, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The prairie vole primarily inhabits prairies, but within its range there are considerable differences in dominant plants and available moisture. In Wyoming, it occurs in basin-prairie shrublands, sagebrush-grasslands, grasslands, and small grain agricultural areas.

Problems:

- Population status, trends, and distribution of the prairie vole are unknown, precluding effective management; and
- There are no efforts to identify key habitats in Wyoming.

Conservation Actions:

- Conduct inventories for prairie voles in all potential habitat in the state; and
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area.

References and Additional Reading:

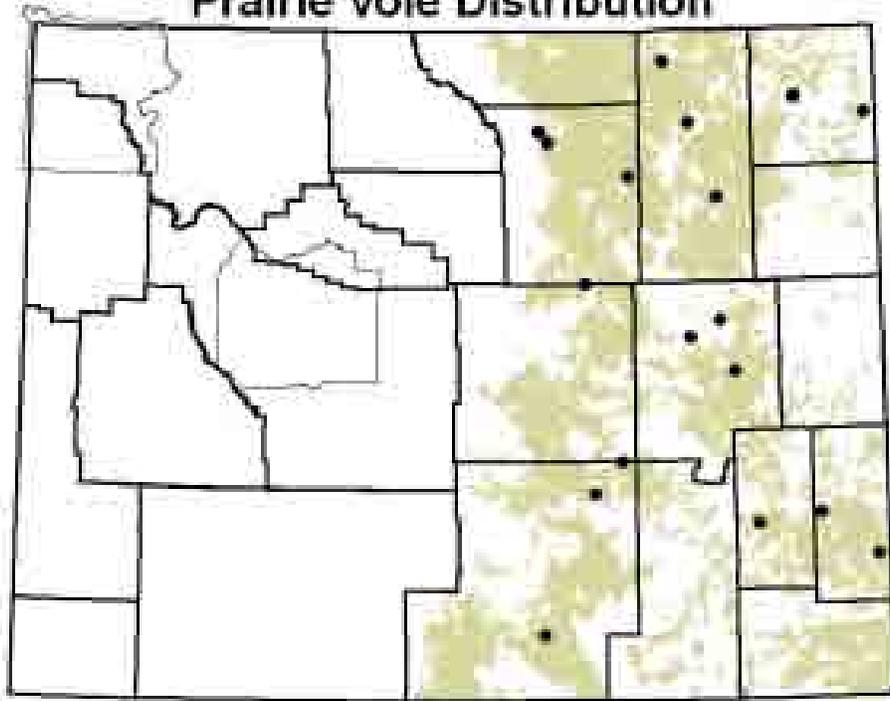
Cerovski AO, Grenier M, Oakleaf B, Van Fleet L, Patla S. 2004. Atlas of birds, mammals, amphibians, and reptiles in Wyoming. Lander: Wyoming Game and Fish Department, Nongame Program. 206 p.

NatureServe. 2004. NatureServe explorer: an online encyclopedia of life. Version 1.8. Arlington (VA): NatureServe. Online <http://www.natureserve.org/explorer>.

Stalling DT. 1990. *Microtus ochrogaster*. Mammalian Species 355:1-9.

Wilson DE, Ruff S. 1999. The Smithsonian book of North American mammals. Washington: Smithsonian Inst Pr. 750 p.

Prairie Vole Distribution



Preble's Shrew (*Sorex preblei*)

Status: NSS3, NatureServe G4 S1

Abundance: Rare

Introduction: The Preble's shrew occurs primarily in Montana, central Idaho, and Oregon. In Wyoming it has been observed in the Lamar Valley and the Snake River Canyon in the northwestern corner of the state, and historically in the southwestern corner. The Preble's shrew is considered rare in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are greatly restricted and habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The habitat needs of the Preble's shrew are poorly known. Most have been collected in arid and semiarid sagebrush-grassland habitats and openings in subalpine coniferous forests dominated by sagebrush. However, it has also and more recently been known to occur near creeks and bogs bordered by willow or riparian shrub, in wet areas in open conifer stands, and areas covered by marsh grasses.

Problems:

- Population status, trends, and distribution of the Preble's shrew are unknown, precluding effective management;
- Habitat needs are poorly known and there are no efforts to identify or maintain key habitats in Wyoming;
- Habitat is restricted and may be impacted by riparian degradation; and
- Sampling and identification of shrews requires special methods, equipment, and experience to be successful and scientifically useful.

Conservation Actions:

- Conduct inventories for Preble's shrews in all potential habitat in the state;
- Provide methodology and technical assistance to encourage participation by US Forest Service and Bureau of Land Management biologists; and
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area.

References and Additional Reading:

Clark TW, Harvey AH, Dorn RD, Genter DL, Groves C, eds. 1989. Rare, sensitive, and threatened species of the Greater Yellowstone Ecosystem. Northern Rockies Conservation Cooperative, Montana Natural Heritage Program, The Nature Conservancy, and Mountain West Environmental Services. 153 p.

Cornely JE, Carraway LN, Verts BJ. 1992. *Sorex preblei*. Mammalian Species 416:1-3.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Wilson DE, Ruff S. 1999. The Smithsonian book of North American mammals. Washington: Smithsonian Inst Pr. 750 p.



Abundance: Rare

Introduction: The pygmy rabbit is patchily distributed throughout the Great Basin and some adjacent intermountain areas from east-central Washington, south to east-central California, and east to Utah and Wyoming. In Wyoming, it occurs only in the southwestern portion of the state. The pygmy rabbit was petitioned for listing under the Endangered Species Act in 2003. A decision on the petition is currently pending and expected in May of 2005. The pygmy rabbit is considered rare in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in distribution, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The pygmy rabbit inhabits dense, tall stands of big sagebrush, usually along intermittent streams or riparian areas in sagebrush-grasslands. It is uniquely dependent on sagebrush, which comprises up to 99% of its winter diet. Also, since it excavates its own burrows, soft, deep soil is a key habitat feature. The pygmy rabbit is considered a keystone species in the big sagebrush habitat type because it does not flourish in habitats dominated by other vegetation, its burrows are used by invertebrates and other vertebrates, and it offers terrestrial and avian predators a dependable food supply.

Problems:

- Population status, trends, and distribution of the pygmy rabbit are unknown in Wyoming, precluding effective management;
- There are no efforts to identify or maintain key habitats in Wyoming;
- The impacts of different grazing prescriptions on pygmy rabbits and their habitat are largely unknown;
- Loss of mature stands of big sagebrush as a result of fire may decrease both food and cover for pygmy rabbits. Big sagebrush is often completely killed by fire and is slow to reestablish; and
- Geographical isolation of existing pygmy rabbit colonies may leave sub-populations vulnerable to demographic and genetic stochasticity.

Conservation Actions:

- Conduct inventories for pygmy rabbits in all potential habitat in the state;
- Assess potential habitat in southwestern Wyoming, delineate crucial range, and work cooperatively with land management agencies to maintain habitat within the designated area;
- Work cooperatively with private landowners and land management agencies to develop and implement management plans for long-term habitat and population protection that maintain movement among various populations;
- In areas where pygmy rabbits occur, maintain dense, tall stands of sagebrush with a grass understory and deep, soft soil; and
- Manage pygmy rabbit habitat to avoid conflicts with livestock grazing and agricultural development.

- Manage pygmy rabbit habitat to reduce the risk of habitat loss to wild and prescribed fire.

References and Additional Reading:

Garber CS, Beauchaine SR. 1993. Revised distribution of the pygmy rabbit (*Brachylagus idahoensis*) in Wyoming: completion report. In: Endangered and nongame bird and mammal investigations. Cheyenne: Wyoming Game and Fish Department. p 170-4.

Green JS, Flinders JT. 1980. *Brachylagus idahoensis*. *Mammalian Species* 125:1-4.

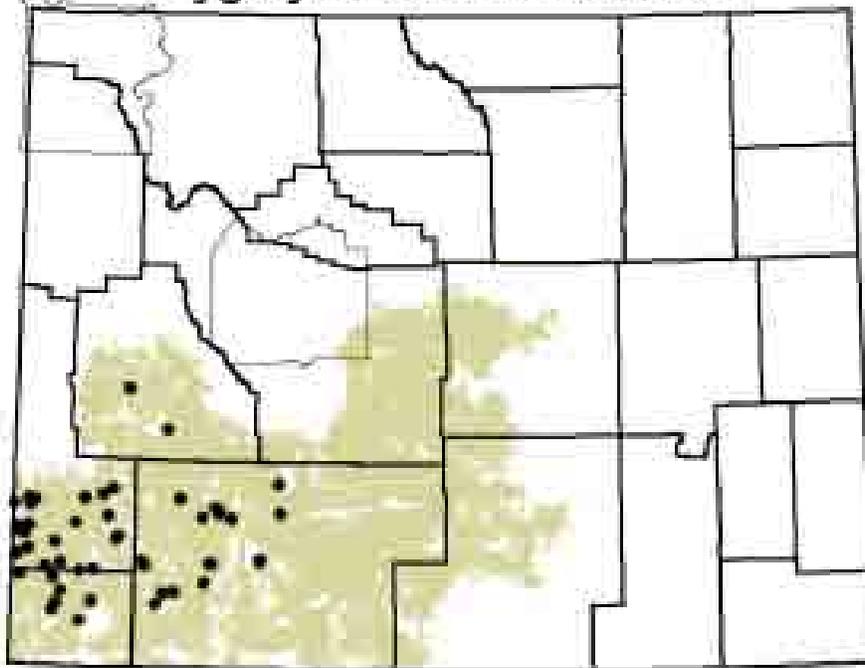
Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Tesky JL. 1994a. *Brachylagus idahoensis*. In: Fire effects information system. USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Online: <http://www.fs.fed.us/database/feis/>.

Washington Department of Fish and Wildlife. 1995. Washington state recovery plan for the pygmy rabbit. Olympia: Wash Dept Fish and Wildl, Wildlife Management Program. 73 p. Online: <http://wdfw.wa.gov/wlm/diversity/soc/recovery/pygrabit/pygrabit.pdf>.

Wilson DE, Ruff S. 1999. *The Smithsonian book of North American mammals*. Washington: Smithsonian Inst Pr. 750 p.

Pygmy Rabbit Distribution



Pygmy Shrew (*Sorex hoyi*)

Status: NSS2; NatureServe G5 S1

Abundance: Rare

Introduction: Primarily a boreal forest obligate, the pygmy shrew occurs all across Canada, the northern US, and in scattered populations southward in the Appalachian Mountains and Rocky Mountains. The relict Rocky Mountain population occurs in the Medicine Bow Mountains in Wyoming and extends south to central Colorado; it is isolated by hundreds of kilometers from any other population north and west of Wyoming. The pygmy shrew is considered rare in Wyoming. It is known in the state from only eight specimens taken in the Medicine Bow Mountains. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 2 (NSS2) because populations are greatly restricted and habitat is restricted.

Habitat: The pygmy shrew inhabits Engelmann spruce/subalpine fir forest near sphagnum moss bogs and other wet areas. It nests in old, decaying logs and root wads. These habitat components are generally associated with mature and old-growth forests that are protected from timber harvest.

Problems:

- Population status, trends, and distribution of the pygmy shrew are unknown, precluding effective management. Wyoming's pygmy shrew population was documented in 1967, and recent documentation is lacking;
- There are no efforts to identify or maintain key habitats in Wyoming; and
- Sampling and identification of shrews requires special methods, equipment, and experience to be successful and scientifically useful.

Conservation Actions:

- Conduct inventories for pygmy shrews in all potential habitat in the state;
- Provide methodology and technical assistance to encourage participation by US Forest Service and Bureau of Land Management biologists; and
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area.

References and Additional Reading:

Clark TW, Harvey AH, Dorn RD, Genter DL, Groves C, eds. 1989. Rare, sensitive, and threatened species of the Greater Yellowstone Ecosystem. Northern Rockies Conservation Cooperative, Montana Natural Heritage Program, The Nature Conservancy, and Mountain West Environmental Services. 153 p.

Long CA. 1974. *Microsorex hoyi* and *Microsorex thompsoni*. Mammalian Species 33:1-4.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Wilson DE, Ruff S. 1999. The Smithsonian book of North American mammals. Washington: Smithsonian Inst Pr. 750 p.



River Otter (*Lutra canadensis*)

Status: NSS4; NatureServe G5 S3

Abundance: Uncommon

Introduction: The river otter occurs throughout most of North America north of Mexico, except the extreme southwestern US, although it is extirpated or rare in large areas of the interior US. It is scattered throughout most of the western 2/3 of Wyoming. The river otter is considered uncommon in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because population status and trends are unknown, although they are suspected to be stable, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat. It is protected from harvest by state legislation that was enacted in 1973.

Habitat: The river otter inhabits a variety of permanent riverine, aquatic, and riparian habitats, including streams, lakes, ponds, swamps, and marshes. Optimum habitat includes slow-moving water with deep pools, abundant riparian vegetation, and plentiful fish. In the Intermountain West, it may prefer valley over mountain habitats, and select streams over lake, reservoir, and pond habitats. It occupies dens in hollow logs, beaver lodges, burrows dug by other animals, log or rock piles, or dense thickets near water. In some areas, beaver ponds, lodges, and bank dens may be critical to river otter denning and foraging. During winter, it generally occupies areas where some open water is available, such as outflows from lakes.

Problems:

- Population status, trends, and distribution of the river otter are poorly known in Wyoming.
- There are no efforts to identify key habitats in Wyoming.
- Population declines in the early 1990s were a result of overharvesting, although numbers and distribution have been increasing since protection began in 1973.

Conservation Actions:

- Conduct inventories for river otters in all potential habitat in the state;
- Monitor populations to provide insight into habitat conditions, water quality, levels of industrial and agricultural pollutants, human disturbance, and other factors that might have an impact on populations;
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area; and
- Manage river otter habitat to reduce conflicts with development and to improve and maintain water quality.

References and Additional Reading:

Foster-Turly P, MacDonald S, Mason C, eds. 1990. Otters: an action plan for their conservation. International Union for Conservation of Nature and Natural Resources/Species Survival Commission, Otter Specialist Group. 126 p.

Larivière S, Walton LR. 1998. *Lontra canadensis*. Mammalian Species 587:1-8.

Melquist WE, Hornocker MG. 1983. Ecology of river otters in west central Idaho. Wildl Monogr 83:1-60.

Melquist WE, Polechla PJ, Toweill D. 2003. River otter. In: Feldhamer GA, Thompson BC, Chapman JA, eds. Wild mammals of North America: biology, management, and conservation. 2d ed. Baltimore: Johns Hopkins Univ Pr. p 708-34.

Rudd W, Forrest L, Lindzey F, Buskirk SW. 1986. River otters in Wyoming: distribution, ecology, and potential impacts from energy development. Research Report 86-02. Unpublished report prepared for Wyoming Wildlife Federation. Wyoming Cooperative Research Unit. 39 p.

Tesky JL. 1993. *Lutra canadensis*. In: Fire effects information system. USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Online: <http://www.fs.fed.us/database/feis/>.



Sagebrush Vole (*Lemmiscus curtatus*)

Status: NSS4; NatureServe G5 S5

Abundance: Common

Introduction: The sagebrush vole inhabits Washington, central Idaho, southern Alberta, and southern Saskatchewan south to east-central California, southern Nevada, southern Utah, northern Colorado, and the western Dakotas. It is scattered throughout most of Wyoming. The sagebrush vole is considered common in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because population status and trends are unknown, although they are suspected to be stable, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The sagebrush vole inhabits semiarid prairies, rolling hills, and brushy canyons with loose, well-drained, sometimes rock-covered, soil. It usually inhabits areas that are dominated by sagebrush or rabbitbrush mixed with bunchgrass, especially crested wheatgrass.

Problems:

- Population status, trends, and distribution of the sagebrush vole are unknown, precluding effective management; and
- There are no efforts to identify key habitats in Wyoming.

Conservation Actions:

- Conduct inventories for sagebrush voles in all potential habitat in the state; and
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area.

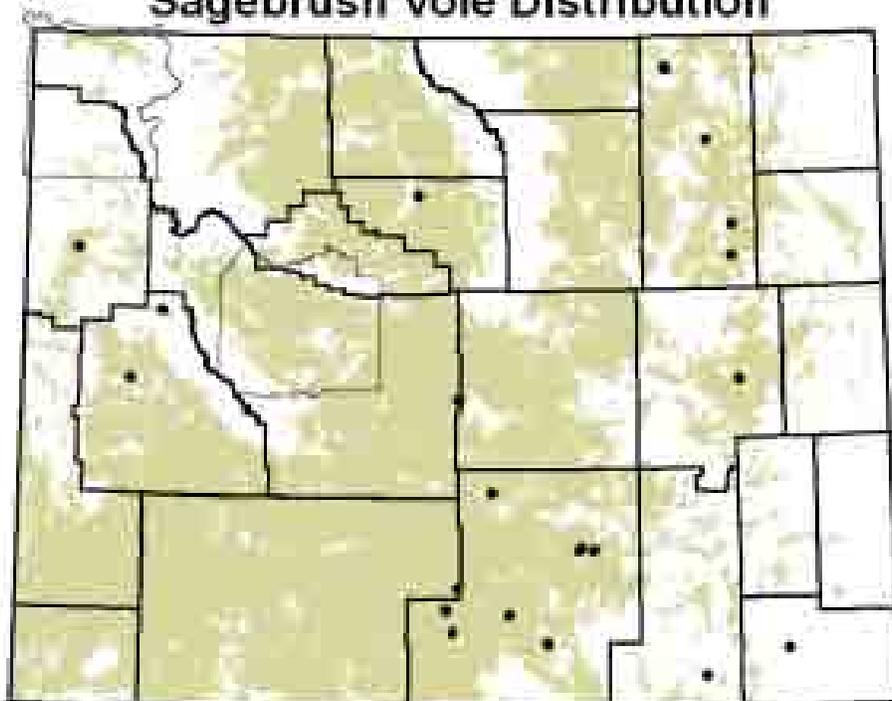
References and Additional Reading:

Carroll LE, Genoways HH. 1980. *Lagurus curtatus*. Mammalian Species 124:1-6.

Mullican TR, Keller BL. 1986. Ecology of the sagebrush vole (*Lemmiscus curtatus*) in southeastern Idaho. Can J Zool 64:1218-23.

Wilson DE, Ruff S. 1999. The Smithsonian book of North American mammals. Washington: Smithsonian Inst Pr. 750 p.

Sagebrush Vole Distribution



Silky Pocket Mouse (*Perognathus flavus*)

Status: NSS3; NatureServe G5 S2

Abundance: Rare

Introduction: The silky pocket mouse inhabits the central and southern Great Plains and intermountain basins from South Dakota and southeastern Utah south to the central plateau of Mexico. It occurs in eastern and southern Wyoming, and is considered rare. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in distribution, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The silky pocket mouse inhabits a variety of arid, and sometimes barren, habitats, including grasslands, shrublands, and juniper woodlands on valley bottoms, hillsides, and mesas. It prefers thin low grasses and a minimum of bare soil. It is most abundant on loose, friable soils.

Problems:

- Population status, trends, and distribution of the silky pocket mouse are unknown, precluding effective management; and
- There are no efforts to identify key habitats in Wyoming.

Conservation Actions:

- Conduct inventories for silky pocket mice in all potential habitat in the state; and
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area.

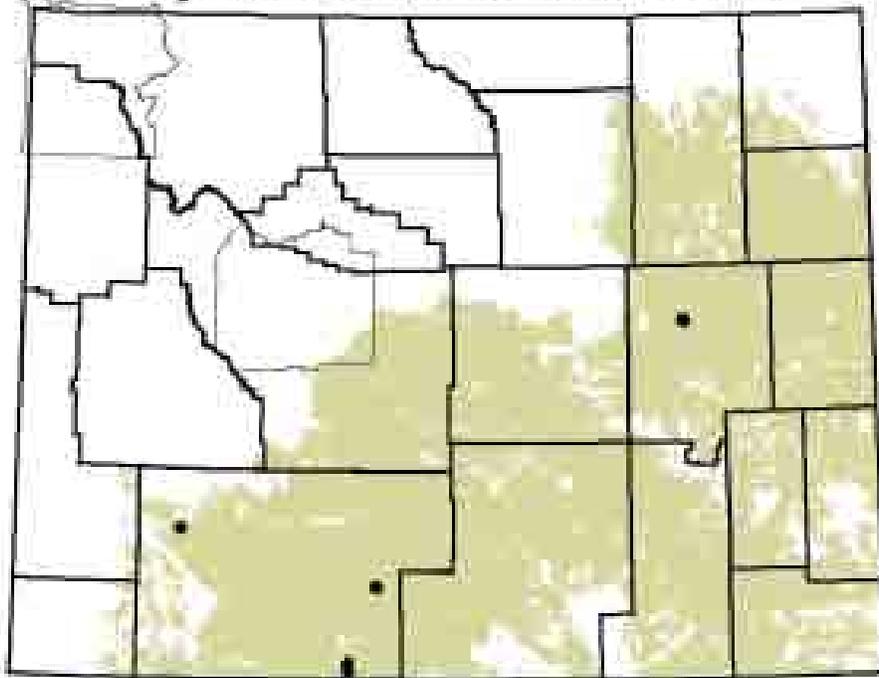
References and Additional Reading:

Best TL, Skupski MP. 1994. *Perognathus flavus*. Mammalian Species 471:1-10.

NatureServe. 2004. NatureServe explorer: an online encyclopedia of life. Version 1.8. Arlington (VA): NatureServe. Online <http://www.natureserve.org/explorer>.

Wilson DE, Ruff S. 1999. The Smithsonian book of North American mammals. Washington: Smithsonian Inst Pr. 750 p.

Silky Pocket Mouse Distribution



Silver-haired Bat (*Lasionycteris noctivagans*) Status: NSS4; NatureServe G5 S3B

Abundance: Uncommon

Introduction: The silver-haired bat is found throughout most of North America from southeastern Alaska across the southern half of Canada, and south to Georgia, Arizona, and northeastern Mexico. During summer, it inhabits the northern United States, including the Rocky Mountains, north into Canada nearly to the treeless zone. During winter, it occurs mostly in the southern third of North America, plus areas of relatively mild coastal climate as far north as Alaska, British Columbia, and New York. It occurs throughout Wyoming during summer. The silver-haired bat is considered uncommon in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because population status and trends are unknown, although they are expected to be stable, and because it may be sensitive to human disturbance.

Habitat: The silver-haired bat inhabits coniferous and mixed deciduous-coniferous forests and woodlands, including juniper, subalpine fir, Engelmann spruce, limber pine, Douglas-fir, aspen, cottonwood, and willow. It is most commonly associated with forested and montane habitats adjacent to lakes, ponds, and streams; occurs most frequently in stands of late-successional forest; and may be reliant on older forests for roost trees. It roosts almost exclusively in trees, usually in cavities in live trees or snags, but also under loose bark or within tree cracks or crevices.

Problems:

- Population status, trends, and distribution of the silver-haired bat are unknown in Wyoming, precluding effective management;
- Timber harvest and the removal of snags may result in loss of roosting habitat; and
- Broad-scale insect control projects may impact the prey base of bats and other insectivores.

Conservation Actions:

- Continue to conduct inventories and monitoring to determine the population status and habitat requirements of the silver-haired bat in Wyoming;
- Work cooperatively with state and federal agencies, the Western Bat Working Group, the Wyoming Bat Working Group, and public and private entities to preserve existing bat habitats, identify potential habitats, and minimize the impacts of pesticides and other environmental contaminants;
- Educate the public about the ecological role of bats and their habitat requirements;
- Maintain large stands of mature and old-growth forests and woodlands and retain all large-diameter snags in areas where silver-haired bats occur; and
- Manage silver-haired bat roosting areas to avoid conflicts with timber harvest activities.

References and Additional Reading:

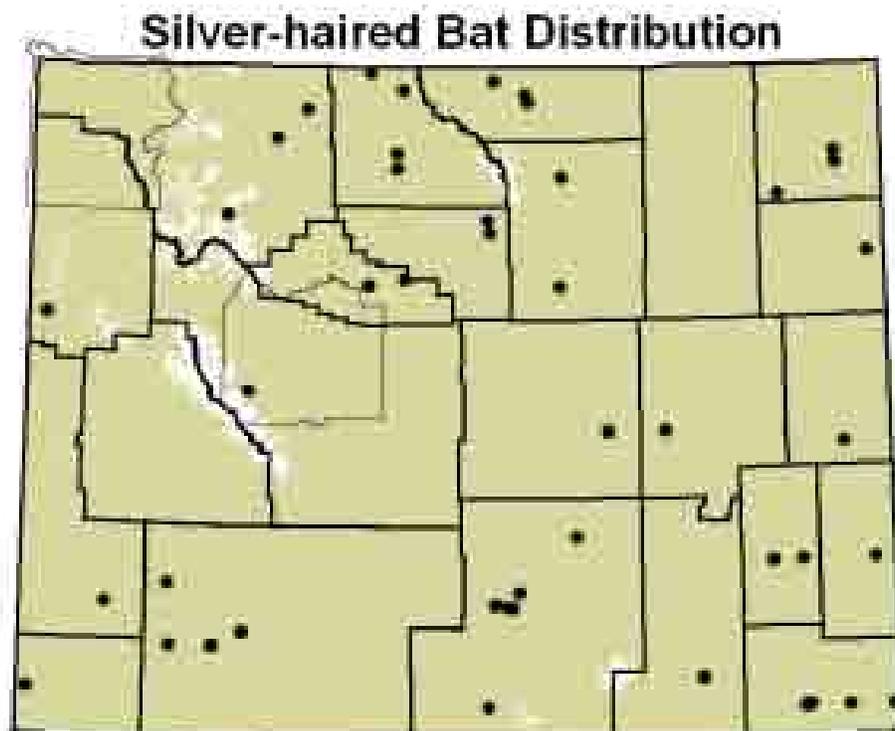
Campbell LA, Hallett JG, O'Connell MA. 1996. Conservation of bats in managed forests: use of roosts by *Lasionycteris noctivagans*. *J Mammal* 77(4):976-84.

Kunz TH. 1982. *Lasionycteris noctivagans*. *Mammalian Species* 172:1-5.

Mattson TA, Buskirk SW, Stanton NL. 1996. Roost sites of the silver-haired bat (*Lasionycteris noctivagans*) in the Black Hills, South Dakota. *Great Basin Nat* 56(3):247-53.

Nicholoff SH, Grenier M. Wyoming bat conservation plan. Lander: Wyoming Game and Fish Department. Forthcoming.

Schmidt CA. 2003e. Conservation assessment for the silver-haired bat in the Black Hills National Forest, South Dakota and Wyoming. Custer (SD): USDA Forest Service, Black Hills National Forest. 22pp. Online www.fs.fed.us/r2/scp/species_assessment_reports.shtml.



Spotted Bat (*Euderma maculatum*)**Status: NSS2; NatureServe G4 S3****Abundance:** Rare

Introduction: The spotted bat inhabits western North America from southern British Columbia through most of the western states to central Mexico. Its distribution in Wyoming is still unknown, although it may be expected to occur throughout western Wyoming and perhaps statewide in suitable habitat. The spotted bat is considered rare in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 2 (NSS2) because populations are restricted in distribution and there is ongoing significant loss of habitat.

Habitat: The spotted bat occupies a wide variety of habitats, from desert scrub to coniferous forest, although it is most often observed in low deserts and basins and juniper woodlands. It roosts in cracks and crevices in high cliffs and canyons. It also may occasionally roost in buildings, caves, or abandoned mines, although cliffs are the only roosting habitat in which reproductive females have been documented.

Problems:

- Population status, trends, and distribution of the spotted bat are unknown in Wyoming, precluding effective management. It is an extremely difficult species to inventory and monitor;
- Activities such as rock climbing and quarry operations may impact roosting bats in rock crevices and cliffs; and
- Broad-scale insect control projects may impact the prey base of bats and other insectivores.

Conservation Actions:

- Continue to conduct inventories and monitoring to determine the population status and habitat requirements of the spotted bat in Wyoming;
- Work cooperatively with state and federal agencies, the Western Bat Working Group, the Wyoming Bat Working Group, and public and private entities to preserve existing bat habitats, identify potential habitats, and minimize the impacts of pesticides and other environmental contaminants;
- Educate the public about the ecological role of bats and their habitat requirements; and
- Minimize disturbance of cliffs and rock crevices where spotted bats (or other bats) are roosting.

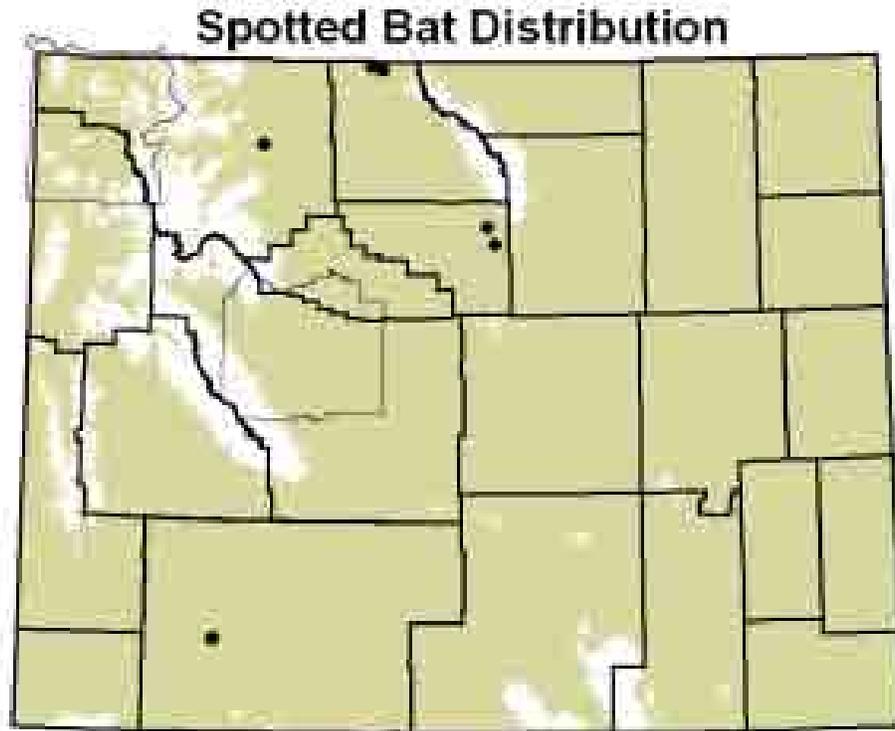
References and Additional Reading:

Nicholoff SH, Grenier M. Wyoming bat conservation plan. Lander: Wyoming Game and Fish Department. Forthcoming.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Schmidt CA. 2003g. Conservation assessment for the spotted bat in the Black Hills National Forest, South Dakota and Wyoming. Custer (SD): USDA Forest Service, Black Hills National Forest. 14 p. Online www.fs.fed.us/r2/scp/species_assessment_reports.shtml.

Watkins LC. 1977. *Euderma maculatum*. Mammalian Species 77:1-4.



Spotted Ground Squirrel (*Spermophilus spilosoma*)

Status: NSS3; NatureServe G5 S3

Abundance: Rare

Introduction: The spotted ground squirrel occurs from southeastern South Dakota and southern Utah south to central Mexico. In Wyoming, it occurs only on the high plains of the southeastern portion of the state. The spotted ground squirrel is considered rare in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in distribution, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The spotted ground squirrel inhabits arid and semiarid areas, including sagebrush-grasslands, grasslands, disturbed areas, and sand dunes. It prefers dry, deep, sandy soils with sparse vegetation.

Problems:

- Population status, trends, and distribution of the spotted ground squirrel are unknown, precluding effective management.
- There are no efforts to identify key habitats in Wyoming.

Conservation Actions:

- Conduct inventories for spotted ground squirrels in all potential habitat in the state.
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area.

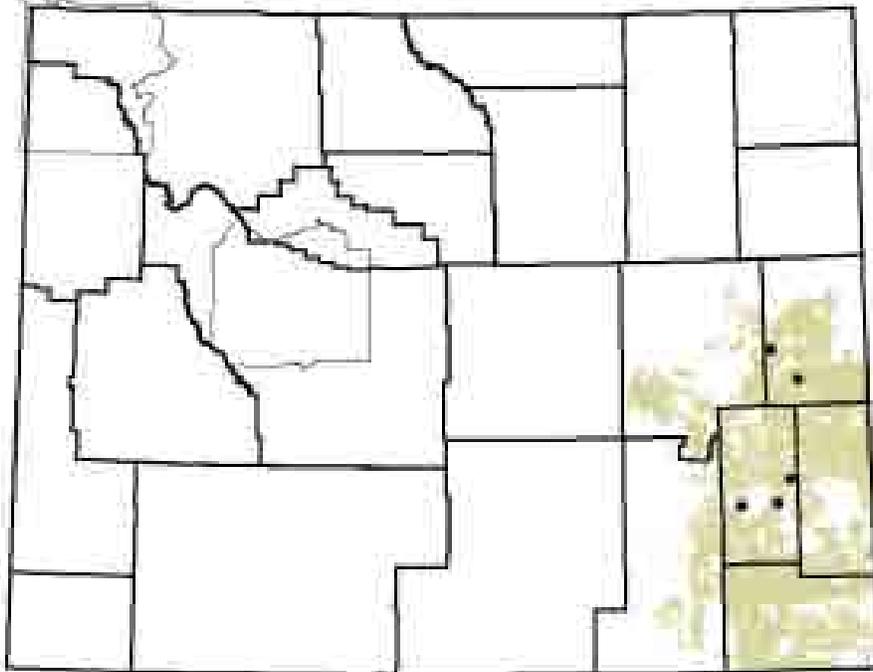
References and Additional Reading:

NatureServe. 2004. NatureServe explorer: an online encyclopedia of life. Version 1.8. Arlington (VA): NatureServe. Online <http://www.natureserve.org/explorer>.

Streubel DP, Fitzgerald JP. 1978. *Spermophilus spilosoma*. Mammalian Species 101:1-4.

Wilson DE, Ruff S. 1999. The Smithsonian book of North American mammals. Washington: Smithsonian Inst Pr. 750 p.

Spotted Ground Squirrel Distribution



Swift Fox (*Vulpes velox*)**Status: NSS4, NatureServe G3 S2****Abundance:** Common

Introduction: Historically the swift fox inhabited southern Saskatchewan and Alberta south across Montana and the Dakotas through the Great Plains states to northwestern Texas and eastern New Mexico. In Wyoming, it occurs primarily east of the Continental Divide, and is considered common in Wyoming. The species was removed from the Endangered Species Act Candidate List in 2002 because of conservation efforts of western states and the Swift Fox Conservation Team. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because population status and trends are unknown, although they are suspected to be stable, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The swift fox primarily inhabits shortgrass and mixed-grass prairies, although it often uses highway and railroad right-of-ways, agricultural areas, and sagebrush-grasslands. It is closely associated with prairie dog colonies and uses underground dens year-round. It selects habitat with low-growing vegetation, relatively flat terrain, friable soils, and high den availability.

Problems:

- Human related activities in the early 1800s through the mid 1900s contributed to a restricted distribution and abundance throughout the range of the swift fox. Some of these activities include the loss of native prairie habitat, predator control campaigns, unregulated trapping and hunting, and rodent control programs;
- Very vulnerable to trapping, poisoning, and death on highways; and
- Population trends and distribution are poorly known in Wyoming.

Conservation Actions:

- Continue and improve statewide inventories to determine population trends and distribution.
- Continue participating in and supporting the Swift Fox Conservation Team;
- Designate crucial habitat and habitat corridors, and identify where habitat conservation and management efforts should focus to protect, enhance, or improve suitable habitat;
- Develop and maintain a positive relationship with landowners on whose property swift fox occur. Educate and cultivate a feeling of participation in landowners to promote beneficial land use practices and management for swift fox on private land;
- Determine the effects of competition from red foxes and coyotes; and
- Integrate management of the swift fox with other Species of Special Concern that are dependent on grasslands, such as the black-footed ferret, Ferruginous Hawk, Mountain Plover, black-tailed prairie dog, and Burrowing Owl.

References and Additional Reading:

Egoscue HJ. 1979. *Vulpes velox*. Mammalian Species 122:1-5.

Kahn R, Fox L, Horner P, Giddings B, Roy C, eds. 1997. Conservation assessment and conservation strategy for swift fox in the United States. Swift Fox Conservation Team. 54 p.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Stephens R. Draft Wyoming Grasslands Conservation Plan. Wyoming Game and Fish Department, Nongame Program. Forthcoming.



Townsend's Big-eared Bat (*Corynorhinus townsendii*) Status: NSS2; NatureServe G4 S2

Abundance: Rare

Introduction: The Townsend's big-eared bat inhabits most of western North America from British Columbia to central Mexico, and east to western South Dakota and Texas. Isolated populations occur in the south-central and Appalachian states. It is a year-round resident throughout most of Wyoming, but is concentrated in the southeastern and north-central portions of the state. The Townsend's big-eared bat is considered rare in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 2 (NSS2) because populations are restricted in distribution and there is ongoing significant loss of habitat.

Habitat: The Townsend's big-eared bat occupies a variety of xeric to mesic habitats, including coniferous forests, juniper woodlands, deciduous forests, basins, and desert shrublands, and is absent only from the most extreme deserts and highest elevations. However, this species requires caves or abandoned mines for roost sites during all seasons and stages of its life cycle, and its distribution is strongly correlated with the availability of these features.

Problems:

- Population status, trends, and distribution of the Townsend's big-eared bat are unknown in Wyoming, precluding effective management;
- Roosting habitat has been lost in Wyoming and continues to be threatened by abandoned mine reclamation and renewed mining;
- The Townsend's big-eared bat is extremely sensitive to disturbance at maternity roosts and hibernacula. Recreational activities (such as spelunking) may impact roosting bats in caves and abandoned mines; and
- Broad-scale insect control projects may impact the prey base of bats and other insectivores.

Conservation Actions:

- Continue to conduct inventories and monitoring to determine the population status and habitat requirements of the Townsend's big-eared bat in Wyoming;
- Work cooperatively with state and federal agencies, the Western Bat Working Group, the Wyoming Bat Working Group, and public and private entities to preserve existing bat habitats, identify potential habitats, and minimize the impacts of pesticides and other environmental contaminants;
- Educate the public about the ecological role of bats and their habitat requirements.
- Minimize disturbance of caves or abandoned mines where Townsend's big-eared bats (or other bats) are roosting; and
- Protect abandoned mines where Townsend's big-eared bats (and other bats) roost from hard closure.

References and Additional Reading:

Gruver JC, Keinath DA. Species assessment for Townsend's big-eared bat (*Corynorhinus* [= *Plecotus*] *townsendii*). Prepared for Wyoming State Bureau of Land Management, Cheyenne. Laramie: Wyoming Natural Diversity Database. Forthcoming.

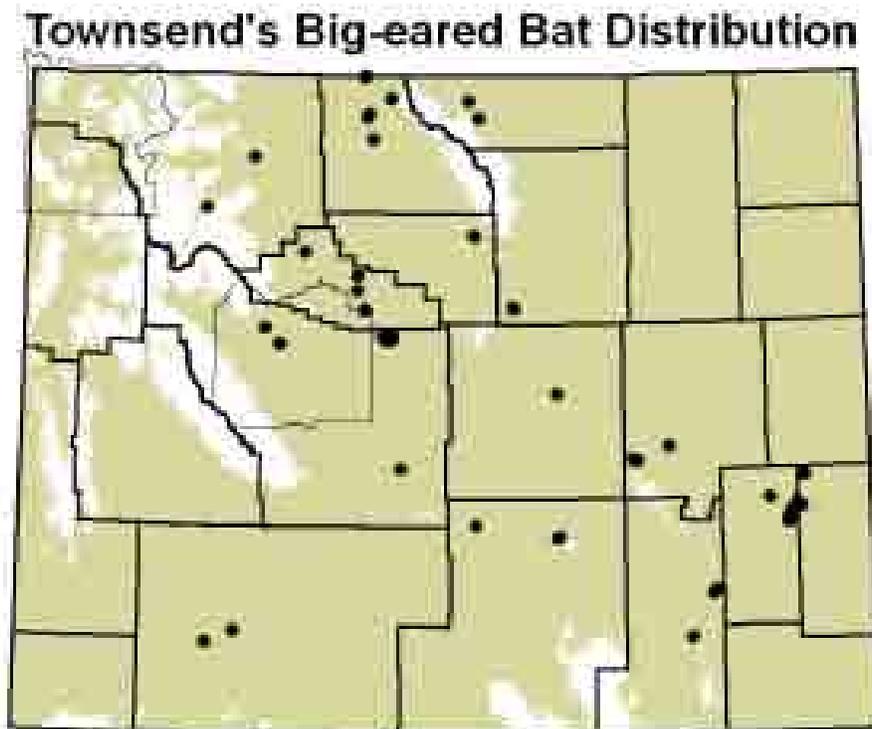
Kunz TH, Martin RA. 1982. *Plecotus townsendii*. Mammalian Species 175:1-6.

Nicholoff SH, Grenier M. Wyoming bat conservation plan. Lander: Wyoming Game and Fish Department. Forthcoming.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Pierson ED, Wackenhut MC, Altenbach JS, Bradley P, Call P, Genter DL, Harris CE, Keller BL, Lengus B, Lewis L, and others. 1999. Species conservation assessment and strategy for Townsend's big-eared bat (*Corynorhinus townsendii townsendii* and *Corynorhinus townsendii pallescens*). Boise: Idaho Conservation Effort, Idaho Department of Fish and Game. 68 p.

Schmidt CA. 2003h. Conservation assessment for the Townsend's big-eared bat in the Black Hills National Forest, South Dakota and Wyoming. Custer (SD): USDA Forest Service, Black Hills National Forest. 23 p. Online www.fs.fed.us/r2/scp/species_assessment_reports.shtml.



Uinta Ground Squirrel (*Spermophilus armatus*) Status: NSS6; NatureServe G5 S3 S4

Abundance: Common

Introduction: The Uinta ground squirrel is found in western Wyoming, southwest Montana, eastern Idaho, and north-central Utah. It has been documented primarily in the degree blocks of western Wyoming (Cеровski *et al* 2004). The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 6 (NSS6) since populations are abundant in adequate habitat types. The only reason it is included in the CWCS is that a significant portion of its range occurs in Wyoming. Population trends in Wyoming will be indicative of range wide trends.

Habitat: The Uinta ground squirrel can be found in sagebrush grasslands, mountain foothills grasslands, irrigated fields, and riparian shrub grasslands. It prefers moist habitats with lush vegetation, and it creates burrows in soft soils. It is a strong swimmer and will swim to find aquatic plants.

Problems:

- Population trends are not well documented;
- Ground squirrels have been targets of intensive eradication programs, and conservation efforts may be poorly understood and not supported if such efforts are ever needed in the future; and
- The species is listed as a 'pest' under Wyoming's Weed and Pest Act, and recreational shooting is not regulated by the WGFD.

Conservation Actions:

- Begin monitoring population trends; and
- If monitoring data show that populations are declining, provide information to the WGFD Commission to allow them to evaluate and consider an appropriate response.

References and Additional Reading:

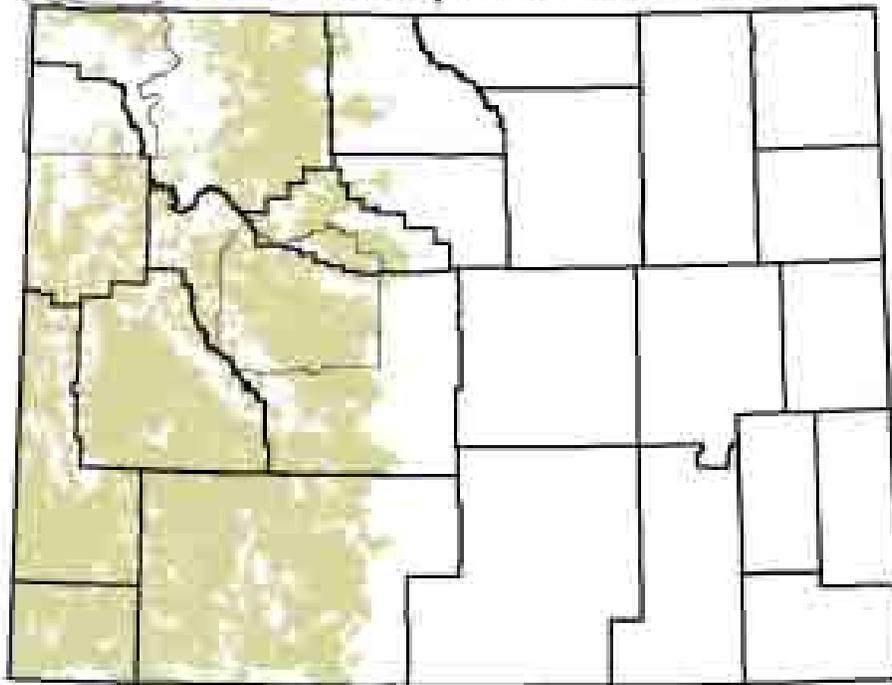
Cеровski, A. O., M.Grenier, B. Oakleaf, L. Van Fleet, and S.Patla. 2004. Atlas of Birds, Mammals, Reptiles and Amphibians in Wyoming, Wyoming Game & Fish Dept. Nongame Program. 206pp.

Eshelman, B.D. and C.S. Sonnemann. 2000. *Spermophilus armatus* in Mammalian Species. 637:1-6. American Society of Mammalogists.

Parmenter, R.R. and J.A. MacMahon. 1983. Factors determining the abundance and distribution of rodents in a shrub-steppe ecosystem: the role of shrubs. *Oecologia*, 59: 145-156.

Whitaker, J. 1996. National Audubon Society Field Guide to North American Mammals. New York, NY. Alfred A. Knopf Inc.

Uinta Ground Squirrel Distribution



Vagrant Shrew (*Sorex nanus*)

Status: NSS3; NatureServe G5 S5

Abundance: Rare

Introduction: The vagrant shrew is distributed from southern British Columbia and Alberta south to central Nevada, with a disjunct population in central Mexico. It occurs throughout most of Wyoming except the eastern tier of counties. The vagrant shrew is considered rare in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in numbers, and habitat is vulnerable, although there is no ongoing loss of habitat.

Habitat: The vagrant shrew inhabits riparian shrub, moist meadow grasslands, bogs, and riparian or marsh habitats with moist soil within a variety of habitat types from sagebrush-grassland and mixed shrubland to conifer forest. It prefers areas with accumulated leaf litter and rotting logs.

Problems:

- Population status, trends, and distribution of the vagrant shrew are unknown in Wyoming, precluding effective management;
- There are no efforts to identify or maintain key habitats in Wyoming; and
- Sampling and identification of shrews requires special methods, equipment, and experience to be successful and scientifically useful.

Conservation Actions:

- Conduct inventories for vagrant shrews in all potential habitat in the state;
- Provide methodology and technical assistance to encourage participation by US Forest Service and Bureau of Land Management biologists; and
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area.

References and Additional Reading:

NatureServe. 2004. NatureServe explorer: an online encyclopedia of life. Version 1.8. Arlington (VA): NatureServe. Online <http://www.natureserve.org/explorer>.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Wilson DE, Ruff S. 1999. The Smithsonian book of North American mammals. Washington: Smithsonian Inst Pr. 750 p.

Vagrant Shrew Distribution



Water Shrew (*Sorex palustris*)

Status: NSS4; NatureServe G5 S4

Abundance: Common

Introduction: The water shrew occurs from Labrador, Nova Scotia, and New England across Canada to east-central Alaska south to the northern Great Lakes region, the Appalachians, and in the western mountains to central California, Nevada, Utah, and New Mexico. It is scattered across most of the western 2/3 of Wyoming. The water shrew is considered common in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because population status and trends are unknown, although they are suspected to be stable, and because its habitat is vulnerable, although there is no ongoing loss of habitat.

Habitat: The water shrew inhabits the vicinity of streams, lakes, ponds, and wetlands. It is most abundant along small, cold streams with thick, overhanging riparian vegetation. It requires high quality water and abundant cover, such as logs, rocks, or overhanging stream banks.

Problems:

- Population status, trends, and distribution of the water shrew are unknown in Wyoming, precluding effective management;
- There are no efforts to identify or maintain key habitats in Wyoming;
- Sampling and identification of shrews requires special methods, equipment, and experience to be successful and scientifically useful; and
- The water shrew is impacted by reduced water quality from siltation, pesticides, and other environmental contaminants, and therefore may be vulnerable to logging, mining, agriculture, and other activities that can affect water quality.

Conservation Actions:

- Conduct inventories for water shrews in all potential habitat in the state;
- Provide methodology and technical assistance to encourage participation by US Forest Service and Bureau of Land Management biologists;
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area; and
- Manage water shrew habitat to reduce conflicts with timber harvesting, mining, and other development. Maintain buffer strips along potential water shrew habitat.

References and Additional Reading:

Beneski JT, Stinson DW. 1987. *Sorex palustris*. Mammalian Species 296:1-6.

Conaway CH. 1952. Life history of the water shrew (*Sorex palustris navigator*). Am Midl Nat 48:219-47.

NatureServe. 2004. NatureServe explorer: an online encyclopedia of life. Version 1.8. Arlington (VA): NatureServe. Online <http://www.natureserve.org/explorer>.

Pagels JF, Fies ML, Glasgow R. 1991. Appalachian water shrew, *Sorex palustris punctulatus* Hooper: recovery plan. Richmond: Virginia Department of Game and Inland Fisheries.



Water Vole (*Microtus richardsoni*)

Status: NSS3; NatureServe G5 S2

Abundance: Rare

Introduction: The water vole occurs from British Columbia and Alberta south through Oregon and western Montana to central Utah. In Wyoming, it inhabits the western mountain ranges and the Bighorn Mountains. The water vole is considered rare in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in distribution, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Special concern has been expressed over the status, distribution, and condition of the Bighorn Mountain population of Water Voles.

Habitat: The water vole inhabits moist subalpine and alpine meadows of willows, grasses, and forbs atop deep soils. It usually remains within about 17 m (56 ft) of low-gradient (about 5°) streams with narrow channels. It nests in a burrow dug into an overhanging stream bank, usually with both aboveground and underwater entrances.

Problems:

- Population status, trends, and distribution of the water vole are unknown in Wyoming, precluding effective management;
- Efforts to identify key habitats in Wyoming have been limited;
- In some areas, vegetative cover has been removed from stream banks; and
- Although suitable habitat in Wyoming is widely distributed, it is naturally fragmented and very limited. Geographical isolation of existing sub-populations may leave them vulnerable to demographic and genetic stochasticity.

Conservation Actions:

- Continue to conduct inventories for water voles in all potential habitat in the state;
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area; and
- Manage water vole habitat to avoid conflicts with livestock grazing.

References and Additional Reading:

Klaus M. 2003. The status, habitat, and response to grazing of water vole populations in the Big Horn Mountains of Wyoming, USA. *Arctic, Antarctic, and Alpine Research* 35:100-9.

Klaus M, Beauvais GP. 2004. Water vole (*Microtus richardsoni*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. 60 p. Online: <http://www.fs.fed.us/r2/projects/scp/assessments/watervole.pdf>.

Ludwig DR. 1984. *Microtus richardsoni*. *Mammalian Species* 223:1-6.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Priday J, Laurion T, Oakleaf B. 1998. Water vole survey of the Shoshone National Forest. In: Threatened, endangered, and nongame bird and mammal investigations. Cheyenne: Wyoming Game and Fish Department. p 156-68.

Wilson DE, Ruff S. 1999. The Smithsonian book of North American mammals. Washington: Smithsonian Inst Pr. 750 p.



Western Heather Vole (*Phenacomys intermedius*)

Status: NSS3; NatureServe G5 S5

Abundance: Common

Introduction: The western heather vole occurs from British Columbia and Alberta south along the Cascade and Rocky Mountains to northern New Mexico and northern California. In Wyoming, it inhabits the mountain ranges of the northwest (Yellowstone, Absarokas, Wind Rivers), the Uintas, the Bighorns, and the Sierra Madre and Medicine Bow Mountains. The western heather vole is considered common in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in distribution, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The western heather vole occupies mountainous regions and typically occurs at higher elevations near or above timberline. It is found in a variety of subalpine and alpine habitats, including open coniferous forest, riparian areas, forest edge, and moist meadows. It is often associated with krummholz, and most habitats have a shrub understory, often of various heaths.

Problems:

- Population status, trends, and distribution of the western heather vole are unknown, precluding effective management. It is difficult to survey because of its scattered, low-density populations; its reluctance to enter traps; and its high rate of mortality in traps;
- There are no efforts to identify key habitats in Wyoming; and
- Habitat may be impacted by incompatible livestock grazing.

Conservation Actions:

- Conduct inventories for western heather voles in all potential habitat in the state; and
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area.

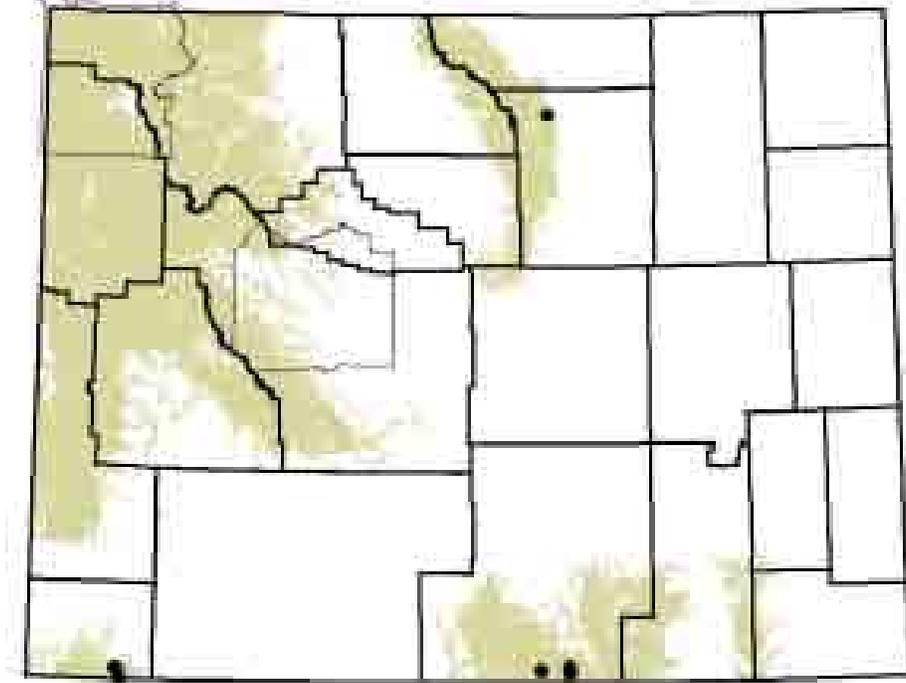
References and Additional Reading:

McAllister JA, Hoffman RS. 1988. *Phenacomys intermedius*. Mammalian Species 305:1-8.

NatureServe. 2004. NatureServe explorer: an online encyclopedia of life. Version 1.8. Arlington (VA): NatureServe. Online <http://www.natureserve.org/explorer>.

Wilson DE, Ruff S. 1999. The Smithsonian book of North American mammals. Washington: Smithsonian Inst Pr. 750 p.

Western Heather Vole Distribution



Western Small-footed Myotis (*Myotis ciliolabrum*) Status: NSS3; NatureServe G5 S3B

Abundance: Uncommon

Introduction: The western small-footed myotis inhabits most of western North America from British Columbia, Alberta, and Saskatchewan, south through most of the United States west of the 100th meridian, and into central Mexico. It is a year-round resident in Wyoming and occurs throughout most of the state at elevations between 915 and 2500 m (3000 and 8000 ft), but is rarely reported in high mountains. The western small-footed myotis is considered uncommon in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because, although it is widely distributed, it is experiencing ongoing significant loss of habitat.

Habitat: The western small-footed myotis inhabits a wide variety of habitats in Wyoming, primarily at lower and intermediate elevations. It is most commonly associated with arid, rocky areas (such as canyons, cliffs, rock outcrops, and badlands) within a variety of habitats, such as montane forest, juniper woodlands, sagebrush steppe, and shortgrass prairie. During summer, the small-footed myotis roosts in a variety of settings, although it is usually associated with rock shelters (such as crevices, overhangs, cliffs, and under rocks), caves, and/or abandoned mines. It also will occasionally roost in buildings, bridges, or under loose tree bark. During winter, it hibernates in caves and abandoned mines, and its reliance on these sites is significant.

Problems:

- Population status, trends, and distribution of the western small-footed myotis are unknown in Wyoming, precluding effective management;
- Roosting habitat has been lost in Wyoming and continues to be threatened by abandoned mine reclamation, removal of old buildings, and renewed mining;
- Recreational activities (such as spelunking and rock climbing) may impact roosting bats in caves, abandoned mines, and rock crevices; and
- Broad-scale insect control projects may impact the prey base of bats and other insectivores.

Conservation Actions:

- Continue to conduct inventories and monitoring to determine the population status and habitat requirements of the western small-footed myotis in Wyoming;
- Work cooperatively with state and federal agencies, the Western Bat Working Group, the Wyoming Bat Working Group, and public and private entities to preserve existing bat habitats, identify potential habitats, and minimize the impacts of pesticides and other environmental contaminants;
- Educate the public about the ecological role of bats and their habitat requirements;
- Minimize disturbance of caves or abandoned mines where western small-footed myotis (or other bats) are roosting; and
- Protect abandoned mines where western small-footed myotis (and other bats) roost from hard closure.

References and Additional Reading:

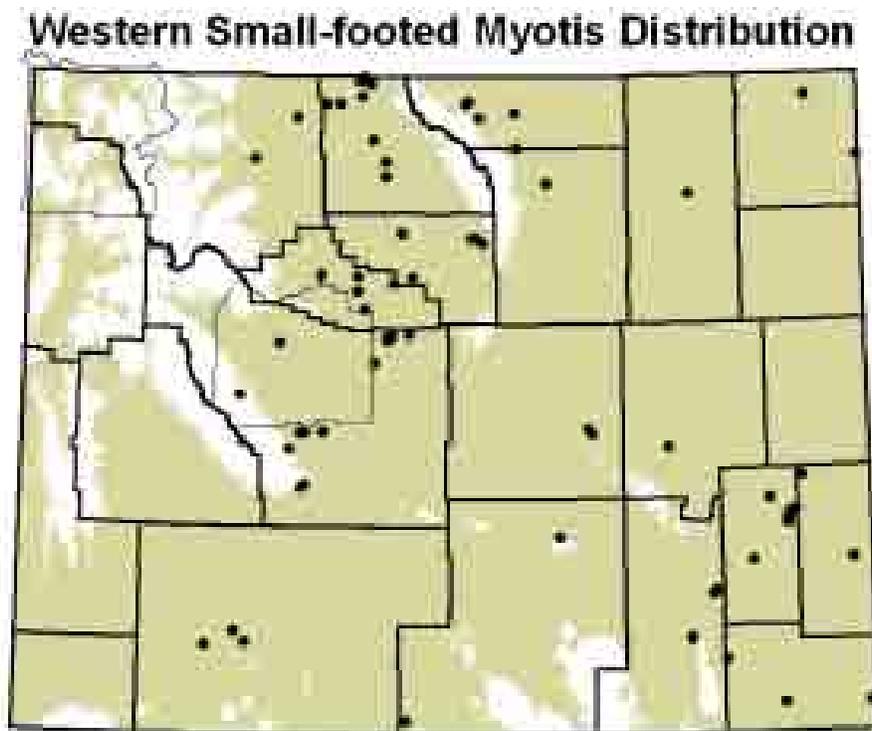
Holloway GL, Barclay RMR. 2001. *Myotis ciliolabrum*. Mammalian Species 670:1-5.

Nicholoff SH, Grenier M. Wyoming bat conservation plan. Lander: Wyoming Game and Fish Department. Forthcoming.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Pierson ED, Wackenhut MC, Altenbach JS, Bradley P, Call P, Genter DL, Harris CE, Keller BL, Lengus B, Lewis L, and others. 1999. Species conservation assessment and strategy for Townsend's big-eared bat (*Corynorhinus townsendii townsendii* and *Corynorhinus townsendii pallescens*). Boise: Idaho Conservation Effort, Idaho Department of Fish and Game. 68 p.

Schmidt CA. 2003f. Conservation assessment for the small-footed myotis in the Black Hills National Forest, South Dakota and Wyoming. Custer (SD): USDA Forest Service, Black Hills National Forest. 16 p. Online www.fs.fed.us/r2/scp/species_assessment_reports.shtml.



White-tailed Prairie Dog (*Cynomys leucurus*)**Status: NSS4; NatureServe G4 S3****Abundance:** Common

Introduction: The white-tailed prairie dog occurs from extreme south-central Montana south to northeastern Utah and western Colorado. In Wyoming, it inhabits primarily the western 2/3 of the state much of which is dominated by sagebrush. The white-tailed prairie dog is considered common in Wyoming. Mapping conducted by the Wyoming Game and Fish Department (WGFD) in the late 1980s and early 1990s indicated approximately 138,000 ha (340,000 ac) of white-tailed prairie dog towns. The WGFD classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because population status and trends are unknown, and because its habitat is vulnerable.

Habitat: The white-tailed prairie dog inhabits arid grassland and shrub/grassland habitats, usually with slopes less than 12% to 15%. It lives primarily at higher elevations than the black-tailed prairie dog, in intermountain valleys, benches, and plateaus with diverse grass and forb cover. Where it occurs east of the Continental Divide in Wyoming, it probably occupies areas that are too dry for the black-tailed prairie dog.

Problems:

- Population trends and status are not well documented. Current trend data have not been readily available to the general public and resource managers;
- Current white-tailed prairie dog mapping efforts are labor intensive. New methods or inventory techniques need to be developed;
- Prairie dogs have been targets of intensive eradication programs and conservation efforts may be poorly understood and not supported;
- Sylvatic plague has the potential to have substantial negative impacts on prairie dog populations. There are currently no effective management approaches to mitigate the spread of plague;
- Listed as a pest under Wyoming's Weed and Pest Act and levels of shooting activity is currently not regulated or monitored by the Wyoming Game and Fish Department; and
- Impacts of natural resource development such as oil and gas are not quantified and preclude effective management.

Conservation Actions:

- Initiate inventories and monitoring to more accurately estimate white-tailed prairie dog population levels and evaluate trends. Develop agreements and funding to conduct statewide aerial photography and spot mapping of colonies;
- Cooperate with the BLM to designate key habitats and develop a coordinated management approach throughout Wyoming;
- Provide assistance to landowners to conserve prairie dogs and their habitat;
- Develop education programs in schools and public forums about the ecological value of prairie dogs and their role as keystone species to build a support base for developing and implementing an effective management program;

- Give priority and special management attention to prairie dog complexes of at least 2000 ha (5000 ac), as these are integral to the white-tailed prairie dog's ecology and are important habitats for many associated or dependent species; and
- Study the effects sylvatic plague in white-tailed prairie dog populations.

References and Additional Reading:

Campbell TM, Clark TW. 1981. Colony characteristics and vertebrate associates of white-tailed and black-tailed prairie dogs in Wyoming. *Am Midl Nat* 105:269-76.

Clark TW, Hoffman RS, Nadler CF. 1971. *Cynomys leucurus*. *Mammalian Species* 7:1-4.

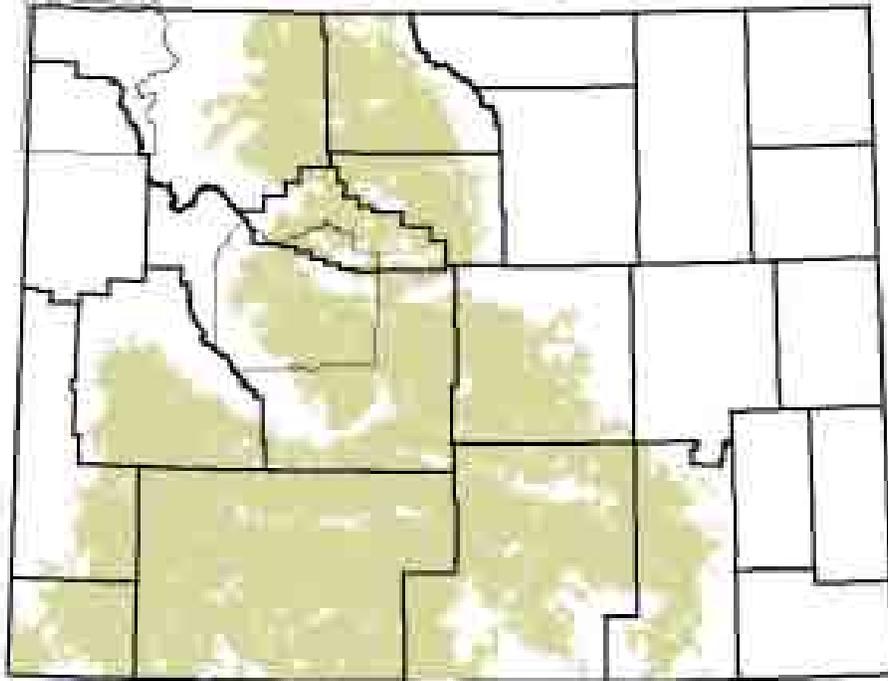
Knowles C. 2002. Status of white-tailed and Gunnison's prairie dogs. Missoula (MT): National Wildlife Federation; Washington (DC): Environmental Defense. 30 p. Online: http://www.environmentaldefense.org/documents/2473_prairiedogreport.pdf.

Menkins GE. 1987. Temporal and spatial variation in white-tailed prairie dog (*Cynomys leucurus*) populations and life histories in Wyoming. PhD dissertation. Laramie: Univ Wyoming.

Oldemeyer JT, Biggins DE, Miller BJ, Crete R, eds. 1993. Management of prairie dog complexes for reintroduction of the black-footed ferret. *Biol Rep* 13. Washington (DC): US Fish and Wildlife Service. 96 p.

Seglund, A.E., A.E. Ernst, M. Greiner, B. Luce, A. Puchniak and P. Schnurr. 2004. White-tailed Prairie Dog Conservation Assessment. Prairie Dog Conservation Team, Sierra Vista. 152pp.

White-tailed Prairie Dog Distribution



Wolverine (*Gulo gulo*)**Status: NSS3; NatureServe G4 S2****Abundance:** Rare

Introduction: The wolverine has a circumpolar distribution that corresponds with the boreal zone of the northern Hemisphere. Historically, North American wolverines were distributed throughout the northern part of the continent, including Alaska, most of Canada, the northern tier of states, and south along the Rocky Mountains to Arizona and New Mexico, although the current distribution is significantly reduced. By the 1920s, it was nearly extirpated from the northern Rocky Mountains, probably primarily as a result of fur trapping. Currently, populations in the Greater Yellowstone Ecosystem, northwestern Montana, and central Idaho are low in density but apparently expanding. In Wyoming, it primarily inhabits the western mountains. However, dispersing individuals have been documented and may occur in small numbers in other areas of the state. The wolverine is considered rare in Wyoming. Several petitions to list the species under the federal Endangered Species Act have been filed in recent years. The U.S. Fish and Wildlife Service has decided against all listing attempts. The Wyoming Game and Fish Department classifies the wolverine as a Species of Special Concern with a Native Species Status of 3 (NSS3) because its populations are restricted in numbers; its habitat is vulnerable, although there is no ongoing significant loss of habitat; and it may be sensitive to human disturbance.

Habitat: The wolverine inhabits subalpine coniferous forests, especially dense, continuous stands in remote mountain areas, and alpine habitats. During summer, it usually occurs at higher elevations in spruce-fir, lodgepole pine, benches, talus, and rock slides on south and east facing slopes. During winter, it usually occurs at mid and lower elevations in Douglas-fir, lodgepole pine, spruce-fir, and riparian habitats. It uses forest stands older than 50 years for movement corridors; late successional forests, rock slides, and talus slopes for feeding; and females use isolated mature or old-growth spruce-fir stands for denning. Dens are primarily in caves, rock crevices, under fallen trees, or in thickets of vegetation. Mean territory size is about 910 km² (351 mi²) for adult males and about 754 km² (291 mi²) for adult females.

Problems:

- Population status, trends, distribution, seasonal movements, and habitat and dietary needs of the wolverine are poorly known in Wyoming. It is difficult to survey because of its low-density populations and wide-ranging habits;
- Winter recreation is increasing in remote mountain areas and may displace wolverines from denning habitat;
- Vulnerable to intense trapping and poisoning (even for other species) and to habitat degradation from logging, mining, and road construction; and
- Geographical isolation of existing wolverine sub-populations may leave them vulnerable to demographic and genetic stochasticity.

Conservation Actions:

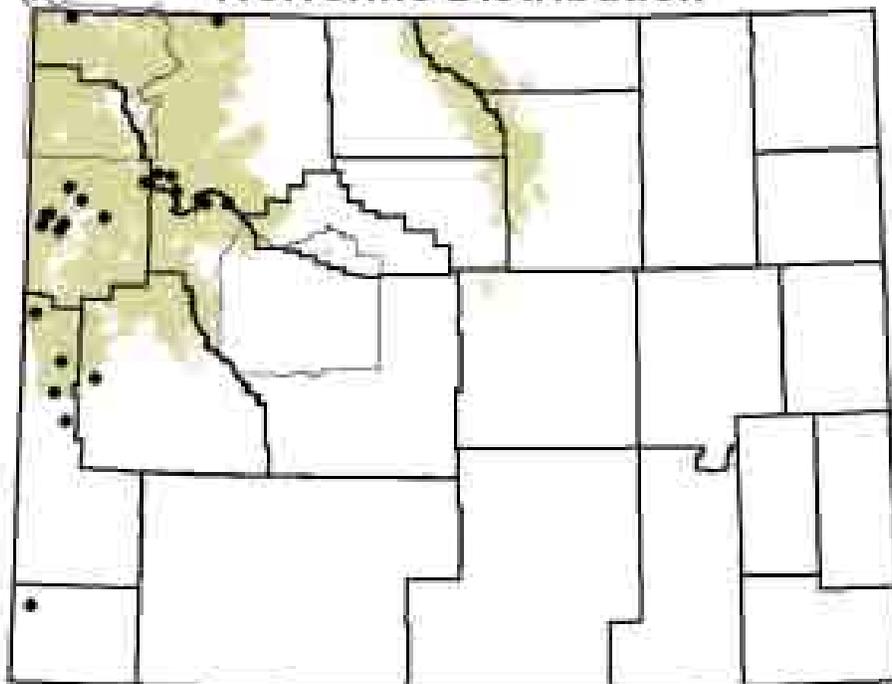
- Develop methods to define and monitor the population status, trends, and distribution of wolverines in Wyoming;
- Collect data on population demographics, food habits, foraging and denning habitat, home range areas, and movement corridors of wolverines in Wyoming;

- Monitor population status and viability in areas where wolverines have been sighted or where there is suitable wolverine habitat;
- Determine the effects of recreational and commercial activities on wolverine populations;
- Define the interspecific relationships of wolverines with other large carnivores;
- Work cooperatively with the Bridger-Teton, Targhee, and Shoshone national forests to develop habitat and population guidelines in areas where wolverines occur;
- Manage wolverine habitat to reduce conflicts with recreation and timber management; and
- Evaluate the potential to restock wolverines in some areas of the state.

References and Additional Reading:

- Copeland JP. 1996. Biology of the wolverine in central Idaho. MSc thesis. Moscow: Univ Idaho.
- Copeland JP, Whitman JS. 2003. Wolverine. In: Feldhamer GA, Thompson BC, Chapman JA, eds. Wild mammals of North America: biology, management, and conservation. 2d ed. Baltimore: Johns Hopkins Univ Pr. p 672-82.
- Hoak JH Weaver JL, Clark TW. 1982. Wolverines in western Wyoming. Northwest Science 56:159-61.
- Hornocker MG, Hash HS. 1981. Ecology of the wolverine in northwestern Montana. Can J Zool 59:1286-301.
- Inman KH and others. 2003. Greater Yellowstone wolverine study. Ennis (MT): Wildlife Conservation Society, North American Program, Wolverine Study Field Office.
- Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.
- Pasitschniak-Arts M, Larivière S. 1995. Gulo gulo. Mammalian Species 499:1-10.
- Ruggiero LF, Aubry KB, Buskirk SW, Lyon LJ, Zielinski WJ, tech eds. 1994. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. Gen Tech Rep RM-254. Fort Collins (CO): USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. 184 p. Online: http://www.fs.fed.us/rm/pub_rm/rm_gtr254.pdf.

Wolverine Distribution



Wyoming Ground Squirrel (*Spermophilus elegans*) Status: NSS6; NatureServe G5 S3 S4

Abundance: Common

Introduction: The Wyoming ground squirrel has three distinct subspecies with separate ranges. *S.e. elegans* is found in the southern half of Wyoming and northern half of Colorado, *S.e. aureus* is found in southwest Montana and east-central Idaho, and *S.e. nevadensis* is found in northern Nevada, southwest Idaho, and southeast Oregon. The Wyoming ground squirrel is considered abundant in Wyoming and The Wyoming Game and Fish Department classifies the Wyoming ground squirrel as a Species of Special Concern with a Native Species Status of 6 (NSS6). Its distribution covers the southwestern two thirds of the state (Cerovski *et al* 2004). The only reason it is included in the CWCS is that a significant portion of its range occurs in Wyoming. Population trends in Wyoming will be indicative of rangewide trends.

Habitat: The Wyoming ground squirrel is found in a variety of habitats including valley bottoms and foothills, mountain meadows, and rocky slopes. Habitat selection is often based on interspecific competition. It is usually found at elevations above 1,500m.

Problems:

- Population trends are not well documented;
- Ground squirrels have been targets of intensive eradication programs;
- Sylvatic plague has the potential to have substantial negative impacts on Wyoming ground squirrel populations;
- There are currently no effective management approaches to mitigate the spread of plague; and
- The species is listed as a pest under Wyoming's Weed and Pest Act, and recreational shooting is not regulated by the WGFD.

Conservation Actions:

- Begin monitoring population trends; and
- If monitoring data show that populations are declining, provide information to the WGFD Commission to allow them to evaluate and consider an appropriate response.

References and Additional Reading:

Andelt, W.F. and S.N. Hopper. 2005. Managing Wyoming Ground Squirrels. Colorado State University Cooperative Extension.

Online <http://www.ext.colostate.edu/pubs/natres/06505.html>

Cerovski, A. O., M.Grenier, B. Oakleaf, L. Van Fleet, and S.Patla. 2004. Atlas of Birds, Mammals, Reptiles and Amphibians in Wyoming, Wyoming Game & Fish Dept. Nongame Program. 206pp.

Record, C. R. 1978. Ground squirrel and prairie dog control in Montana. Proc. Vert. Pest Conf., 8:93-97.

Zegers, David. 1984. *Spermophilus elegans* in Mammalian species. 214:1-7. American Society of Mammologists.



Wyoming pocket gopher (*Thomomys clusius*)

Status: NSS;4 NatureServe G2 S2

Abundance: Rare

Introduction: This is the only species of mammal that occurs exclusively in Wyoming (<http://www.sdvc.uwyo.edu/cgi-bin/wbn/atlas>). It is found in Southeastern Sweetwater County and southwestern Carbon County.

Habitat: Little appears to be known about this species. The only references in which it is addressed merely state that it uses upland drier ridge tops, gravelly loose soils and greasewood habitats (Clark and Stromberg 1987, Cerovski *et al* 2004, <http://www.sdvc.uwyo.edu/cgi-bin/wbn/atlas>).

Problems:

- Little is known about the life history of this species, although in general, its habits are probably similar to other species of intermountain pocket gophers; and
- Pocket gophers are considered pests by many, and they have no protection under Wyoming State law.

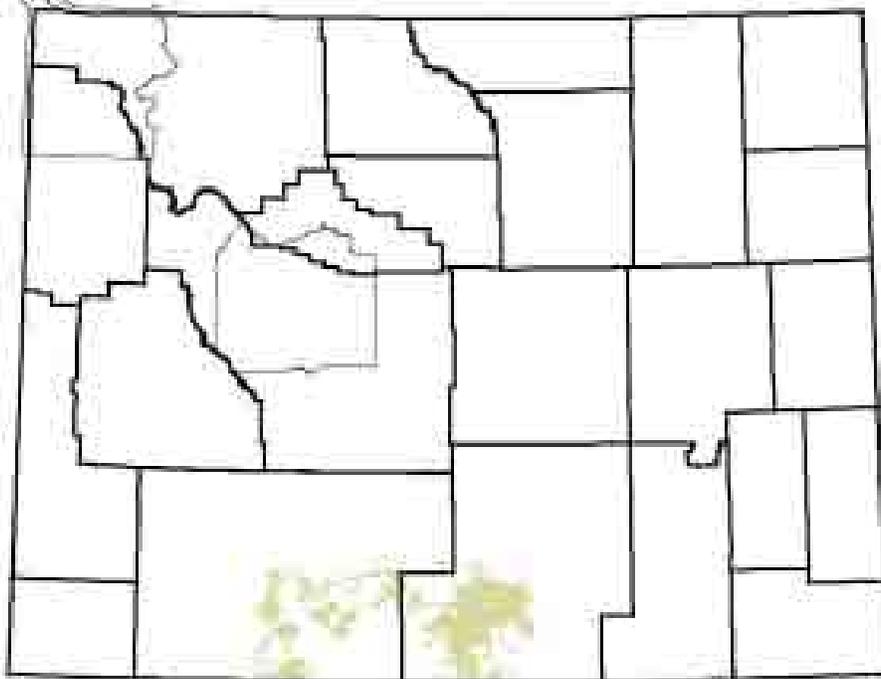
Conservation Actions:

- More information is needed to determine status and trend of this species; and
- More information is needed to determine habitat needs of this species.

References and Additional Reading:

- Cerovski, A. O., M.Grenier, B. Oakleaf, L. Van Fleet, and S.Patla. 2004. Atlas of Birds, Mammals, Reptiles and Amphibians in Wyoming, Wyoming Game & Fish Dept. Nongame Program. 206pp.
- Clark, T. W. and M. R. Stromberg. 1987. Mammals In Wyoming. University of Kansas, Museum of Natural History. Lawrence, KS. 314pp. <http://www.sdvc.uwyo.edu/cgi-bin/wbn/atlas>.

Wyoming Pocket Gopher Distribution



American Bittern (*Botaurus lentiginosus*)

Status: NSS3; NatureServe G4 S3

Abundance: Uncommon

Introduction: The American Bittern breeds locally across Canada and most of the US. It winters along the Pacific coast; from Nevada and Utah south into Texas, Mexico, and Cuba; along the lower Atlantic coast south into Florida; the Caribbean; and along the Gulf coast. It is scattered throughout most of Wyoming in marsh habitat. Although it has been documented in the majority of the state, confirmed or probable breeding has only been recorded in nine general regions. The American Bittern is considered an uncommon summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because breeding populations are restricted in numbers and distribution; nesting habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat; and it is sensitive to human disturbance.

Habitat: The American Bittern is totally dependent on wetland habitats. It usually inhabits marshes with open water in the center, gradual slopes, a band of emergent vegetation around the periphery, and idle grassland in the adjacent uplands. It prefers large wetlands, at least 3 ha (7 ac), with tall, dense emergent vegetation such as cattails, bulrushes, and reeds.

Problems:

- Impacted by a loss of suitable marsh nesting habitat;
- Breeding habitat in Wyoming is disjunct and secure breeding sites are limited in distribution;
- The availability and suitability of breeding sites can be unstable between years as a result of fluctuating water levels and changes in land use practices;
- The American Bittern is a secretive, solitary nester, making counting populations more difficult than for other water birds; and
- It is sensitive to human disturbance during nesting.

Conservation Actions:

- Continue annual inventory and monitoring efforts and implement “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003) to determine statewide population trends;
- Maintain a minimum of three American Bittern breeding locations in Wyoming;
- Manage American Bittern nesting areas to maintain wetland complexes in a variety of stages and conditions, including tall, dense emergent vegetation; idle adjacent uplands; and shallow water;
- Maintain water quality to sustain substantial populations of fish, amphibians, and invertebrates as a food source for American Bitterns;
- Maintain stable water levels throughout the nesting season (April through August) in wetlands where American Bitterns are breeding; and
- Manage American Bittern nesting areas to minimize human disturbance during the breeding season.

References and Additional Reading:

Dechant JA, Sondreal ML, Johnson DH, Igl LD, Goldade CM, Zimmerman AL, Euliss BR. 2003i. Effects of management practices on grassland birds: American Bittern. Jamestown

(ND): Northern Prairie Wildlife Research Center. Online:
<http://www.npwrc.usgs.gov/resource/literatr/grasbird/ambi/ambi.htm>.

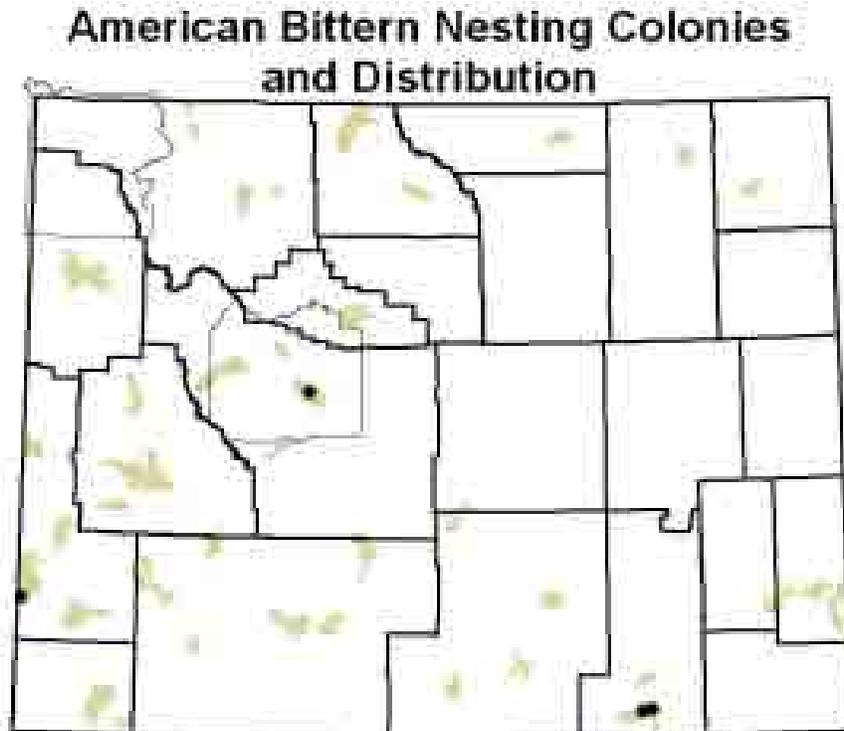
Findholt SL. 1985. Status and distribution of colonial nesting water birds in Wyoming. Nongame Special Report. Cheyenne: Wyoming Game and Fish Department. 67 p.

Gibbs JP, Melvin S, Reid FA. 1992. American Bittern (*Botaurus lentiginosus*). In: Poole A, Stettenheim P, Gill F, eds. The birds of North America. Nr 18. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p



American Three-toed Woodpecker (*Picoides dorsalis*) Status: NSS4; NatureServe G5 S3

Abundance: Uncommon

Introduction: The American Three-toed Woodpecker occurs locally from northern Alaska across Canada south to southern New Mexico and New England. It occurs year-round in Wyoming and is scattered primarily across the western 2/3's of the Wyoming. The American Three-toed Woodpecker is considered an uncommon resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because its population status and trends are unknown, although they are expected to be stable, and because its habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The American Three-toed Woodpecker inhabits coniferous forests, primarily above 2700 m (8900 ft). The critical mix of habitat elements that appear necessary to support viable populations are:

- large, unfragmented blocks of old-growth spruce-fir and lodgepole pine forest;
- an abundance of dead, dying, and diseased trees to supply suitable nest sites and foraging substrates; and
- occasional disturbances (such as fire or beetle outbreaks) to high and mid elevation conifer forests.

Problems:

- The population status and trends of American Three-toed Woodpeckers in Wyoming are largely unknown. The Breeding Bird Survey does not adequately census this species because of a lack of routes in its preferred habitat;
- With a relatively large home range and a close association with old-growth conifer forests, it is sensitive to forest harvesting and fragmentation; and
- Impacted by logging of old-growth forest, fire suppression, salvage and suppression logging of burned and beetle-infested trees, and short logging rotations.

Conservation Actions:

- Determine population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003).
- Work cooperatively with other agencies to conduct surveys and manage habitat for American Three-toed Woodpeckers.
- Maintain dense forests of mature and old-growth conifers with an element of disturbance, and retain large-diameter trees and snags (at least 30 cm [12 in] in diameter at breast height) to supply suitable nest sites and foraging substrates.

References and Additional Reading:

Clark TW, Harvey AH, Dorn RD, Genter DL, Groves C, eds. 1989. Rare, sensitive, and threatened species of the Greater Yellowstone Ecosystem. Northern Rockies Conservation Cooperative, Montana Natural Heritage Program, The Nature Conservancy, and Mountain West Environmental Services. 153 p.

Leonard DL. 2001. Three-toed Woodpecker (*Picoides tridactylus*). In: Poole A, Gill F, eds. The birds of North America. Nr 588. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Mohren SR. 2002. Habitat evaluation and density estimates for the black-backed woodpecker (*Picoides arcticus*) and the three-toed woodpecker (*Picoides tridactylus*) in the Black Hills National Forest. MSc thesis. Laramie: Univ of Wyoming.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Van Dam B, Soule JD, Hammerson G, Koenen M, Mehlman DW. 1993. Three-toed Woodpecker (*Picoides tridactylus*): species management abstract. The Nature Conservancy. Online: www.conserveonline.org.

Wiggins D. 2004. American Three-toed Woodpecker (*Picoides dorsalis*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. 43 p. Online: <http://www.fs.fed.us/r2/projects/scp/assessments/americanthreetoedwoodpecker.pdf>

American Three-toed Woodpecker Summer Distribution



American White Pelican (*Pelecanus erythrorhynchos*) Status: NSS3; NatureServe G3 S1B

Abundance: Common

Introduction: The American White Pelican breeds locally from southern Canada south to California, Colorado, and Texas. It winters from central California and the Gulf of Mexico south to Nicaragua. It occurs throughout Wyoming, however, it nests at only a few specific locations in Wyoming, and breeding has been documented in only four general regions. The American White Pelican is considered a common summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because breeding populations are restricted in numbers and distribution; nesting habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat; and it is sensitive to human disturbance.

Habitat: The American White Pelican uses a variety of aquatic habitats for foraging and can be found on rivers, streams, lakes, ponds, and marshes. It nests colonially on large freshwater lakes, and requires islands isolated from mammalian predators. Colonies are usually located on flat, open ground near water.

Problems:

- Nesting colonies are impacted by fluctuating water levels. Nests may be flooded by rising water, while lake level subsidence can make colonies accessible to mammalian predators
- Sensitive to human disturbance at breeding colonies and foraging sites; and
- Some members of the public believe that American White Pelicans are responsible for significantly reducing populations and availability of game fish in Wyoming.

Conservation Actions:

- Continue annual inventory and monitoring efforts and implement “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003) to determine statewide population trends;
- Maintain a minimum of two American White Pelican nesting colonies in Wyoming, including at least one colony outside of Yellowstone National Park;
- Maintain stable water levels throughout the nesting season in lakes where American White Pelicans are breeding;
- Manage American White Pelican nesting areas to minimize human disturbance during the breeding season; and
- Educate the public about pelican feeding habits and preferred food sources.

References and Additional Reading:

- Evans RM, Knopf FL. 1993. American White Pelican (*Pelecanus erythrorhynchos*). In: Poole A, Gill F, eds. The birds of North America. Nr 57. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.
- Findholt SL. 1985. Status and distribution of colonial nesting waterbirds in Wyoming. Nongame Special Report. Cheyenne: Wyoming Game and Fish Department. 67 p.

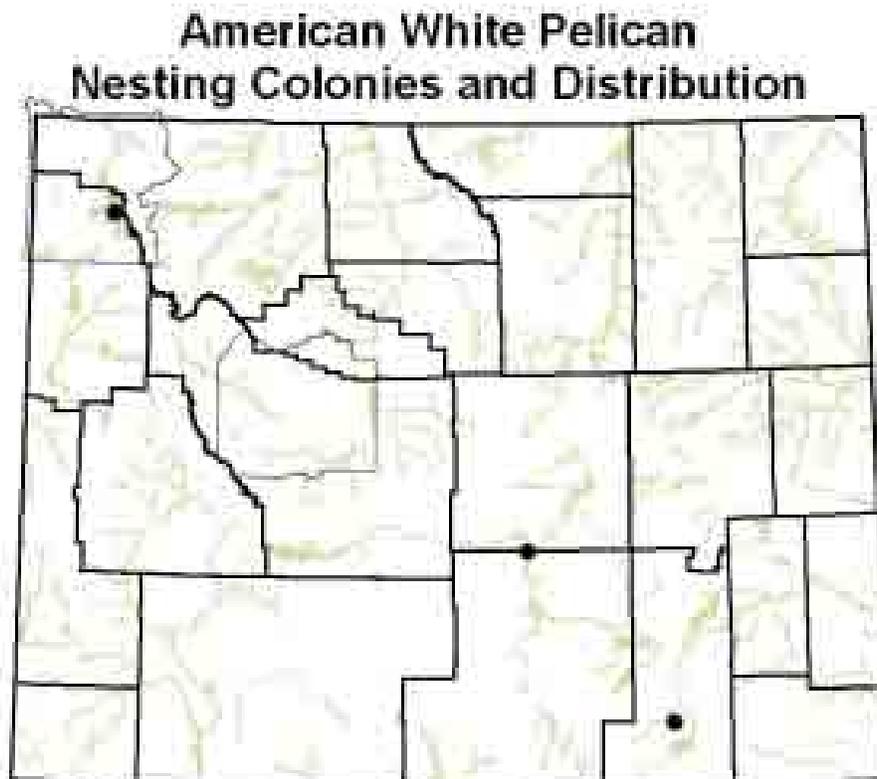
Findholt SL. 1990. Foraging ecology of the American White Pelican (*Pelecanus erythrorhynchos*) nesting at Pathfinder Reservoir, Wyoming. PhD dissertation. Laramie: Univ Wyoming.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Wyoming Game and Fish Department. 1997. Piscivorous bird management plan. Cheyenne: Wyoming Game and Fish Department.



Ash-throated Flycatcher (*Myiarchus cinerascens*)

Status:NSS3; NatureServe G5 S3B

Abundance: Unknown

Introduction: The Ash-throated Flycatcher breeds in western North America from Oregon and Wyoming to northern Mexico. It winters from southern California and Arizona south to northeastern Costa Rica. In Wyoming, it nests only in the southwestern portion of the state; individuals found outside of this area in Wyoming are usually migrating. The abundance of the Ash-throated Flycatcher is unknown in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because breeding populations are restricted in distribution, and nesting habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The Ash-throated Flycatcher nests only in juniper woodlands in Wyoming and may be limited to areas where pinyon pine is present. It is most abundant in lower elevation juniper woodlands and is typically found on steep, rocky slopes sparsely covered by old-growth juniper, a sparse understory, and an abundance of snags. It is a secondary cavity nester and requires either a natural cavity or one excavated by a woodpecker.

Problems:

- Population status and trends of the Ash-throated Flycatcher are unknown in Wyoming;
- Suitable pinyon-juniper breeding habitat is restricted to the extreme southwestern portion of the state; and
- Throughout much of the West, resource managers view juniper as an invasive species that should be controlled or replaced with more desirable habitats.

Conservation Actions:

- Determine statewide population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- Maintain mature juniper woodlands with an open canopy, well interspersed with sagebrush and other shrubs, and a mosaic of large trees and snags in areas where Ash-throated Flycatchers nest;
- Use prescribed and natural fire to maintain open stands of juniper woodland where Ash-throated Flycatchers occur; and
- Management of manipulation of juniper in southwestern Wyoming should not favor one of the juniper obligates to the detriment of others. Instead, management should be coordinated to provide a mosaic of juniper woodland conditions.

References and Additional Reading:

Cardiff SW, Dittmann DL. 2002. Ash-throated Flycatcher (*Myiarchus cinerascens*). In: Poole A, Gill F, eds. The birds of North America. Nr 664. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Fitton S. 1989. Nongame species accounts: the Utah juniper obligates. Wyoming Game and Fish Department, Nongame Program. 52 p.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.



Bald Eagle (*Haliaeetus leucocephalus*)**Status: NSS2; NatureServe G4 S3B S5N****Abundance:** Uncommon

Introduction: The Bald Eagle occurs throughout most of North America from Alaska to central Mexico, wintering generally throughout the breeding range except in the far north. It nests along major river drainages and lakes throughout Wyoming with the most significant concentrations in Teton, Sublette, and Carbon counties. Significant numbers also nest in Grand Teton and Yellowstone national parks. The population in Wyoming increases during winter as individuals that breed farther north arrive. The Bald Eagle is considered an uncommon resident in Wyoming, although the number of nesting pairs in the state has increased from 20 in 1978 to over 100 in 2002. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 2 (NSS2) because breeding populations are restricted in numbers and distribution, there is ongoing significant loss of nesting habitat, and it is sensitive to human disturbance.

Habitat: The Bald Eagle nests near large lakes and rivers in forested habitat where adequate prey and old, large-diameter cottonwood or conifer trees are available for nesting. Highly productive nesting areas in the Greater Yellowstone Area were found to have open water available in winter, low severity of early spring weather, limited human activity, and high sinuosity and an abundance of islands, riffles, runs, and pools in the river. Migrating and wintering eagles congregate near open water areas where concentrations of prey are available, such as carcasses of ungulate species, and spawning areas for kokanee, trout, and other fish.

Problems:

- Human activity and development (residential and recreational) near rivers and lakes continues to escalate and is degrading Bald Eagle nesting habitat;
- Pioneering pairs of Bald Eagles often have difficulty becoming established in areas that are disjunct from other successful nesting pairs; and
- Bald Eagles are still accumulating organochlorines and relatively high levels of heavy metals, and may also be at risk from organophosphate or carbamate pesticides. These contaminants could affect production and survival.

Conservation Actions:

- Research and monitor Bald Eagle populations with emphasis on those that have become established either in urban areas or suboptimal natural habitats;
- Establish incentive programs, conservation easements, and special management agreements to protect Bald Eagle nesting habitats and core populations;
- Conduct research on issues that negatively impact the Bald Eagle's ability to expand or maintain stable populations;
- Continue to identify, monitor, and define Bald Eagle nesting populations and important habitats such as winter roosts and foraging areas;
- Continue to provide recommendations to agencies, private individuals, and groups that want to improve Bald Eagle habitat and minimize potential impacts of proposed land-use projects;
- Provide private landowners with information on the importance of maintaining optimum habitat for nesting eagles and the importance of their role as partners in managing it; and

- Manage Bald Eagle nesting areas to minimize conflicts with recreation and development and to minimize pesticide use.

References and Additional Reading:

Buehler DA. 2000. Bald Eagle (*Haliaeetus leucocephalus*). In: Poole A, Gill F, eds. The birds of North America. Nr 506. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Greater Yellowstone Bald Eagle Working Group. 1996. Greater Yellowstone Bald Eagle management plan: 1995 update. Lander: Greater Yellowstone Bald Eagle Working Group, Wyoming Game and Fish Department. 47 p.

Harmata AR, Montopoli GJ, Oakleaf B, Harmata PJ, Restani M. 1999. Movements and survival of Bald Eagles banded in the Greater Yellowstone Ecosystem. J Wildl Manage 63(3):781-93

Harmata A, Oakleaf B. 1992. Bald Eagles in the Greater Yellowstone Ecosystem: an ecological study with emphasis on the Snake River, Wyoming. Cheyenne: Wyoming Game and Fish Department. 232 p.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

US Fish and Wildlife Service. 1986. Recovery plan for the Pacific Bald Eagle. Portland (OR): US Fish and Wildlife Service. 160 p.

Bald Eagle Nesting Distribution



Abundance: Common

Introduction: There are eastern and western populations with no evidence of exchange. The largest population of this sea duck is found west of the Continental Divide. A small population occurs in the eastern Canada and the United States. The western population breeds from southern Alaska and Mackenzie District through the western states and provinces to California and Colorado. This population winters primarily along the Pacific coast from Alaska to central California. In Wyoming, breeding sites are located in the northwest part of the state, including Yellowstone National Park, and these ducks are common in the Snake, Salt, Green and Bear River drainages. The species occurs across the state during fall and winter wherever there is open water. The western population has been estimated at about 200,000 to 250,000 birds. In Wyoming, Barrow's goldeneyes are less common during the breeding season than during migration. Breeding occurs in the higher elevations of northwestern Wyoming. The Barrow's goldeneye has moderate abundance in Wyoming and is considered a common resident. The Wyoming Game and Fish Department (WGFD) classifies the Barrow's goldeneye as a Species Special Concern with a Native Species Status of 3 (NSS3) because its breeding population in Wyoming is restricted in numbers, habitat is restricted and vulnerable but no recent or on-going significant loss.

Habitat:

The Barrow's goldeneyes utilize a variety of habitats during the year. In western mountain and intermountain areas it breeds on montane and subalpine lakes and rivers, beaver ponds, and small sloughs. Prime breeding habitat consists of tall forest growth with hollow trees, generally close to biologically productive cold-water lakes, pools, or rivers. They also tend to select breeding sites near water bodies that harbor no fish. Barrow's goldeneyes are almost exclusively cavity nesters, usually in dead trees, and females with breeding experience show high fidelity to previous nest sites. They are partial to abandoned woodpecker holes. As their diet is primarily aquatic invertebrates, for feeding, they prefer open water without emergent or dense submerged vegetation. Finally, Barrow's goldeneyes may be found in aspen or cottonwood-riparian communities, or marshes, lakes and rivers associated with lodgepole pine, Douglas fir and other coniferous forests, and, during migration and winter, these ducks occupy habitats at lower elevations.

Problems:

- Because of the restricted distribution of this species (60 percent of the entire population breeds and winters in one Canadian province), and relatively small global population, Barrow's goldeneyes warrant careful monitoring;
- Oil spills on wintering areas and the bioaccumulation of agricultural and industrial pollutants in prey items may cause local population declines;
- Habitat degradation or loss may result from recreational development on breeding lakes;
- Availability of suitable cavity nest sites may affect population size; and
- Logging activities may remove older trees and snags that provide most of the nest cavities and may increase predation of existing cavities.

Conservation Actions:

- Take readily to artificial nesting boxes;
- Do not introduce fish into fishless breeding areas;
- Maintain buffer strips in riparian and lentic areas as a logging standard;
- Manage all current and historic nesting sites to minimize the potential for degradation and conflicts with development;
- Manage nesting areas to minimize human disturbance during the breeding season;
- Maintain good water quality;
- Document and prioritize historic and current breeding locations; and
- Identify potential breeding sites that may become attractive of female Barrow's goldeneyes following habitat management.

References and Additional Reading:

Eadie, J.M., J. P.L. Savard, and M.L. Mallory. 2000. Barrow's goldeneye (*Bucephala islandica*). In The Birds of North America, No. 548 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA. 32pp.

Johnsgard, P.A. 1975. Waterfowl of North America. Indiana Univ. Press, Bloomington. 575 pp.

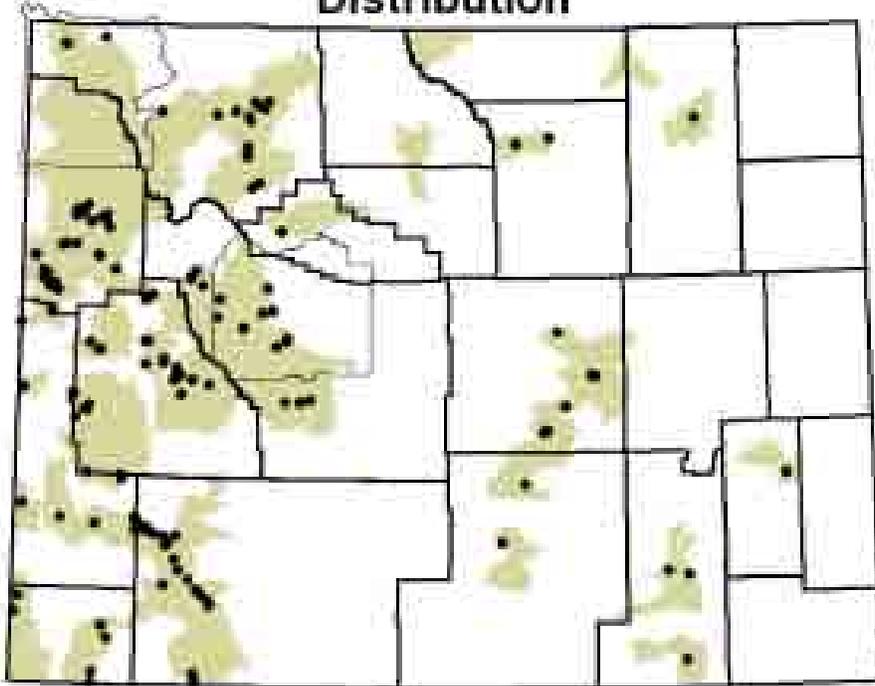
NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: May 8, 2004).

Seaduckjv. 2004. The sea duck joint venture - sea duck information series. [web application]. Available <http://www.seaduckjv.org/infroseries> . (Accessed: August 19, 2004).

Todd, F. S. 1979. Waterfowl - Ducks, geese & swans of the world. Harcourt Brace Jovanovich, New York, New, York. 399 pp.

Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.

Barrow's Goldeneye Breeding Distribution



Black-crowned Night-Heron (*Nycticorax nycticorax*) Status: NSS3; NatureServe G5 S3B

Abundance: Uncommon

Introduction: The Black-crowned Night-Heron is very widespread and occurs in North and South America, Eurasia, and Africa. In North America, it breeds in southern Canada and throughout most of the US, and winters from Oregon south and southeast to Mexico and the Gulf coast. It occurs throughout most of Wyoming, and breeding has been confirmed in 10 general areas. The Black-crowned Night-Heron is considered an uncommon summer resident in Wyoming. It was documented breeding at 16 different sites from 1982 through 1994. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because breeding populations are restricted in numbers and distribution; nesting habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat; and it is sensitive to human disturbance.

Habitat: The Black-crowned Night-Heron inhabits marshes, swamps, wooded streams, and shores of lakes and ponds. It nests in colonies in emergent vegetation or in shrubs near the edge of water.

Problems:

- Impacted by a loss of suitable marsh nesting habitat;
- Sensitive to drought-related habitat changes in nesting areas; and
- Sensitive to human disturbance during nesting, particularly just before and during egg-laying.
- Some populations in the Intermountain West have high DDT levels and exhibit low productivity.

Conservation Actions:

- Continue annual inventory and monitoring efforts and implement “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003) to determine statewide population trends;
- Maintain a minimum of 10 Black-crowned Night-Heron nesting colonies and 150 breeding pairs of Black-crowned Night-Herons in Wyoming;
- Maintain suitable marsh habitat in areas where Black-crowned Night-Herons nest; and
- Manage Black-crowned Night-Heron nesting areas to minimize human disturbance during the breeding season.

References and Additional Reading:

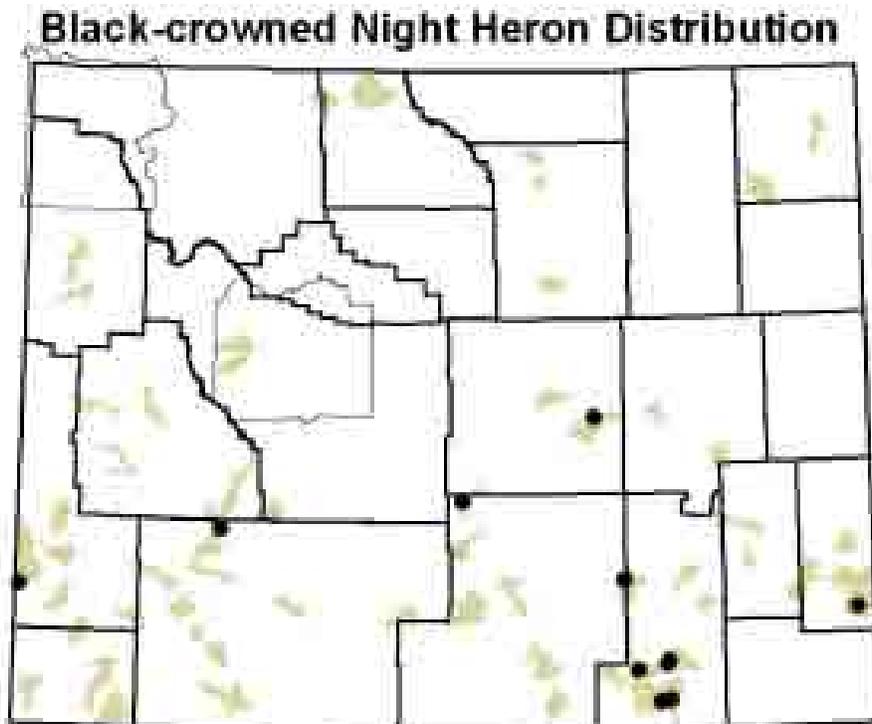
Davis WE. 1993. Black-crowned Night-Heron (*Nycticorax nycticorax*). In: Poole A, Gill F, eds. The birds of North America. Nr 74. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Findholt SL. 1985. Status and distribution of colonial nesting waterbirds in Wyoming. Nongame Special Report. Cheyenne: Wyoming Game and Fish Department. 67 p.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

NatureServe. 2004. NatureServe explorer: an online encyclopedia of life. Version 1.8. Arlington (VA): NatureServe. Online <http://www.natureserve.org/explorer>.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.



Black Rosy Finch (*Leucosticte arata*)**Status: NSS4; NatureServe G4 S1B, S2N****Abundance:** Uncommon

Introduction: The Black Rosy-finch is one of 3 species of rosy-finch in North America. The Black Rosy-finch breeds high on scattered mountaintops in the Great Basin from northern New Mexico to southern Montana and from Oregon to Wyoming and Colorado (Asaki 2005). In Wyoming, breeding has been documented in the northwest corner of the state, and breeding is suspected in the Bighorn Mountains, Wyoming and Salt River Ranges and in the southern Wind River Range (Cerovski *et al* 2004).

Habitat: Rosy-finches are the highest breeding birds in North America, rarely nesting below 10,000 feet elevation. The Black Rosy-finch is a ground or low nesting species (Gough *et al* 1998). It breeds on the mountain tundra (audubon2.org) and nests primarily in cracks and holes in rock outcrops and cliffs of high alpine environs (Bent 1968). The Black Rosy-Finch feeds on seeds of grasses and forbs. In summer its granivorous diet is supplemented with insects. The Black Rosy-finch is generally a short distance migrant, typically moving downward in winter to use mid - to low elevation basin habitats near summer range. It may also move southward to the Southern Rocky Mountain states (audubon2.org). It winters in grasslands, cultivated lands, roadsides and some residential areas.

Problems:

- Audubon Christmas Bird Count data suggests a decline since the 1970s; and
- Little is known about the needs of this species and the threats to it, particularly during the non-breeding season when it is more likely to be associated with human development and activities.

Conservation Actions:

- More information is needed on the status and population trend of this species in Wyoming; and
- More information is needed on the winter habitats and winter habitat use of this species.

References and Additional Reading:

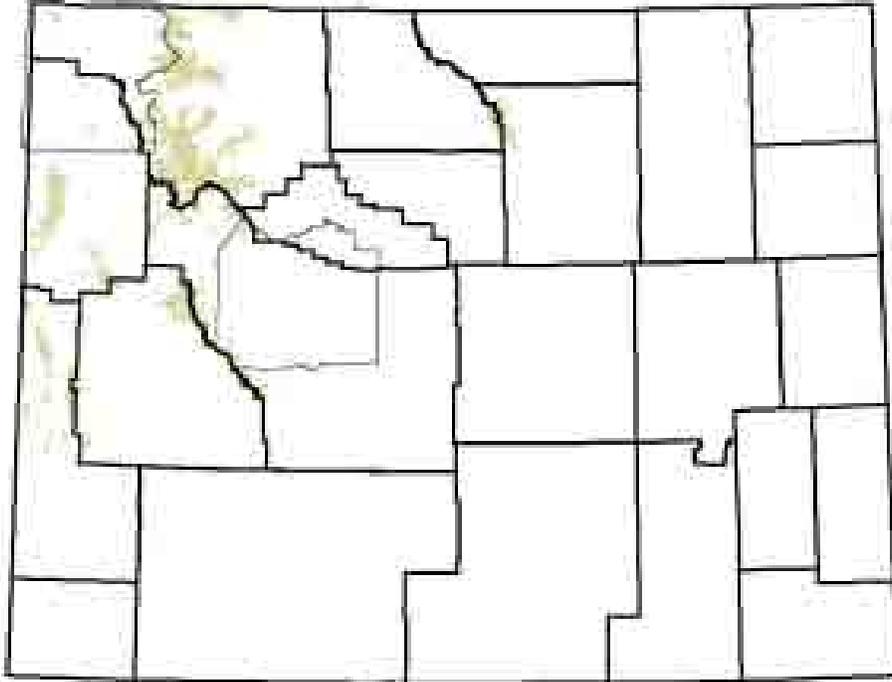
Asaki, M. 2005. Mountain Roses. Wyoming Wildlife. March 24-29.

Bent, A.C. 1968. Life Histories of North American Cardinals, Grosbeaks, Buntings, Towhees, Finches, Sparrows and Allies. Dover Publications, Inc., New York. 602pp.

Cerovski, A. O., M.Grenier, B. Oakleaf, L. Van Fleet, and S.Patla. 2004. Atlas of Birds, Mammals, Reptiles and Amphibians in Wyoming, Wyoming Game & Fish Dept. Nongame Program. 206pp.

Gough, G.A., Sauer, J.R., Iliff, M. *Patuxent Bird Identification Infocenter*. 1998. Version 97.1. Patuxent Wildlife Research Center, Laurel, MD. Online <http://www.mbr-pwrc.usgs.gov/Infocenter/infocenter.html> or <http://www.audubon2.org/bird/watchlist.html>.

Black Rosy Finch Distribution



Black Tern (*Chlidonias niger*)**Status: NSS3; NatureServe G4 S1****Abundance:** Common

Introduction: The Black Tern breeds locally in Canada, the northern 2/3's of the US, and Eurasia. The North American population winters along both coasts from Panama south to Peru. It is scattered across most of Wyoming and although confirmed or suspected breeding has only been recorded in seven general regions. The Black Tern is considered a common summer resident in Wyoming. It was documented nesting at six different sites in Wyoming from 1982 through 1994. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because breeding populations are restricted in numbers and distribution; nesting habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat; and it is sensitive to human disturbance.

Habitat: The Black Tern inhabits biologically rich marshes and aquatic areas, and usually prefers marshes or marsh complexes greater than 20 ha (50 ac). It nests in small, loose colonies, generally in areas of still water, with 25% to 75% of the surface covered by emergent vegetation, and well-interspersed with open water.

Problems:

- The availability and suitability of breeding sites can be unstable between years as a result of fluctuating water levels and changes in land use practices. Most of the historical breeding areas in Wyoming are not reliable breeding sites during years of drought or high water conditions;
- Sensitive to human disturbance during nesting; and
- Breeding habitat in Wyoming is disjunct and secure breeding sites are limited in distribution.

Conservation Actions:

- Continue annual inventory and monitoring efforts and implement "Monitoring Wyoming's Birds: The Plan for Count-based Monitoring" (Leukering and others 2003) to determine statewide population trends;
- Maintain a minimum of three Black Tern breeding locations and 50 breeding pairs of Black Terns in Wyoming;
- Manage Black Tern nesting areas to maintain wetland complexes at least 20 ha (50 ac) in size with approximately 50:50 emergent vegetation cover to open water ratio, and with a good interspersed of vegetation and water;
- Maintain stable water levels throughout the nesting season in wetlands where Black Terns are breeding; and
- Manage Black Tern nesting areas to minimize human disturbance during the breeding season.

References and Additional Reading:

Dunn EH, Agro DJ. 1995. Black Tern (*Chlidonias niger*). In: Poole A, Gill F, eds. The birds of North America. Nr 147. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Findholt SL. 1985. Status and distribution of colonial nesting waterbirds in Wyoming. Nongame Special Report. Cheyenne: Wyoming Game and Fish Department. 67 p.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

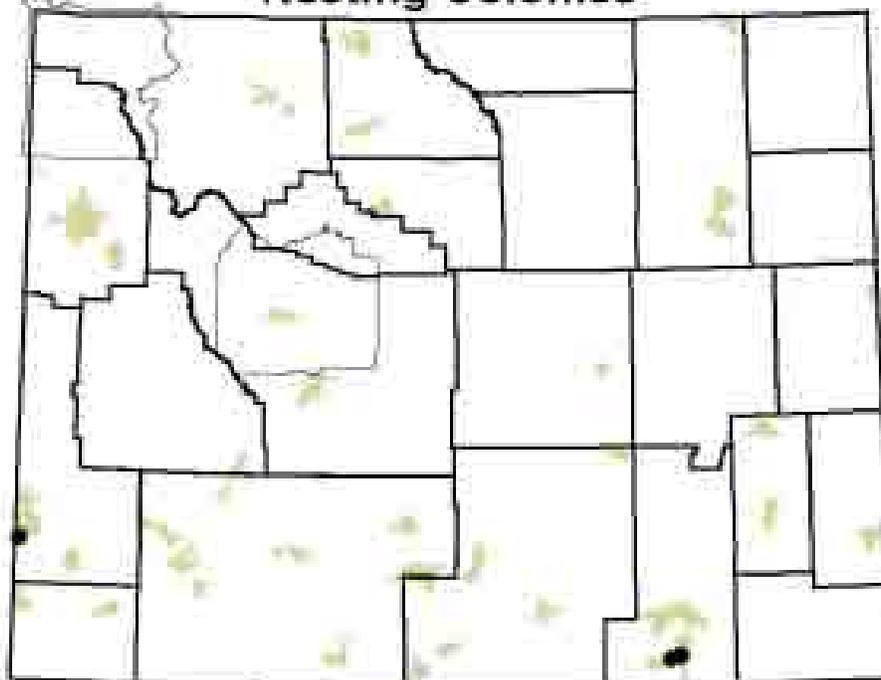
Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Novak PG, Soule J, Jennings R. 1992. Black Tern (*Chlidonias niger*): species management abstract. The Nature Conservancy. Online: www.conserveonline.org.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Shuford WD. 1999. Status assessment and conservation plan for the Black Tern (*Chlidonias niger surinamensis*) in North America. Denver: USDI Fish and Wildlife Service. 129 p. Online: <http://mountain-prairie.fws.gov/blacktern/sacp.htm>.

Black Tern Foraging Areas and Nesting Colonies



Black-backed Woodpecker (*Picoides arcticus*)**Status: NSS4; NatureServe G5 S1****Abundance:** Rare

Introduction: The Black-backed Woodpecker occurs locally from northern Alaska, east to Newfoundland and northern New England, and south to central California and northern Minnesota. It wanders irregularly south in winter. It occurs year-round in Wyoming and currently nests only in the northwest and northeast corners of the state. The Black-backed Woodpecker is considered a rare resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because its population status and trends are unknown, although they are expected to be stable, and because its habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The Black-backed Woodpecker inhabits mature and old-growth montane coniferous forests with decadent trees, snags, and fallen logs. It is closely associated with recently-burned forest habitats and depends heavily on the larvae of wood-boring beetles. It may require a dynamic mosaic of recent burns across a landscape to sustain populations.

Problems:

- The population status and trends of Black-backed Woodpeckers in Wyoming are largely unknown. The Breeding Bird Survey does not adequately census this species because of a lack of routes in its preferred habitat; and
- Impacted by habitat loss from fire suppression, removal of fire-killed or insect-infested trees, and the conversion of mature and old growth forests to young stands.

Conservation Actions:

- Determine population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- Work cooperatively with other agencies to conduct surveys and manage habitat for Black-backed Woodpeckers;
- Maintain dense forests of mature and old-growth conifers and retain large-diameter trees and snags (at least 20 cm [8 in] in diameter at breast height) to supply suitable nest sites and foraging substrates; and
- On a landscape scale, provide a continual supply (1 to 2% of the landscape) of recent stand replacement fires greater than 40 ha (100 ac) in size, with at least 50% of that total unsalvaged after burning.

References and Additional Reading:

Clark TW, Harvey AH, Dorn RD, Genter DL, Groves C, eds. 1989. Rare, sensitive, and threatened species of the Greater Yellowstone Ecosystem. Northern Rockies Conservation Cooperative, Montana Natural Heritage Program, The Nature Conservancy, and Mountain West Environmental Services. 153 p.

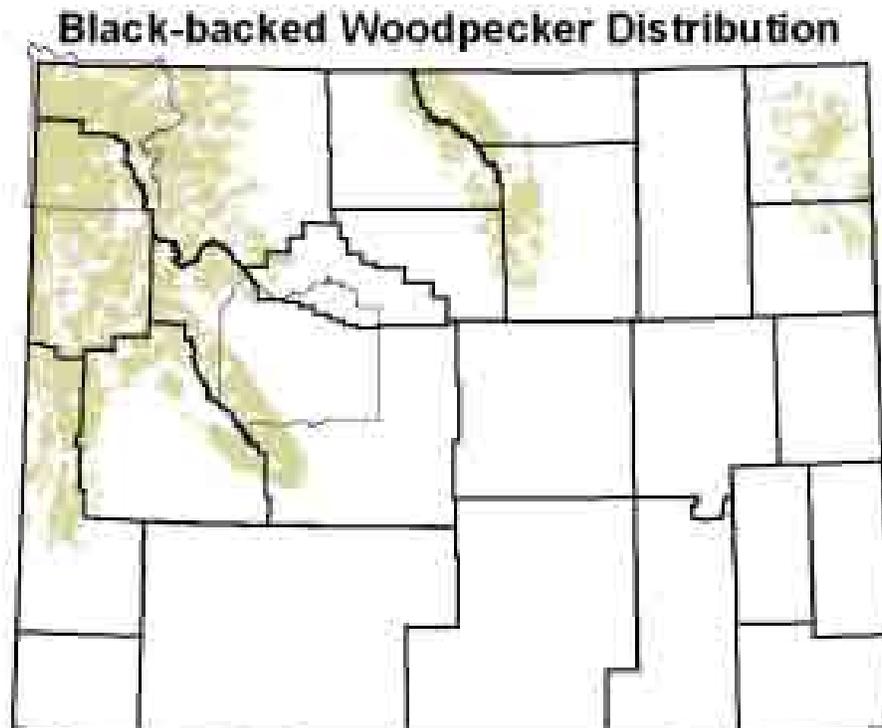
Dixon RD, Saab VA. 2000. Black-backed Woodpecker (*Picoides arcticus*). In: Poole A, Gill F, eds. The birds of North America. Nr 509. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Mohren SR. 2002. Habitat evaluation and density estimates for the black-backed woodpecker (*Picoides arcticus*) and the three-toed woodpecker (*Picoides tridactylus*) in the Black Hills National Forest. MSc thesis. Laramie: Univ of Wyoming.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Paige C, Koenen M, Mehlman DW. 1999d. Black-backed Woodpecker (*Picoides arcticus*): species management abstract. The Nature Conservancy. Online: www.conserveonline.org.



Bobolink (*Dolichonyx oryzivorus*)**Status: NSS4; NatureServe G5 S2****Abundance:** Uncommon

Introduction: The Bobolink breeds from southern British Columbia across southern Canada to Nova Scotia, and south to eastern Oregon, central Colorado, central Illinois, and western North Carolina. It winters in central and southern South America. During summer, it is scattered across the grasslands of Wyoming. The Bobolink is considered an uncommon summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because breeding populations are restricted in distribution, and because its nesting habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The Bobolink inhabits grasslands and requires large expanses of grass or forb cover. It prefers large, open areas of tall grass, alfalfa, clover, or grain crops; it also inhabits native and introduced wet meadows, ungrazed to lightly-grazed mixed-grass prairies, and fallow fields.

Problems:

Bobolinks are impacted by a variety of actions that reduce the availability of hayfield breeding habitat. This is especially significant when alterations occur during incubation and early nestling stages.

Conservation Actions:

- Determine statewide population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- In areas where Bobolinks nest, manage for large areas (>30 ha [75 ac]) of grasslands of moderate height and density and adequate litter; and
- Manage Bobolink nesting areas to minimize disturbance (including haying, burning, and moderate to heavy grazing) during the breeding season (early May to mid July).

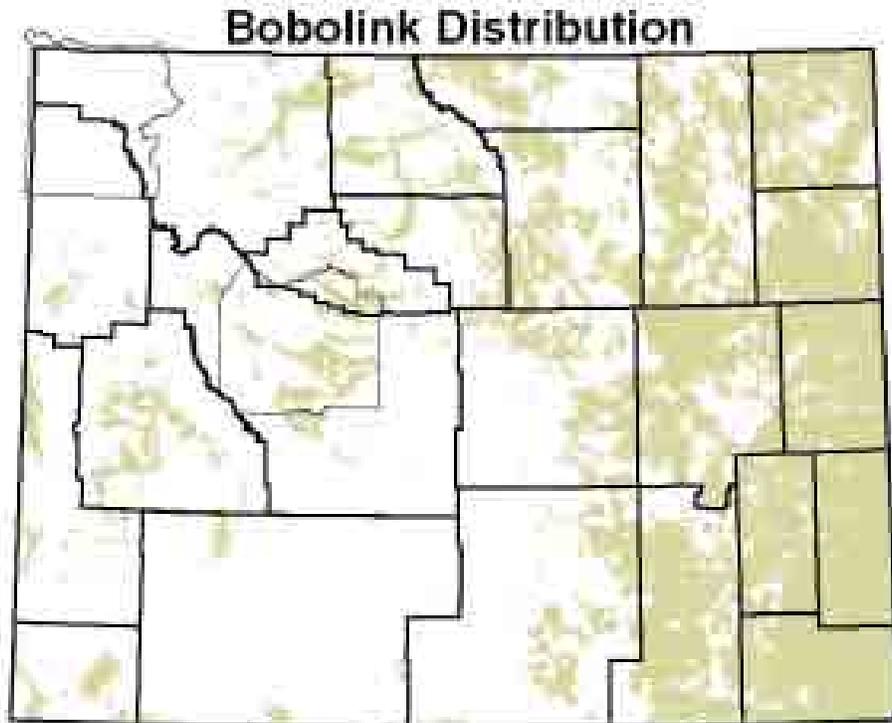
References and Additional Reading:

Dechant JA, Sondreal ML, Johnson DH, Igl LD, Goldade CM, Zimmerman AL, Euliss BR. 2003j. Effects of management practices on grassland birds: Bobolink. Jamestown (ND): Northern Prairie Wildlife Research Center. Online: <http://www.npwrc.usgs.gov/resource/literatr/grasbird/bobo/bobo.htm>.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming’s birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Martin SG, Gavin TA. 1995. Bobolink (*Dolichonyx oryzivorus*). In: Poole A, Gill F, eds. The birds of North America. Nr 176. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.



Boreal Owl (*Aegolius funereus*)**Status: NSS4; NatureServe G5 S2****Abundance:** Unknown

Introduction: The Boreal Owl inhabits North America and Eurasia. In North America, it occurs from treeline in Alaska, east to Newfoundland, and south through the Rocky Mountains to northern New Mexico. It winters mainly in its breeding range, although it is nomadic in response to cyclic prey populations. It is found primarily in western Wyoming and in the Sierra Madre Range in south-central Wyoming. The abundance of the Boreal Owl is unknown in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because its population status and trends are unknown, although they are expected to be stable, and because its habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The Boreal Owl inhabits mature, high elevation forests of Engelmann spruce, subalpine fir, and lodgepole pine; interspersed mature aspen stands are also important as they usually provide more nesting cavities than spruce-fir. The Boreal Owl requires large areas of forest habitat, as home ranges are usually over 1000 ha (2500 ac). It prefers a forest structure that is typical of mature and old-growth forests, including large downed logs, a high overstory canopy, large snags, small openings, and an open stand structure for foraging. It requires large woodpecker or natural cavities in trees for nesting.

Problems:

- The population status and trends of Boreal Owls in Wyoming are largely unknown. The Breeding Bird Survey does not adequately census this species because of a lack of routes in its preferred habitat and the timing of the Breeding Bird Survey, which is asynchronous with its nesting period; and
- Impacted by forest fragmentation and removal of mature forest habitats on a regional scale, which result in reductions of prey populations, nesting cavities, and foraging habitat.

Conservation Actions:

- Continue annual inventory and monitoring efforts and implement “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003) to determine population trends;
- Work cooperatively with other agencies to conduct surveys and manage habitat for Boreal Owls;
- Maintain large stands of high elevation mature and old-growth forests with abundant snags in areas where Boreal Owls occur. At a landscape scale, maintain a portion of each watershed in mature or older forest, and over half of each watershed in stands older than saplings;
- Maintain abundant small mammal populations and large woodpecker populations in high elevation forests to provide a food source and cavity nest sites; and
- Maintain mature aspen stands dispersed across the landscape, in a mosaic with other age classes.

References and Additional Reading:

Garber CS, Wallen RL, Duffy KE. 1991. Distribution of Boreal Owl observation records in Wyoming. *J Raptor Res* 25(4):120-2.

Hayward GD. 1997. Forest management and conservation of Boreal Owls in North America. *J Raptor Res* 31(2):114-24.

Hayward GD, Hayward PH. 1993. Boreal Owl (*Aegolius funereus*). In: Poole A, Gill F, eds. *The birds of North America*. Nr 63. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Hayward GD, Hayward PH, Garton EO. 1993. Ecology of Boreal Owls in the northern Rocky Mountains, USA. *Wildl Monogr* 124:1-59.

Hayward GD, Verner J, tech eds. 1994. Flammulated, Boreal, and Great Gray Owls in the United States: a technical conservation assessment. Gen Tech Rep RM-253. Fort Collins (CO): USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. 214 p.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. *Wyoming bird conservation plan*. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. *Wyoming bird conservation plan*. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.



Brewer's Sparrow (*Spizella breweri*)

Status: NSS4; NatureServe G5 S5

Abundance: Common

Introduction: The Brewer's Sparrow breeds from southeastern Alaska and Saskatchewan south to southern California and southwestern Kansas. It winters from southern California, east to western Texas, and south to central Mexico. During summer, it occurs throughout most of Wyoming. The Brewer's Sparrow is considered a common summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because breeding populations are declining, and because its nesting habitat is vulnerable.

Habitat: Considered a sagebrush obligate, the Brewer's Sparrow is closely associated with sagebrush shrublands that have abundant, scattered shrubs and short grass. It can also be found in mountain mahogany, rabbitbrush, pinyon-juniper, or bunchgrass grasslands. It is positively correlated with shrub cover, above-average vegetation height, bare ground, and horizontal habitat heterogeneity (patchiness).

Problems:

- The Brewer's Sparrow is impacted by fragmentation and removal of sagebrush habitat.

Conservation Actions:

- Determine statewide population trends by implementing "Monitoring Wyoming's Birds: The Plan for Count-based Monitoring" (Leukering and others 2003);
- In areas where Brewer's Sparrows occur, maintain large, dense, unfragmented stands of sagebrush habitat with tall shrubs, patchy distribution, openings in the canopy for grass seed production, some grass cover for a seed food source, and some bare ground for an insect food source; and
- Manage Brewer's Sparrow habitat to avoid conflicts with range improvement projects and agricultural development, and to reduce the risk of habitat loss to fire.

References and Additional Reading:

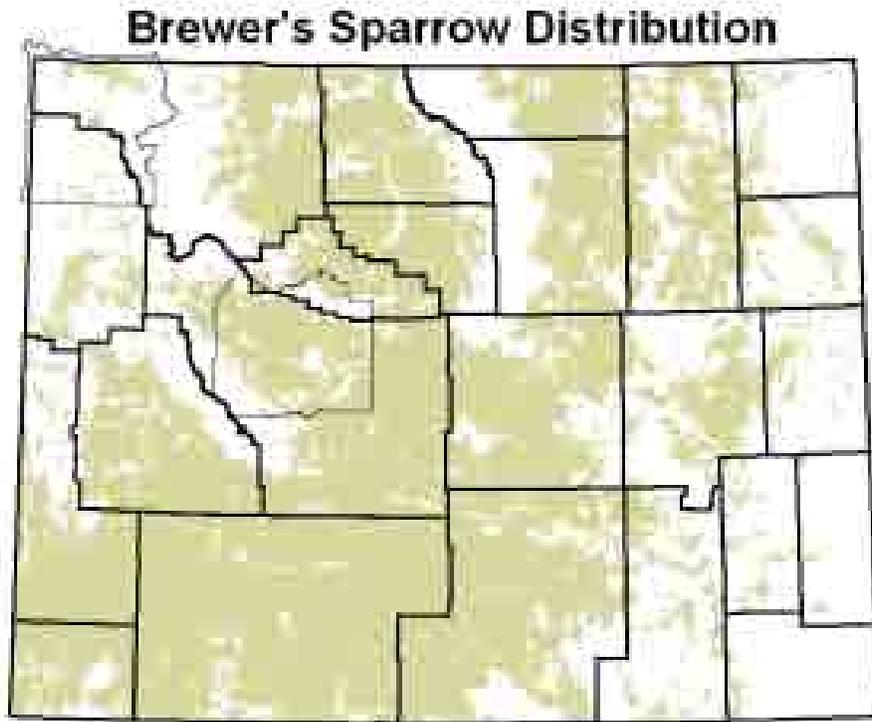
Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. P 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Paige C, Koenen M, Kwan D, Mehlman DW. 1999a. Brewer's Sparrow (*Spizella breweri*): species management abstract. The Nature Conservancy. Online: www.conserveonline.org.

Paige C, Ritter SA. 1999. Birds in a sagebrush sea: managing sagebrush habitats for bird communities. Boise (ID): Partners In Flight, Western Working Group. 47 p.

Rotenberry JT, Patten MA, Preston KL. 1999. Brewer's Sparrow (*Spizella breweri*). In: Poole A, Gill F, eds. The birds of North America. Nr 390. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.



Brown-capped Rosy-finch (*Leucosticte australis*) Status: NSS4; NatureServe G4 S1

Abundance: Uncommon

Introduction: The Brown-capped Rosy-finch occurs in the Central and Southern Rocky Mountains from northern New Mexico (Santa Fe Region) to southern Wyoming. Breeding in Wyoming has only been documented in the Snowy Range. But, the bird has been recorded in degree blocks along the Colorado border. There have been some sightings of this species in the Bighorn Mountains and in northwestern Wyoming (Cerovski *et al* 2004).

Habitat: The 3 species of Rosy-finch are the highest breeding birds in North America, rarely nesting below 10,000 feet elevation. Like the other 2 Rosy-finches, the Brown-capped is a ground or low nesting species (Gough *et al* 1998). It breeds on the tundra of mountain summits (audubon2.org) and nests primarily in cracks and holes in high alpine rock outcrops and cliffs (Bent 1968). In summer, the Brown-capped Rosy-finch feeds on insects and seeds of grasses and forbs (Bent 1968). The Brown-capped Rosy-finch does not migrate *per se*; when necessary, it moves downward in winter to use mid - to low elevation basin habitats near summer range (audubon2.org). Winter food is exclusively seeds, and habitats include open areas such as alpine tundra, high parks, meadows, grasslands, cultivated lands, roadsides, shrublands and residential areas (audubon2.org).

Problems:

- Audubon Christmas Bird Count data indicate a steady decline from the 1970s to the 1990s, for an overall drop of 50%, but more detailed analysis is needed;
- The species has a very limited range;
- Little more than natural history information and distribution is known for this species because of the difficult access to its habitat and nesting sites; and
- The effects of human activity, particularly in winter, need to be better understood.

Conservation Actions:

- More information is needed on the status of this species in Wyoming; and
- More information is needed on the winter habitats and winter habitat use of this species.

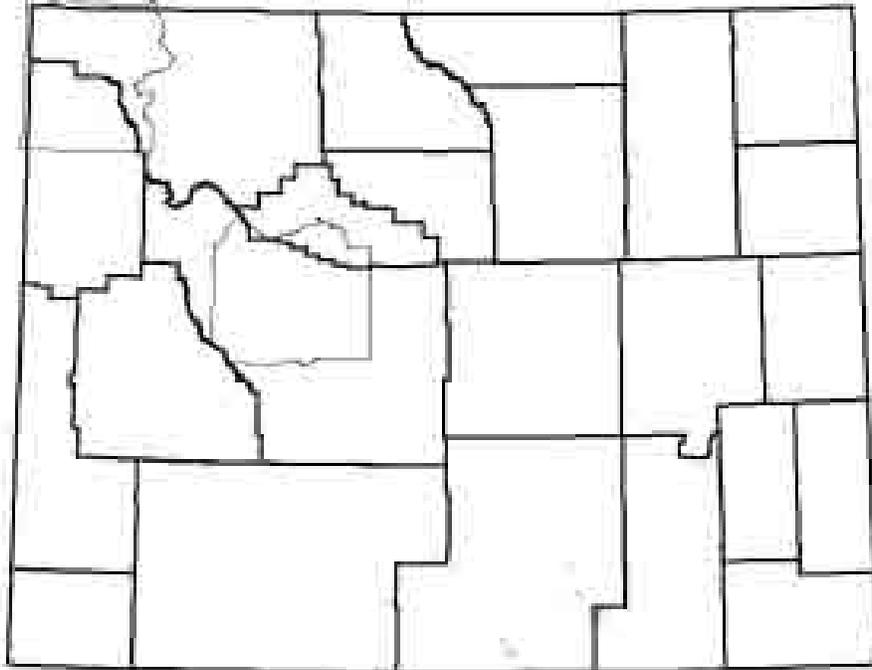
References and Additional Reading:

Bent, A.C. 1968. Life Histories of North American Cardinals, Grosbeaks, Buntings, Towhees, Finches, Sparrows and Allies. Dover Publications, Inc., New York. 602pp.

Cerovski, A. O., M.Grenier, B. Oakleaf, L. Van Fleet, and S.Patla. 2004. Atlas of Birds, Mammals, Reptiles and Amphibians in Wyoming, Wyoming Game & Fish Dept. Nongame Program. 206pp.

Gough, G.A., Sauer, J.R., Iliff, M. *Patuxent Bird Identification Infocenter*. 1998. Version 97.1. Patuxent Wildlife Research Center, Laurel, MD. Online <http://www.mbr-pwrc.usgs.gov/Infocenter/infocenter.html> or <http://www.audubon2.org/bird/watchlist.html>.

Brown-capped Rosy Finch Distribution



Burrowing Owl (*Athene cunicularia*)**Status: NSS4; NatureServe G4 S3****Abundance:** Uncommon

Introduction: During summer, the western subspecies of the Burrowing Owl inhabits southern British Columbia to southern Manitoba south through most of the western US to central Mexico. It winters from California to Texas south through most of Central America. In Wyoming, the highest concentrations of Burrowing Owls are in the south and east, although it occurs and breeds throughout most of the state. The Burrowing Owl is considered an uncommon summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because population status and trends are unknown, although they are suspected to be stable; because its habitat is vulnerable, although there is no ongoing significant loss of habitat; and because it is sensitive to human disturbance.

Habitat: The Burrowing Owl uses a wide variety of arid and semiarid environments, with well-drained, level to gently sloping areas characterized by sparse vegetation and bare ground. It prefers open prairie, grassland, desert, and shrub-steppe habitats, and may also inhabit agricultural areas. It depends on mammals, particularly prairie dogs and ground squirrels, that dig burrows, which it uses for nesting, roosting, and escape.

Problems: Burrowing Owls are impacted by the elimination of burrowing mammals through control programs and habitat loss. They are also impacted by the loss of habitat to urbanization and conversion of native grasslands to croplands or to taller, nonnative grasslands.

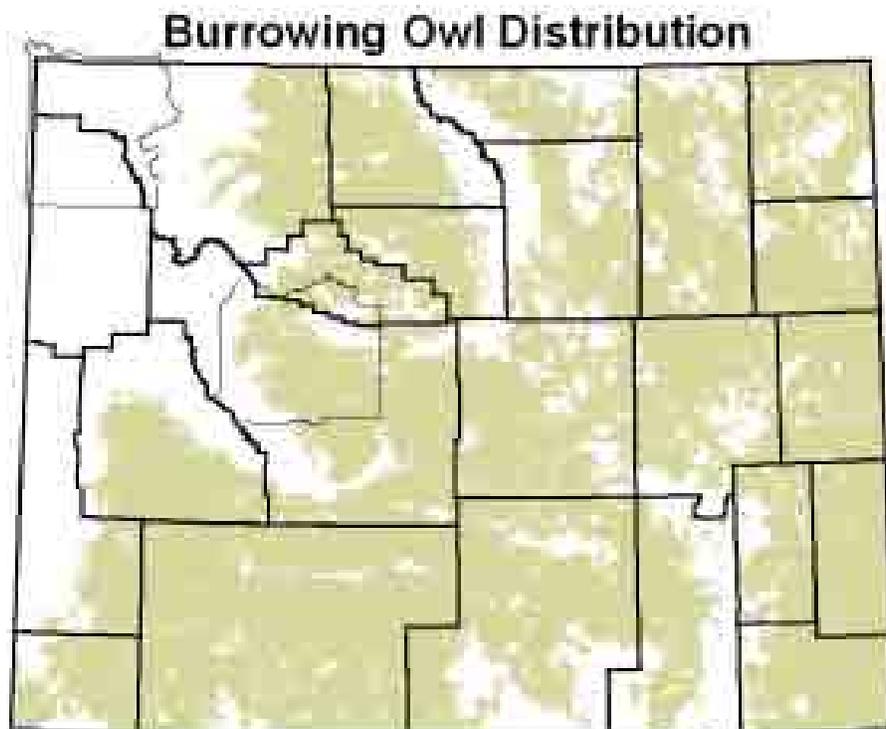
Conservation Actions:

- Determine statewide population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- Maintain prairie dog colonies where Burrowing Owls are present via conservation easements and voluntary agreements with landowners, and habitat management plans with land managers;
- Manage the habitat within 0.4 to 0.8 km (¼ to ½ mi) of Burrowing Owl nesting areas to minimize human disturbance during the breeding season;
- Manage Burrowing Owl foraging and nesting areas to minimize the reduction of small mammal populations, especially prairie dogs and ground squirrels, and the control of insect populations; and
- Manage Burrowing Owl nesting areas and shortgrass prairie habitat to minimize the potential for degradation and conflicts with development.

References and Additional Reading:

Haug EA, Millsap BA, Martell MS. 1993. Burrowing Owl (*Athene cunicularia*). In: Poole A, Gill F, eds. The birds of North America. Nr 61. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

- Johnson AS, Anderson SH. 2002. Conservation assessment for the western Burrowing Owl in the Black Hills National Forest, South Dakota and Wyoming. Custer (SD): USDA Forest Service, Black Hills National Forest. 24 p. Online: http://www.fs.fed.us/r2/blackhills/projects/planning/assessments/burrowing_owl.pdf.
- Klute DS, Ayers LW, Green MT, Howe WH, Jones SL, Shaffer JA, Sheffield SR, Zimmerman TS. 2003. Status assessment and conservation plan for the western Burrowing Owl in the United States. Bio Tech Pub FWS/BTP-R6001-2003. Washington: US Fish and Wildlife Service. Online: <http://mountain-prairie.fws.gov/birds>.
- Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.
- Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.
- Stephens R. Draft Wyoming Grasslands Conservation Plan. Wyoming Game and Fish Department, Nongame Program. Forthcoming.



Bushtit (*Psaltriparus minimus*)

Status: NSS3; NatureServe G5 S1

Abundance: Uncommon

Introduction: The Bushtit occurs from Vancouver Island and Washington south to Baja California and east to Colorado and Wyoming. In Wyoming, it is found almost exclusively in the southwestern corner of the state. The Bushtit is considered an uncommon summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because breeding populations are restricted in distribution, and nesting habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The Bushtit nests only in juniper woodlands in Wyoming and may be limited to areas where pinyon pine is present. It is most often found in younger junipers that have not yet developed cavities but are reproductively mature, between 35 and 100 years old. It forages throughout the junipers but especially at the edge of juniper stands, in openings, and in the sagebrush and mountain mahogany understory.

Problems:

- Population status and trends of the Bushtit are unknown in Wyoming;
- Suitable pinyon-juniper breeding habitat is restricted to the extreme southwestern portion of the state;
- During nest building, egg laying, and early incubation, human presence or changes in weather can cause desertion and even pair bond dissolution; and
- Throughout much of the West, resource managers view juniper as an invasive species that should be controlled or replaced with more desirable species.

Conservation Actions:

- Determine statewide population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- Maintain stands of younger age-classes of juniper and a mosaic of edges, open areas, and shrubs in juniper woodlands where Bushtits nest;
- Use prescribed and natural fire to maintain open stands of juniper woodland where Bushtits occur; and
- Management of manipulation of juniper in southwestern Wyoming should not favor one of the juniper obligates to the detriment of others. Instead, management should be coordinated to provide a mosaic of juniper woodland conditions.

References and Additional Reading:

Fitton S. 1989. Nongame species accounts: the Utah juniper obligates. Wyoming Game and Fish Department, Nongame Program. 52 p.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming’s birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Sloane SA. 2001. Bushtit (*Psaltriparus minimus*). In: Poole A, Gill F, eds. The birds of North America. Nr 598. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.



Canvasback (*Aythya valisineria*)

Status: NSS3; NatureServe G5 S4B

Abundance: Uncommon

Introduction: Breeding grounds are from Alaska to California and Nebraska with the highest densities in the prairie-parklands of southern Canada. Canvasbacks winter along the Atlantic Coast, Mississippi River delta and delta lakes in Louisiana, Gulf coast, and Pacific coast. In Wyoming, canvasbacks are much less common during the breeding season than during migration. Most of the breeding effort has been observed in the south-central and western portions of the state. The canvasback has low abundance in Wyoming and is considered an uncommon summer resident. The Wyoming Game and Fish Department (WGFD) classifies the canvasback as a Species of Special Concern with a Native Species Status of 3 (NSS3) because its breeding population in Wyoming is restricted in numbers, habitat is restricted and vulnerable but no recent or on-going significant loss.

Habitat: Canvasbacks are ecological specialists and require deep, open, permanent ponds, marshes and potholes for feeding, resting, and courtship activities. They are omnivorous and their diet consists of aquatic vegetation and aquatic invertebrates. Breeding may occur in small lakes, deep-water marshes, sheltered bays of large freshwater and alkali lakes, permanent and semi-permanent ponds, sloughs, potholes and shallow river impoundments. Females usually breed in their natal area and may either make a floating nest, or nest on top of a muskrat house. Nests are made of loosely woven reeds and sedges. In aspen parklands and mixed-grass prairies, the preferred breeding habitat is semipermanent and permanent, shallow marshes bordered by dense emergent vegetation, including bulrushes, cattails and reed grass. Brooding often takes place in the same habitat as breeding.

Problems:

- Historically low population status;
- Population tends to fluctuate in response to climatic conditions. In severe droughts, canvasbacks delay breeding or don't to breed at all;
- Encroachment of raccoons into breeding grounds is a relatively recent occurrence and has resulted in considerable nest destruction and a loss of productivity;
- This species has suffered from loss of breeding habitat due to development, drainage and cultivation of wetlands, and human disturbance;
- Very vulnerable to habitat destruction and oil pollution; and
- Declines in the western U.S. are not directly attributable to contaminants acquired by populations wintering in San Francisco Bay; however, evidence of high and increasing selenium levels and elevated mercury levels warrant future monitoring.

Conservation Actions:

- Document and prioritize historic and current breeding locations;
- Manage nesting areas to minimize human disturbance during the breeding season. Land use adjacent to wetlands affects canvasback nest density;
- Identify potential breeding sites that may become attractive to female canvasbacks following habitat management;
- Management for canvasbacks should focus on wetland complexes;
- Water levels should be kept constant during the laying and incubation periods to reduce losses from flooding and predation;

- Protect large lakes that support large post-breeding populations;
- Insure that wetlands protection laws are enforced;
- Work with agricultural interests to minimize loss of water in important breeding areas to irrigation demands and destruction of emergent vegetation around marsh edges;
- Manage all current and historic nesting and brood rearing habitat to minimize the potential for degradation and conflicts with development.
- Maintain good water quality.

References and Additional Reading:

Johnsgard, P.A. 1975. Waterfowl of North America. Indiana Univ. Press, Bloomington. 575 pp.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer> (Accessed: May 9, 2004).

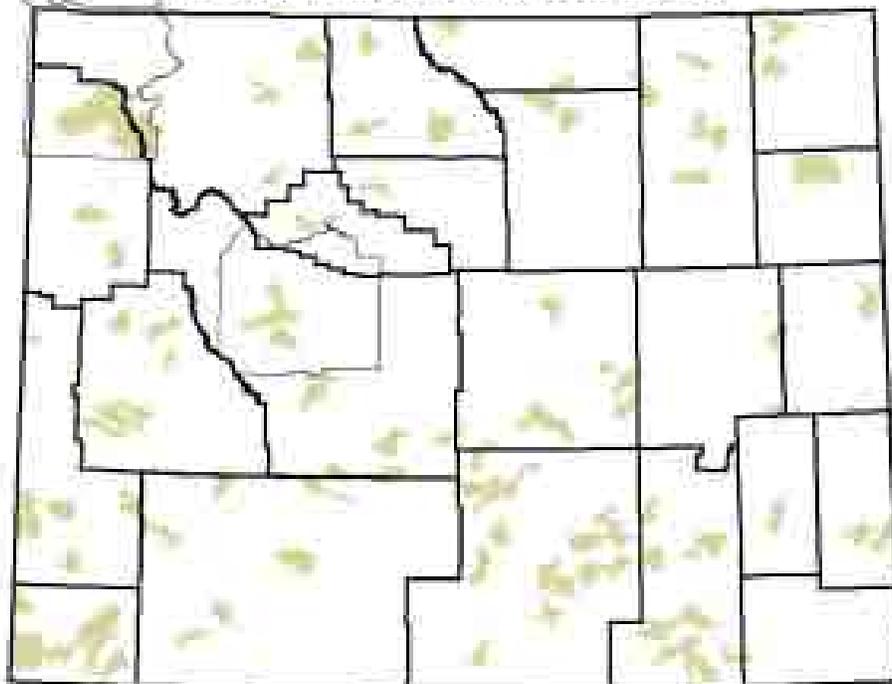
Mowbray, T.B. 2002. Canvasback (*Aythya valisineria*). In The Birds of North America, No. 659 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA. 40pp.

Schroeder, R.L. 1984. Habitat suitability index models: Canvasback (breeding habitat). U.S. Fish and Wildlife Service. FWS/OBS-82/10.82. 16 pp.

Todd, F. S. 1979. Waterfowl - Ducks, geese & swans of the world. Harcourt Brace Jovanovich, New York, New, York. 399 pp.

Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.

Canvasback Distribution



Caspian Tern (*Sterna caspia*)

Status: NSS3; NatureServe G5 S1

Abundance: Uncommon

Introduction: The Caspian Tern breeds locally from central Canada south through most of the US to Baja California and Florida, and winters mainly in coastal areas in the southern US south to Mexico. It also occurs in Africa, Eurasia, and Australia. It is scattered across most of Wyoming although confirmed or probable breeding has only been recorded in four general areas. The Caspian Tern is considered an uncommon summer resident in Wyoming. It was documented nesting at four different sites between 1983 and 1994. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because breeding populations are restricted in numbers and distribution; nesting habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat; and it is sensitive to human disturbance.

Habitat: The Caspian Tern inhabits marshes and aquatic areas and prefers open areas with sparse vegetation. It nests on the ground in small colonies on sandy or gravelly beaches along lakes, rivers, and marshes. Nests consist of scrapes in rocks or sand, are often exposed and close to water, and are usually on an island or peninsula. It generally forages in shallow water with enough clarity to reveal fish from above.

Problems:

- Breeding habitat in Wyoming is disjunct and secure breeding sites are limited in distribution;
- The availability and suitability of breeding sites can be unstable between years as a result of fluctuating water levels and changes in land use practices; and
- It is sensitive to human disturbance during nesting, which results in predation on eggs or young, or abandonment of the nest.

Conservation Actions:

- Continue annual inventory and monitoring efforts and implement “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003) to determine statewide population trends;
- Maintain a minimum of three Caspian Tern breeding locations and 35 breeding pairs of Caspian Terns in Wyoming;
- Maintain stable water levels throughout the nesting season in wetlands where Caspian Terns are breeding; and
- Manage Caspian Tern nesting areas to minimize human disturbance during the breeding season.

References and Additional Reading:

Cuthbert FJ, Wires LR. 1999. Caspian Tern (*Sterna caspia*). In: Poole A, Gill F, eds. The birds of North America. Nr 403. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Findholt SL. 1985. Status and distribution of colonial nesting waterbirds in Wyoming. Nongame Special Report. Cheyenne: Wyoming Game and Fish Department. 67 p.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Ritter S. 1989a. Nongame species account: Caspian Tern. Wyoming Game and Fish Department, Nongame Program. 24 p.



Chestnut-collared Longspur (*Calcarius ornatus*)

Status: NSS4; NatureServe G5 S1

Abundance: Uncommon

Introduction: The Chestnut-collared Longspur breeds from southern Alberta and Manitoba south to west-central Colorado and east to Minnesota. It winters from Arizona east to Kansas and south to north-central Mexico. During summer, it is scattered across the grasslands of Wyoming, mainly in the eastern half of the state. The Chestnut-collared Longspur is considered an uncommon summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because populations are restricted in distribution, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The Chestnut-collared Longspur inhabits shortgrass and open mixed-grass prairies. It avoids excessively shrubby areas, although it uses scattered shrubs and other low elevated perches for singing. Within arid habitats, it often prefers relatively more mesic areas; low, moist areas and wet-meadow zones around wetlands may provide suitable habitat.

Problems: The primary factor suspected to be limiting nesting populations of Chestnut-collared Longspurs is the availability of native grasslands. Chestnut-collared Longspurs will not nest in croplands.

Conservation Actions:

- Determine statewide population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- Manage Chestnut-collared Longspur nesting areas to minimize conversion of native shortgrass prairie and mixed-grass grasslands to cultivated agricultural lands, and to minimize habitat loss due to fragmentation, roads, exotic plants, and a shift in community ecology characteristics;
- Manage Chestnut-collared Longspur nesting areas to minimize habitat loss due to roads, livestock grazing, urban and suburban development, and habitat fragmentation; and
- In areas where Chestnut-collared Longspurs nest, manage for required minimum patch size of 46 ha (115 ac) to maintain nesting habitat (that is, high and low grass/forb structure with singing perches, especially in moist areas).

References and Additional Reading:

Dechant JA, Sondreal ML, Johnson DH, Igl LD, Goldade CM, Nenneman MP, Euliss BR. 2003c. Effects of management practices on grassland birds: Chestnut-collared Longspur. Jamestown (ND): Northern Prairie Wildlife Research Center. Online: <http://www.npwrc.usgs.gov/resource/literatr/grasbird/cclo/cclo.htm>.

Hill DP, Gould LK. 1997. Chestnut-collared Longspur (*Calcarius ornatus*). In: Poole A, Gill F, eds. The birds of North America. Nr 288. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.



Clark's Grebe (*Aechmophorus clarkii*)

Status: NSS4; NatureServe G5 S1B

Abundance: Uncommon

Introduction: The Clark's Grebe breeds from British Columbia, east to Minnesota, and south to central Mexico. It winters from central California south to central Mexico. During summer, it is scattered across most of Wyoming although confirmed or suspected breeding has been recorded primarily in western Wyoming. The Clark's Grebe is considered an uncommon summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because population status and trends are unknown, although they are suspected to be stable; because its habitat is restricted and vulnerable, although there is no ongoing significant loss; and because it is sensitive to human disturbance.

Habitat: The Clark's Grebe inhabits marshes and lakes, usually with extensive areas of open water and bordered by tall emergent vegetation. Ideal nesting areas provide large clumps of emergent vegetation interspersed with open water so that the vegetation blocks wave action. Large bulrush "islands" with inner open water areas and channels are good nesting sites.

Problems:

- The availability and suitability of breeding sites can be unstable between years as a result of fluctuating water levels and changes in land use practices. The Clark's Grebe often nests late in the season, and is threatened by low water levels in late summer;
- It is sensitive to human disturbance during nesting. Entire colonies will leave their nests when approached by humans, leaving them vulnerable to predators; repeated disturbances early in the nesting cycle can cause nest abandonment; and
- Breeding habitat in Wyoming is disjunct and secure breeding sites are limited in distribution.

Conservation Actions:

- Determine statewide population trends by implementing "Monitoring Wyoming's Birds: The Plan for Count-based Monitoring" (Leukering and others 2003);
- Manage Clark's Grebe nesting areas to maintain extensive complexes of marshes with stands of emergent vegetation greater than 6 m (20 ft) wide and interspersed with patches of shallow open water;
- Maintain stable water levels throughout the nesting season in wetlands where Clark's Grebes are breeding; and
- Manage Clark's Grebe nesting areas to minimize human disturbance during the breeding season.

References and Additional Reading:

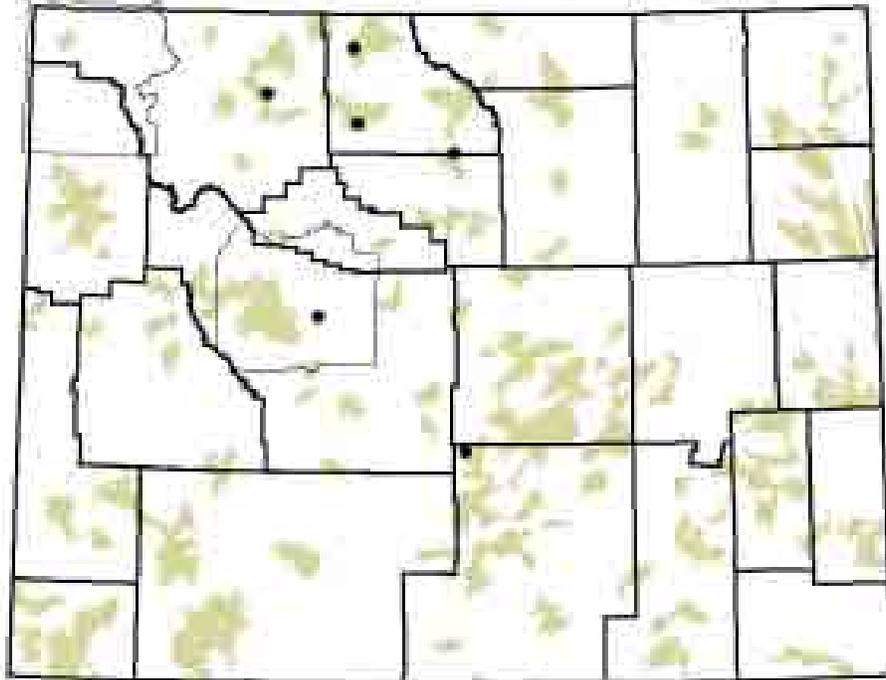
DeGraaf RM, Scott VE, Hamre RH, Ernst L, Anderson SH. 1991. Forest and rangeland birds of the United States: natural history and habitat use. Agriculture Handbook 688. USDA Forest Service. 625 p.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Storer RW, Nuechterlein GL. 1992. Western and Clark's Grebe (*Aechmophorus occidentalis* and *A. clarkii*). In: Poole A, Gill F, eds. The birds of North America. Nr 26. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Clark's Grebe and Western Grebe Distribution



Columbian Sharp-tailed Grouse (*Tympanuchus phasianellus columbianus*)

Status: NSS3; NatureServe G4 T3 S1

Abundance: Uncommon

Introduction: The Columbian Sharp-tailed Grouse occurs locally from British Columbia south to Nevada and east to Colorado, although it has been extirpated from Oregon, California, and Nevada. It occurs in scattered pockets in northwestern and south-central Wyoming. The Wyoming Game and Fish Department classifies the Columbian Sharp-tailed Grouse as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in numbers and distribution, and habitat is vulnerable, although there is no ongoing significant loss.

Habitat: The Columbian Sharp-tailed Grouse inhabits mountain-foothills shrub communities of serviceberry, snowberry, chokecherry, and Gambel oak; sagebrush-grassland; and willow-riparian habitats. In Wyoming, it prefers mountain-foothills shrub and sagebrush-snowberry habitats in the transitional zone between sagebrush-grass and forested habitats. Leks are the hub of breeding activity and are typically located in areas with little slope and low, sparse vegetation, such as knolls, ridgetops, or benches that allow good visibility. Nests are located within 1 km (0.6 mi) of the lek in an area with relatively tall, dense residual cover from the previous year. Brood-rearing areas contain a mosaic of dense shrubs and grasses with rich forb and insect foods, usually in mountain-foothills shrub or sagebrush-snowberry habitats. During winter, the Columbian Sharp-tailed Grouse relies on riparian areas and other sites within 6.4 km (4 mi) of the breeding complex with deciduous trees and shrubs for feeding, roosting, and escape cover.

Problems:

- Conversion of low elevation mountain-foothills shrub, sagebrush, and grassland communities to cropland and other human development has contributed to a loss of Columbian Sharp-tailed Grouse habitat;
- Loss of vegetative cover, invasion of nonnative annual vegetation, pesticides, and fire (too much in some areas, not enough in other areas) have reduced the quality of existing Columbian Sharp-tailed Grouse habitat;
- Lek sites isolated by more than 40 km (25 mi) from other lek sites may be vulnerable to demographic and genetic stochasticity; and
- Human activities, including loud noises and mechanical, recreational, and photographic activities, near active leks can interrupt and disturb breeding activity.

Conservation Actions:

- Determine statewide population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- Work with landowners and managers to maintain all current and traditional Columbian Sharp-tailed Grouse leks and winter, brood-rearing, and nesting habitats and minimize the potential for degradation and conflicts with development;
- Provide nesting cover with relatively dense residual herbaceous vegetation and good visual obstruction to a height of 15 to 30 cm (6 to 12 in) within 1 km (0.6 mi) of leks;
- Provide a mosaic of dense shrubs and grasses with rich forbs and insect foods for brood-rearing, in a complex with the lek and nesting areas (within 2.5 km [1.5 mi] of the lek);

- Provide high quality winter cover and forage in riparian and deciduous shrub and tree habitats within 6.4 km (4 mi) of the breeding complex;
- Manage Columbian Sharp-tailed Grouse brood-rearing areas to minimize the impacts of pesticides or vegetation alteration during the brood-rearing season (May 15 to July 15); and
- Manage areas within 0.8 km (0.5 mi) of active leks to minimize human disturbance during the breeding season (March to June).

References and Additional Reading:

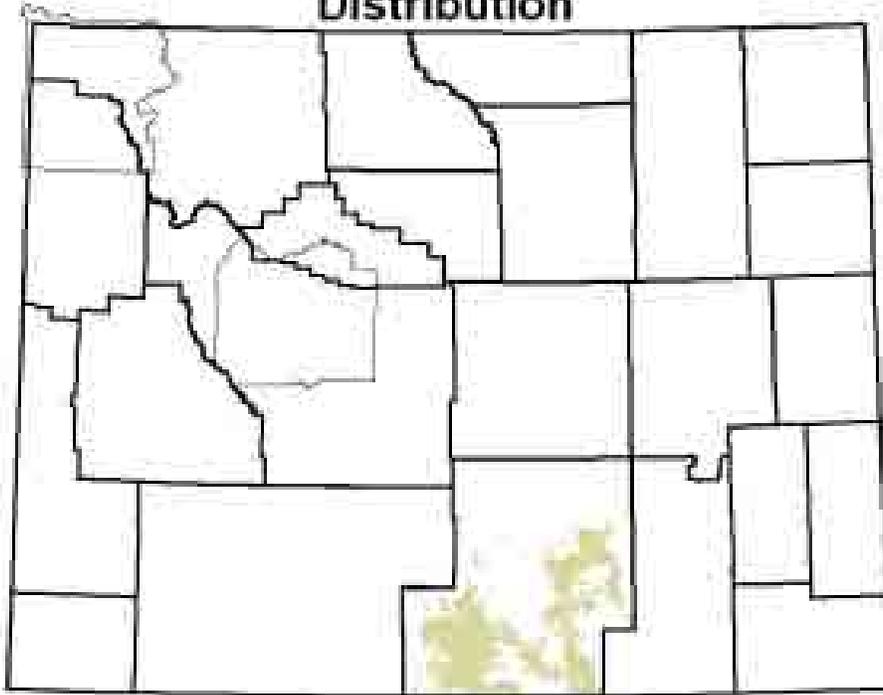
Giesen KM, Connelly JW. 1993. Guidelines for management of Columbian Sharp-tailed Grouse habitats. *Wildl Soc Bull* 21(3):325-333.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Utah Division of Wildlife Resources. 2002. Strategic management plan for Columbian Sharp-tailed Grouse. Publication 02-19. State of Utah, Department of Natural Resources, Division of Wildlife Resources. 39 p. Online: <http://www.wildlife.utah.gov/uplandgame/pdf/02sharptail.pdf>.

Columbian Sharp-tailed Grouse Distribution



Common Loon (*Gavia immer*)**Status: NSS1; NatureServe G5 S1B S2N****Abundance:** Uncommon

Introduction: The Common Loon breeds in Iceland, Greenland, and throughout the lake country of the northern US and Canada and winters along the Pacific, Atlantic, and Gulf Coasts. Its range in Wyoming is small; although it is found on lakes across most of Wyoming during migration, it nests only in northwestern Wyoming. The Common Loon has low abundance in Wyoming and is considered an uncommon summer resident. Common Loons have nested or attempted to nest on 28 lakes in Wyoming, seven of which are located outside of Yellowstone National Park (YNP). The number of adult loons that are typically found in Wyoming during the breeding season, both within and outside of YNP, ranges from 40 to 60. However, because of their secretive nature and use of remote lakes, loons may also occupy suitable habitat that has not been surveyed for nesting territories. The Wyoming Game and Fish Department classifies the Common Loon as a Species of Special Concern with a Native Species Status of 1 (NSS1) because its breeding population in Wyoming is restricted in numbers and distribution, making extirpation possible; because there is ongoing significant loss of nesting habitat; and because it is sensitive to human disturbance.

Habitat: Lakes that are suitable for breeding are extremely limited in Wyoming and must have the following characteristics:

- At least 4 ha (10 ac), although reproductive success is better on lakes that are greater than 10 ha (25 ac);
- Free of human disturbance or have areas that are secluded from human activity;
- Between 1800 and 2400 m (6000 and 8000 ft) in elevation;
- Have clear water with a minimum visibility of 3 to 4 m (10 to 13 ft), as loons are visual predators;
- Islands or protected shore areas for nesting and raising young;
- Abundant populations of small to mid-sized fish;
- Greater than 2 m (6 ft) deep to prevent winter kill of fish; and remain ice free for at least 4 months to allow young to fledge; and
- Ideal nesting lakes also generally have at least partially forested, rocky shorelines; an area of shallow water with emergent vegetation; and a steep slope adjacent to the shoreline for an underwater approach to the nest.

Problems:

- Narrow nesting habitat requirements make loons susceptible to habitat degradation and loss;
- Breeding habitat is restricted in Wyoming and may be declining;
- Breeding population in Wyoming is only about 20 pairs. This population is vulnerable to extirpation without adequate management;
- Very sensitive to human disturbances, which may cause desertion of the nest or chicks;
- Nests may be flooded by boat wakes or rising water, while lake level subsidence can move the shoreline too far from nests and cause nest desertion or loss of newly-hatched chicks; and
- May be impacted by acid rain and other environmental contaminants, which kill fish that are used as food.

Conservation Actions:

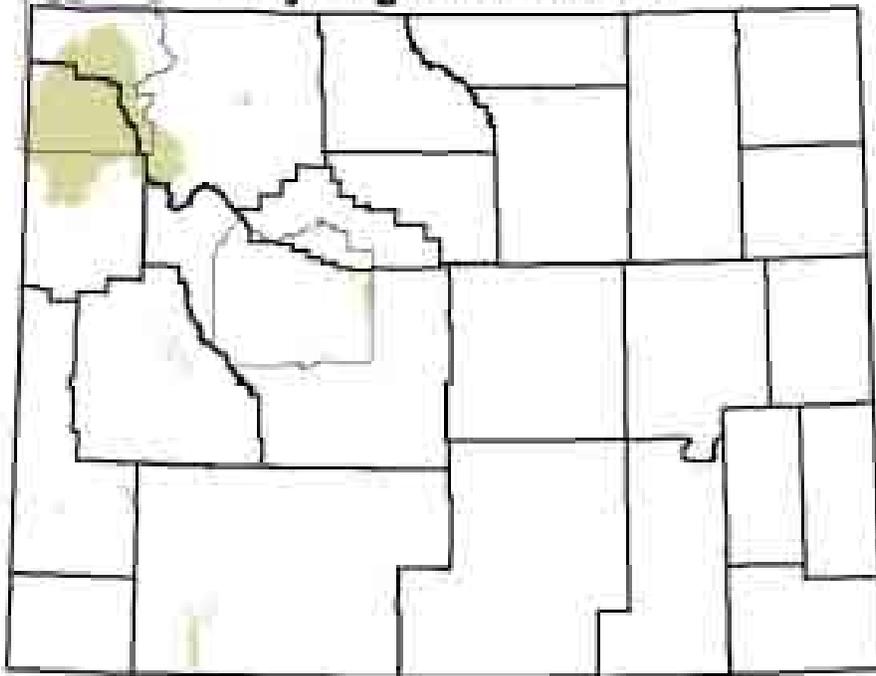
- Continue annual inventory and monitoring efforts to ensure that Common Loon territorial pairs are returning to and producing young on lakes with suitable breeding habitat;
- Continue coordinating surveys with YNP, to allow direct comparison of annual breeding data and the development of joint management schemes between WGFD and YNP;
- Identify and survey additional potential breeding sites where Common Loons have not been documented before to avoid focusing management on only a portion of the population;
- Manage all current and traditional Common Loon nesting sites to minimize the potential for degradation and conflicts with development. Because loons exhibit strong fidelity to previous nest sites, there is a high probability that they will reuse nests and nurseries if these areas are not developed or degraded. When possible, 2 or 3 alternate sites with characteristics of preferred nesting areas should be protected on each breeding lake. Small islands should receive complete protection from development. Undeveloped buffer zones of at least 150 m (500 ft) should be left on either side of nest sites and nursery areas;
- Manage Common Loon nesting areas to minimize human disturbance during the breeding season. Where necessary, identify and resolve potential conflicts with activities such as boating, fishing, swimming, camping, and picnicking near nest sites and in nursery areas;
- Maintain stable water levels throughout the nesting season in lakes where Common Loons are breeding;
- Maintain good water quality; and
- Educate the public about the natural history and conservation needs of loons. This can include interpretive signs and information at lakeside campsites, marinas, and other lake access points; informational brochures; press releases; and lectures, slide programs, and other presentations.

References and Additional Reading:

- Cerovski A. 2001. Surveys of the Common Loon in Wyoming: completion report. In: Cerovski AO, ed. Threatened, endangered, and nongame bird and mammal investigations: annual completion report. Wyoming Game and Fish Department, Nongame Program. p 39-42.
- McIntyre JW, Barr JR. 1997. Common Loon (*Gavia immer*). In: Poole A, Gill F, eds. The birds of North America. Nr 313. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.
- NatureServe. 2004. NatureServe explorer: an online encyclopedia of life. Version 1.8. Arlington (VA): NatureServe. Online <http://www.natureserve.org/explorer>.
- Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.
- Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Ritter S. 1989b. Nongame species account: Common Loon. Wyoming Game and Fish Department, Nongame Program. 35 p.

Common Loon Nesting and Key Migration Areas



Dickcissel (*Spiza americana*)

Status: NSS4; NatureServe G5 S1

Abundance: Uncommon

Introduction: The Dickcissel breeds from southern Saskatchewan, east to western New York, and south to southern Texas and northern Georgia. It winters from southwestern Mexico south to northern South America. During summer, it is scattered across most of Wyoming in grassland habitat, although breeding has been documented only in the eastern part of the state. The Dickcissel is considered an uncommon summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because populations are restricted in distribution, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The Dickcissel usually inhabits grasslands with taller grasses, forbs, or shrubs, but also uses alfalfa and hayfields. It prefers habitat with dense vegetation, a high abundance of forbs, moderately deep litter, and singing perches.

Problems:

- Local breeding populations are impacted by loss of nests and nestlings when fields are mowed; and
- Native grasslands in Venezuela, where Dickcissels winter, have been highly modified by ranching and grain production.

Conservation Actions:

- Determine statewide population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- In areas where Dickcissels nest, provide large areas of grassland habitat (10 to 30 ha [25 to 75 ac]) with dense, tall vegetation; a high abundance of forbs; moderately deep litter; and singing perches; and
- Manage Dickcissel nesting areas to minimize disturbance (including haying, burning, and moderate to heavy grazing) during the breeding season (late April to late August).

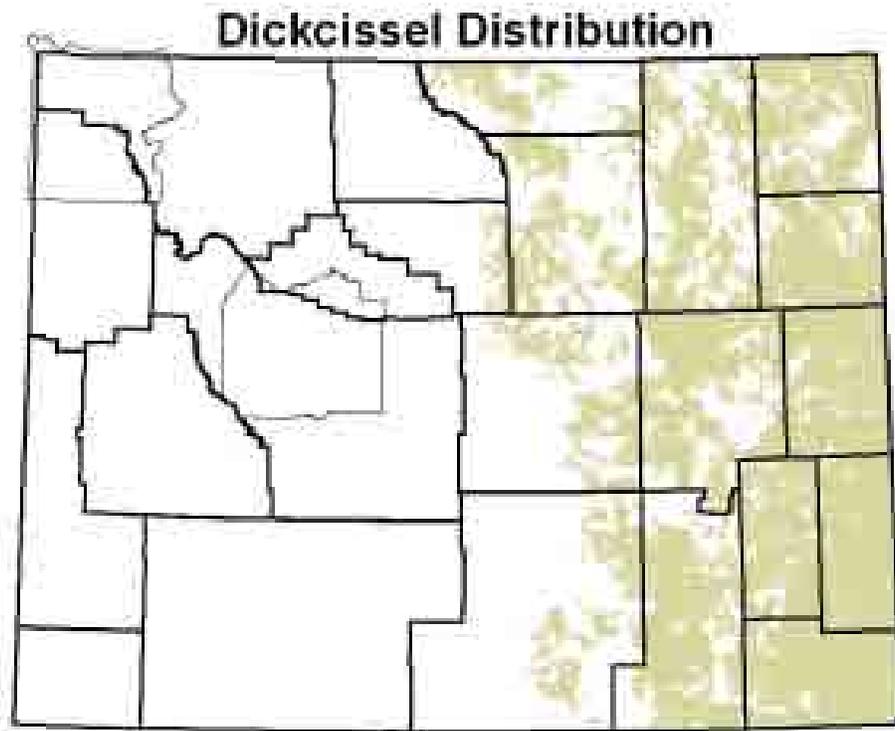
References and Additional Reading:

Dechant JA, Sondreal ML, Johnson DH, Igl LD, Goldade CM, Zimmerman AL, Euliss BR. 2003k. Effects of management practices on grassland birds: Dickcissel. Jamestown (ND): Northern Prairie Wildlife Research Center. Online: <http://www.npwr.usgs.gov/resource/literatr/grasbird/dick/dick.htm>.

Leukering T, Carter MF, Panjabi A, Faulkner D, Leivad R. 2003. Monitoring Wyoming’s birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Temple SA. 2003. Dickcissel (*Spiza americana*). In: Poole A, Gill F, eds. The birds of North America. Nr 703. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.



Ferruginous Hawk (*Buteo regalis*)**Status: NSS3; NatureServe G4 S4B S5N****Abundance:** Common

Introduction: The Ferruginous Hawk breeds from the Canadian Prairie Provinces south to Oregon, Nevada, Arizona, and Oklahoma. It winters from the central and southern portions of its breeding range south into Baja California and central Mexico. It occurs and breeds throughout most of Wyoming. The Ferruginous Hawk is considered a common resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in distribution, and because it is sensitive to human disturbance.

Habitat: The Ferruginous Hawk inhabits semiarid open country, primarily grasslands, basin-prairie shrublands, and badlands. It requires large tracts of relatively undisturbed rangeland and nests on rock outcrops, the ground, cutbanks, cliff ledges, or trees.

Problems:

- Impacted by conversion of native prairie to cropland or other uses, urbanization, loss of vegetative cover, poisoning, human disturbance near the nest site, and reduced prey availability, including the elimination of prairie dog towns and ground squirrel colonies;
- Resource development is occurring or proposed for a significant portion of Ferruginous Hawk nesting habitat in Wyoming, and can decrease prey abundance and/or reduce availability of nesting sites; and
- Current monitoring efforts are not adequate to document population trends or identify needed management over large areas of the state.

Conservation Actions:

- Continue to conduct aerial surveys in Ferruginous Hawk habitat to collect information on nesting activity;
- Increase monitoring efforts to document population trends and identify needed management. Implement “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- Work with private landowners to conserve grassland habitat by seeking financial incentives from various sources and providing assistance and expertise with management activities;
- Manage Ferruginous Hawk nesting areas to minimize the potential for degradation and conflicts with development; and
- Manage Ferruginous Hawk nesting areas to minimize human disturbance during the breeding season (April 1 through July 31).

References and Additional Reading:

Bechard MJ, Schmutz JK. 1995. Ferruginous Hawk (*Buteo regalis*). In: Poole A, Gill F, eds. The birds of North America. Nr 172. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union. 20 pp.

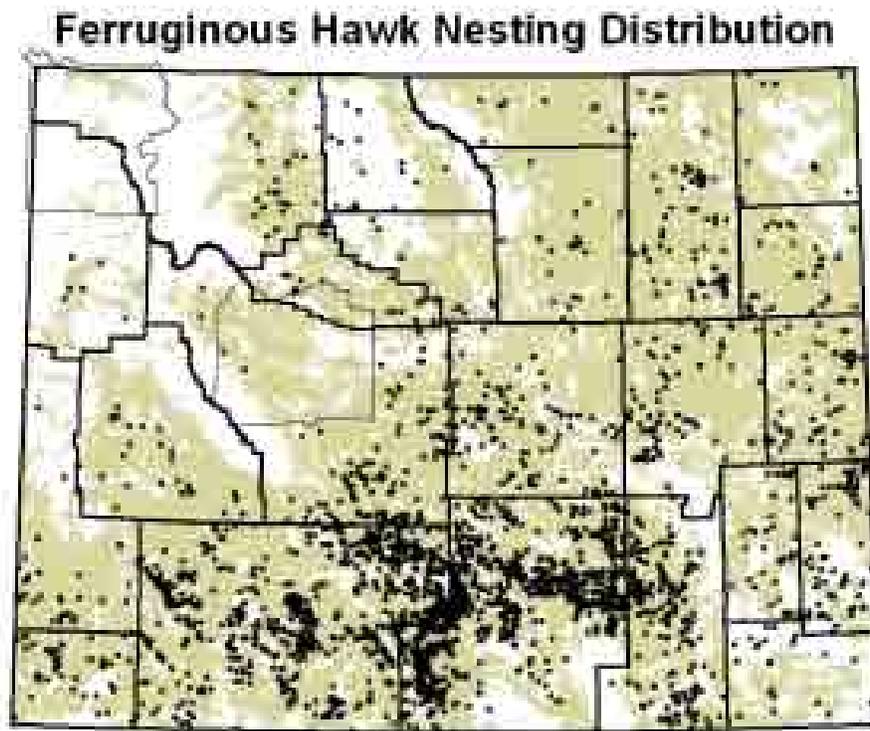
Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

NatureServe. 2004. NatureServe explorer: an online encyclopedia of life. Version 1.8. Arlington (VA): NatureServe. Online <http://www.natureserve.org/explorer>.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Tesky JL. 1994b. *Buteo regalis*. In: Fire effects information system. USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Online: <http://www.fs.fed.us/database/feis/>.



Forster's Tern (*Sterna forsteri*)**Status: NSS3; NatureServe G5 S1****Abundance:** Common

Introduction: The Forster's Tern breeds locally from the central Prairie Provinces of Canada south to southern California, the coast of northeastern Mexico, and South Carolina. It winters from central California south to Costa Rica and from Virginia to the Greater Antilles. It is scattered across most of Wyoming, although breeding has been confirmed in only four general areas. The Forster's Tern is considered a common summer resident in Wyoming. It was documented nesting at eight different sites between 1982 and 1994. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because breeding populations are restricted in numbers and distribution; nesting habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat; and it is sensitive to human disturbance.

Habitat: The Forster's Tern inhabits freshwater marshes and marshy borders of ponds and lakes, and prefers large marsh complexes with vegetated nest sites near patches of open water. It nests in small, loose colonies on mats of floating dead vegetation, large muskrat houses near the edges of open pools of water, or in a shallow depression in sand or mud close to water.

Problems:

- Breeding habitat in Wyoming is disjunct and secure breeding sites are limited in distribution.
- The availability and suitability of breeding sites can be unstable between years as a result of fluctuating water levels and changes in land use practices; and
- Sensitive to human disturbance during nesting.

Conservation Actions:

- Continue annual inventory and monitoring efforts and implement "Monitoring Wyoming's Birds: The Plan for Count-based Monitoring" (Leukering and others 2003) to determine statewide population trends;
- Maintain a minimum of 4 Forster's Tern breeding locations and 45 breeding pairs of Forster's Terns in Wyoming;
- In areas where Forster's Terns are nesting, maintain complexes of marshes with stands of emergent vegetation greater than 6 m (20 ft) wide and interspersed with patches of open water;
- Maintain stable water levels throughout the nesting season in wetlands where Forster's Terns are breeding; and
- Manage Forster's Tern nesting areas to minimize human disturbance during the breeding season.

References and Additional Reading:

Findholt SL. 1985. Status and distribution of colonial nesting waterbirds in Wyoming. Nongame Special Report. Cheyenne: Wyoming Game and Fish Department. 67 p.

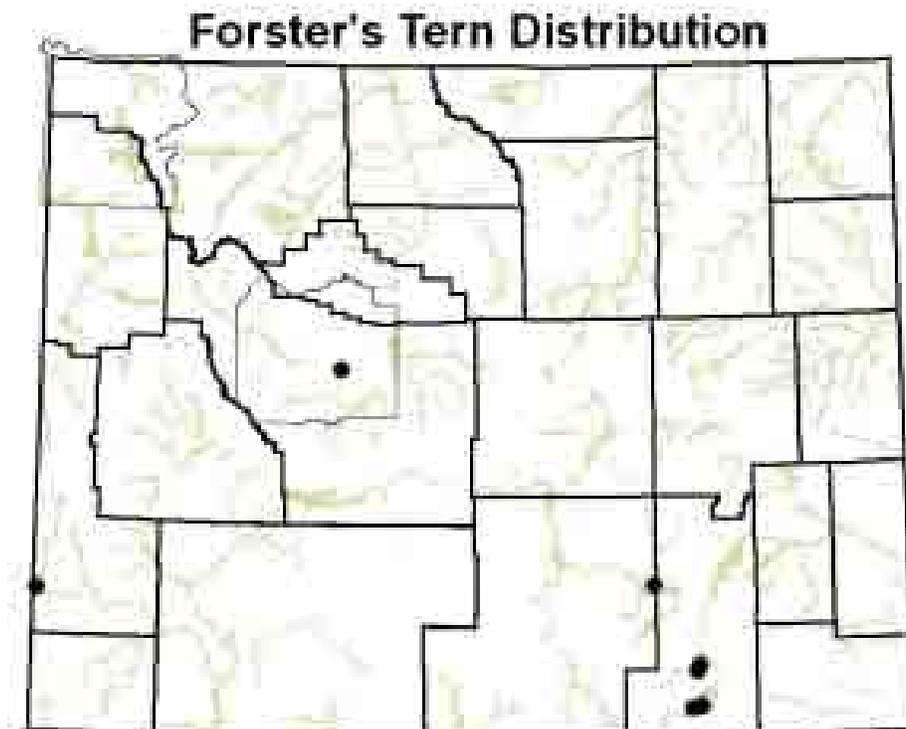
Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

McNicholl MK, Lowther PE, Hall JA. 2001. Forster's Tern (*Sterna forsteri*). In: Poole A, Gill F, eds. The birds of North America. Nr 595. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

NatureServe. 2004. NatureServe explorer: an online encyclopedia of life. Version 1.8. Arlington (VA): NatureServe. Online <http://www.natureserve.org/explorer>.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.



Franklin's Gull (*Larus pipixcan*)**Status: NSS3; NatureServe G4 G5 SHB****Abundance:** Common

Introduction: The Franklin's Gull breeds from the Canadian Prairie Provinces, south to Utah, and east to Iowa. It winters primarily along the Pacific coast of South America, casually along the Gulf coast of Texas and Louisiana, and in Hawaii. It is found across most of Wyoming during migration, but breeding has only been confirmed in northwestern Wyoming. The Franklin's Gull is considered a common summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because breeding populations are restricted in numbers and distribution; nesting habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat; and it is sensitive to human disturbance.

Habitat: The Franklin's Gull inhabits marshes and sloughs with sparse emergent vegetation, such as cattails, bulrushes, or reeds, but scavenges in most open habitats below 2500 m (8000 ft). It nests in colonies in marshes no denser than 10 plants less than 1 m tall per square meter (≤ 1 plant < 3 ft tall per square foot), and usually near patches of open water.

Problems:

- Breeding habitat in Wyoming is disjunct and secure breeding sites are limited in distribution;
- The availability and suitability of breeding sites can be unstable between years as a result of fluctuating water levels and changes in land use practices; and
- Sensitive to human disturbance during nesting.

Conservation Actions:

- Continue annual inventory and monitoring efforts and implement "Monitoring Wyoming's Birds: The Plan for Count-based Monitoring" (Leukering and others 2003) to determine statewide population trends;
- In areas where Franklin's Gulls are nesting, maintain complexes of marshes with sparse emergent vegetation interspersed with patches of open water;
- Maintain stable water levels throughout the nesting season in wetlands where Franklin's Gulls are breeding; and
- Manage Franklin's Gull nesting areas to minimize human disturbance during the breeding season.

References and Additional Reading:

Burger J, Gochfeld M. 1994. Franklin's Gull (*Larus pipixcan*). In: Poole A, Gill F, eds. The birds of North America. Nr 116. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Findholt SL. 1985. Status and distribution of colonial nesting waterbirds in Wyoming. Nongame Special Report. Cheyenne: Wyoming Game and Fish Department. 67 p.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

NatureServe. 2004. NatureServe explorer: an online encyclopedia of life. Version 1.8. Arlington (VA): NatureServe. Online <http://www.natureserve.org/explorer>.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.



Grasshopper Sparrow (*Ammodramus savannarum*)

Status: NSS4; NatureServe G5 S4

Abundance: Common

Introduction: The Grasshopper Sparrow breeds from southern British Columbia, east to southern Maine, and south to southern California and central Georgia, although the main population is on the Great Plains. It winters from central California, east to North Carolina, and south to northern South America. During summer, it is scattered across the grasslands of Wyoming, although it breeds mainly in the eastern half of the state. The Grasshopper Sparrow is considered a common summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because populations are restricted in distribution, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The Grasshopper Sparrow inhabits shortgrass prairies, mixed grasslands, meadows, open sagebrush-grasslands, and agricultural areas. It requires herbaceous cover and conspicuous perches, and avoids areas containing more than 35% shrubs.

Problems: The Grasshopper Sparrow is impacted by the loss of habitat to urbanization, conversion of native grasslands to cropland, and loss of vegetative cover.

Conservation Actions:

- Determine statewide population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- In areas where Grasshopper Sparrows nest, provide large areas (>30 ha [75 ac]) of dense grasslands with heavy forb cover, thick litter depth, grass height up to 46 cm (18 in), overall bare ground of 1 to 2%, shrub canopy cover of 5% or less, and conspicuous singing perches; and
- Manage Grasshopper Sparrow nesting areas to minimize disturbance (including haying, burning, and heavy grazing) during the breeding season (mid April to late August).

References and Additional Reading:

Dechant JA, Sondreal ML, Johnson DH, Igl LD, Goldade CM, Nenneman MP, Euliss BR. 2003d. Effects of management practices on grassland birds: Grasshopper Sparrow. Jamestown (ND): Northern Prairie Wildlife Research Center. Online: <http://www.npwrc.usgs.gov/resource/literatr/grasbird/grsp/grsp.htm>.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming’s birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Vickery PD. 1996. Grasshopper Sparrow (*Ammodramus savannarum*). In: Poole A, Gill F, eds. The birds of North America. Nr 239. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.



Great Blue Heron (*Ardea herodias*)

Status: NSS4; NatureServe G5 S4B

Abundance: Common

Introduction: The Great Blue Heron breeds from southeastern Alaska and southern Canada south to Venezuela, and winters from the central US and southern New England south to Venezuela. It occurs throughout Wyoming during summer. The Great Blue Heron is considered a common summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because its habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat, and it is sensitive to human disturbance.

Habitat: The Great Blue Heron inhabits cottonwood riparian habitat, marshes, swamps, lakes, and rivers. It nests colonially in trees in swamps and forested areas, and less commonly in shrubs or on the ground.

Problems:

- The availability of large, contiguous stands of cottonwood-riparian habitat required for rookeries is restricted and vulnerable to human disturbance, development, and changing land use practices;
- Sensitive to human disturbance during nesting; and
- Although 209 rookeries have been located in Wyoming, usually less than 25% are active in any year.

Conservation Actions:

- Continue annual inventory and monitoring efforts and implement “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003) to determine statewide population trends;
- Maintain suitable riparian and wetland habitat in areas where Great Blue Herons nest; and
- Manage Great Blue Heron nesting areas to minimize human disturbance during the breeding season.

References and Additional Reading:

Allen H. 1991. The Great Blue Heron. NorthWord Pr. 175 p.

Butler RW. 1992. Great Blue Heron (*Ardea herodias*). In: Poole A, Gill F, eds. The birds of North America. Nr 25. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming’s birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Vos DK. 1984. Response of breeding Great Blue Herons to human disturbance in north central Colorado. MSc thesis. Fort Collins: Colorado St Univ.

Wyoming Game and Fish Department. 1997. Piscivorous bird management plan. Cheyenne: Wyoming Game and Fish Department.

Great Blue Heron Nesting Distribution



Great Gray Owl (*Strix nebulosa*)**Status: NSS4; NatureServe G5 S2****Abundance:** Unknown

Introduction: The Great Gray Owl inhabits the boreal climatic zones of North America and Eurasia. In North America, it breeds from central Alaska and Canada south to central California, the northern Rocky Mountains, northwestern Minnesota, and south-central Ontario. It winters mainly in its breeding range, although it wanders south irregularly into the northern US. It is a year-round resident in Wyoming, primarily in the mountainous areas in the western third of the state. The abundance of the Great Gray Owl is unknown in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because its population status and trends are unknown, although they are expected to be stable, and because its habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The Great Gray Owl inhabits dense coniferous forests, especially near water. It forages primarily in wet montane meadows. It usually nests near bogs or clearings, in the top of large broken-off tree trunks, in nests of other large birds, or in debris platforms from dwarf mistletoe.

Problems:

The population status and trends of Great Gray Owls in Wyoming are largely unknown. The Breeding Bird Survey does not adequately census this species because of a lack of routes in its preferred habitat. This species may be impacted by intensive timber harvesting if nest sites or roost trees needed by adults and fledged young are eliminated.

Conservation Actions:

- Determine population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- Work cooperatively with other agencies to conduct surveys and manage habitat for Great Gray Owls;
- Develop a cooperative, statewide, interagency/non-governmental organization database on Great Gray Owl nest sites, with data sensitivity built in;
- Conduct thorough surveys for Great Gray Owls prior to any timber harvesting;
- Maintain mature or older forest stands with an open understory and a dense overstory (at least 60% canopy closure) in areas where Great Gray Owls occur;
- Manage Great Gray Owl nesting areas to provide a dense stand of trees around or near the nest tree, with abundant dead and downed material. Retain large-diameter (greater than 50 cm [20 in] diameter at breast height) dead trees with broken tops, and large-diameter trees with dwarf mistletoe; and
- Manage Great Gray Owl nesting areas to minimize human disturbance during the breeding season.

References and Additional Reading:

Bull EL, Duncan JR. 1993. Great Gray Owl (*Strix nebulosa*). In: Poole A, Gill F, eds. The birds of North America. Nr 41. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Bull EL, Henjum MG. 1990. Ecology of the Great Gray Owl. Gen Tech Rep PNW-GTR-265. Portland (OR): USDA Forest Service, Pacific Northwest Research Station. 39 p. Online: <http://www.fs.fed.us/pnw/pubs/gtr265/gtr265.pdf>.

Franklin AB. 1988. Breeding biology of the Great Gray Owl in southeastern Idaho and northwestern Wyoming. Condor 90(3):689-96.

Hayward GD, Verner J, tech eds. 1994. Flammulated, Boreal, and Great Gray Owls in the United States: a technical conservation assessment. Gen Tech Rep RM-253. Fort Collins (CO): USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. 214 p.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nero RW, Clark RJ, Knapton RJ, Hamre H, eds. 1987. Biology and conservation of northern forest owls. Gen Tech Rep RM-142. Fort Collins (CO): USDA Forest Service, Rocky Mountain Forest and Range Experiment Station.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.



Greater Sage grouse (*Centrocercus urophasianus*)

Status: NSS2; NatureServe G4 S4

Abundance: Common

Introduction: The sage grouse is a large, long-lived sagebrush dependent upland game bird. Sage grouse nest on the ground under sagebrush and feed on sagebrush, forbs and insects. The degree to which the different sage grouse populations in the state migrate is variable depending on location and severity of winter. Although still considered common in Wyoming, available data and anecdotal accounts indicate Wyoming's populations have experienced declines over the last half century. The greater sage grouse, the species found in Wyoming, has been petitioned for protection under the Endangered Species Act. The Washington State population of the species is currently a Candidate for listing under the act. The Gunnison sage grouse, a distinct but closely related species of grouse inhabiting portions of Colorado and Utah, also has Candidate status under the ESA.

Habitat: Sage grouse depend on a variety of sagebrush community types and associated habitats, including basin-prairie and mountain foothills shrub lands, wet-moist meadows. Alfalfa, and irrigated meadows also serve as habitat when immediately adjacent to sagebrush. Sage grouse use different habitats during different times of the year

Problems: Sage grouse populations have been impacted by the decline in quantity and quality of sagebrush habitats caused by a variety of sources. Likewise there are potentially severe impacts related to West Nile virus.

Conservation Actions:

- Establish local working groups to review conditions impacting sage-grouse in different parts of Wyoming and make recommendations regarding actions that can be taken to either stabilize or increase local populations.
- Continue to research and document sage-grouse habitat needs and the effects of human activities on sage-grouse and sagebrush habitats.
- Continue research on the effects of West Nile virus on sage-grouse populations in the state.
- Continue harvest and population data collection to document status and trend of sage-grouse in Wyoming.
- Implement strategies in the Department's Habitat Strategic Plan for sagebrush habitats.
- Eliminate, reduce or mitigate negative anthropogenic effects to sage-grouse and their habitats.

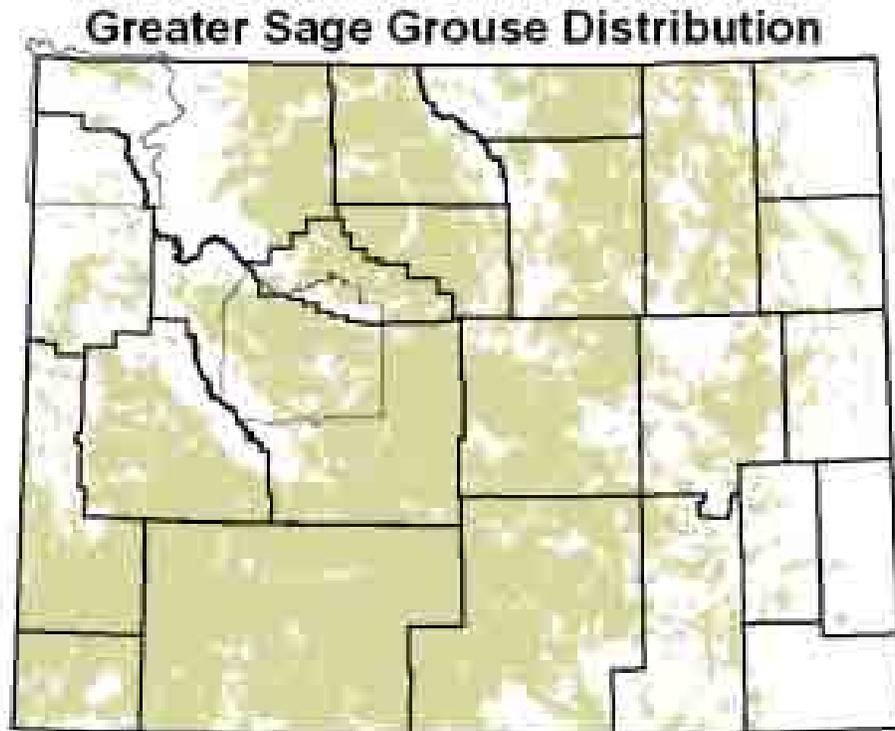
References and Additional Reading:

Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.

Wyoming Game and Fish Department, 2003. Wyoming Greater Sage Grouse Conservation Plan. Wyoming Game and Fish Department, Cheyenne WY. 98pp

Connelly, J.W., M. A. Schroeder, A.R. Sands and C.E. Braun. 2000. Guidelines to manage sage grouse populations and their habitats. Wildlife Society bulletin 28: 967-985.

Connelly, J.W., S. T. Knick, M. A. Schroeder, and S. J. Stiver. 2004. Conservation assessment of greater sage-grouse and sagebrush habitats. Unpublished Report, Western Association of Fish and Wildlife Agencies. Cheyenne, Wyoming. 610pp.



Greater Sandhill Crane (*Grus canadensis*)

Status: NSS3; NatureServe G5 S3B S5N

Abundance: Common

Introduction: Two populations of sandhill cranes are found in Wyoming, the Rocky Mountain Population (RMP) of greater sandhill cranes and the Mid-Continent Population (MCP) of sandhill cranes. Sandhill cranes can be found about anywhere in Wyoming during the spring, summer or fall. Although there is some overlap, cranes found in and west of Big Horn, Washakie, Natrona, and Carbon counties are identified as RMP greater sandhill cranes. Those cranes seen to the east of these counties are identified as from the MCP. Although we would like to encourage management to enhance crane production statewide, the remainder of this species page will focus on the RMP of greater sandhill cranes (*G. c. tabida*). The fall pre-migration survey done in September is used to track the status of this population. In 2003, 19,523 RMP cranes were recorded with 3,446 (17.7%) in Wyoming. The September staging groups in Wyoming could include birds from Idaho, Montana, Utah, Wyoming, and Yellowstone National Park. In Wyoming, RMP greater sandhill cranes are less common during the breeding season than during the fall migration. Sandhill cranes are considered a common summer resident. The Wyoming Game and Fish Department classifies the RMP of greater sandhill cranes as a Species of Special Concern with a Native Species Status of 3 (NSS3) because its breeding population is restricted in number and distribution, habitat is restricted and vulnerable but no recent or on-going significant loss, and the species is sensitive to human disturbance.

Habitat: This species exhibits high fidelity to its breeding sites. Typical nesting habitat occurs in river valleys, marshes, and wet meadows of western and central Wyoming, particularly in ranching country where human populations are low. Omnivorous, sandhill cranes feed on cultivated grains whenever possible, but also eat roots, tubers, seeds, berries, small vertebrates, and invertebrates. Occupies wet-moist meadow grasslands, sedge meadows, irrigated native and introduced meadows, and marshes. Necessary components of fall pre-migration staging habitat are grain or alfalfa fields in close proximity to roosting sites in shallow lakes, marshes, or river bottoms.

Problems:

- Seasonal habitats are impacted by housing and industrial developments, changing agricultural practices, oil and gas exploration and development, drought, flood control projects, and wetland drainage and degradation;
- Ongoing development in the Star Valley may impact preferred crane roost sites in the future;
- Hazards, such as transmission lines and even stock fences, contribute to annual mortality.
- Breeding populations disappear from areas of heavy human use;
- Crop depredation; and
- Breeding habitat is restricted in Wyoming and may be declining.

Conservation Actions:

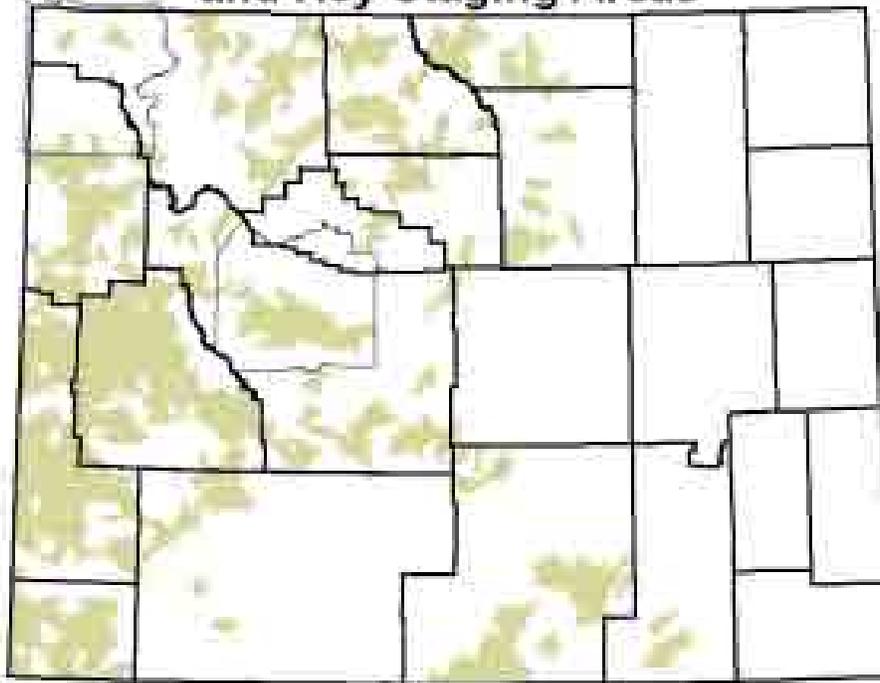
- Protect sufficient habitat on primary fall pre-migration staging areas, including roosting sites, loafing sites, and feeding areas to support 4,000 - 6,000 cranes;
- Provide sufficient grain croplands annually on the Ocean Lake WHMA to support 600-1,000 sandhill cranes in the pre-migration staging period (August 10-October 25);

- In cooperation with private landowners and the USFWS, develop a long-term strategy to protect and enhance wetlands on the lower Bear River and Salt River for crane production and staging, and continue to support development of Cokeville Meadows NWR;
- Utilize recreational hunting to regulate crane numbers and to minimize fall depredation to private croplands;
- Identify and survey additional potential breeding sites;
- Manage all current and traditional sandhill crane nesting sites to minimize the potential for degradation and conflicts with development;
- Manage sandhill crane nesting areas to minimize human disturbance during the breeding season;
- Maintain stable water levels throughout the nesting season in lakes where sandhill cranes are breeding;
- Maintain good water quality; and
- Document and prioritize historic and current breeding locations.

References and Additional Reading:

- Subcommittee on Rocky Mountain Greater Sandhill Cranes. 1997. Management plan of the Pacific and Central Flyways for the Rocky Mountain population of greater sandhill cranes. [Joint] Subcommittee, Rocky Mountain Population Greater Sandhill Cranes, Pacific Flyway Study Committee and Central Flyway Tech. Committee, [c/o USFWS/DMBM], Portland, Oregon. 74pp.
- Tacha, T. C. and C. E. Braun. 1994. Migratory shore and upland game bird management. eds. Allen Press. Lawrence, Kansas. 223 pp.
- Tacha, T.C., S.A. Nesbitt, and P.A. Vohs. 1992. Sandhill Crane. *In* The Birds of North America, No. 31 (A. Poole, P. Stettenheim, and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA; The American Ornithologists' Union, Washington, DC. 24pp.
- Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.

Greater Sandhill Crane Nesting and Key Staging Areas



Harlequin Duck (*Histrionicus histrionicus*)**Status: NSS3; NatureServe G4 S1B****Abundance:** Uncommon

Introduction: The Harlequin Duck breeds in Eurasia and two disjunct regions in North America. The Pacific population breeds from western Alaska south to Oregon, Idaho, and Wyoming; and the Atlantic population breeds from Greenland south to Newfoundland. The Harlequin Duck winters in Eurasia, the Aleutian Islands south to central California, and Labrador south to Maryland. In Wyoming, it is found only in the northwestern portion of the state. The Harlequin Duck is considered an uncommon summer resident in Wyoming. About 50 to 75 pairs are known breed in the state. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because breeding populations are restricted in numbers and distribution; nesting habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat; and it is sensitive to human disturbance.

Habitat: The Harlequin Duck prefers cold, shallow, rapid mountain streams away from concentrated human activities. It nests on the ground along streams with less than 5% gradient, dense shrubs lining the banks, braided channels, swift currents, abundant aquatic insects, and good water quality.

Problems:

- Occurs in extremely low densities in Wyoming;
- Although historical data on harlequins are lacking, the cutting and floating of railroad ties probably degraded harlequin habitat as nesting areas were logged, streams were dammed, and stored water was released suddenly during spring runoff;
- Extensive forest fires in 1988 may have increased sediment loads in streams and eliminated streamside cover in many drainages;
- Nesting success may be impacted by stream degradation as a result of sedimentation, channelization, logging, incompatible recreation, and incompatible livestock grazing;
- Productivity is lower in areas with heavy recreational use or other human disturbance; and
- The Harlequin Duck is difficult to inventory and its population status and trends are poorly known in Wyoming.

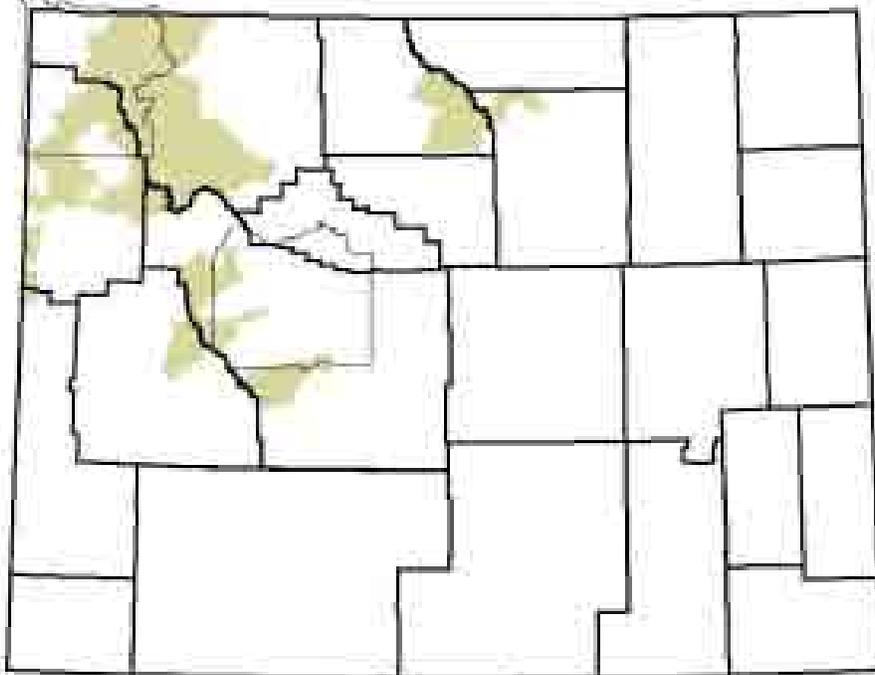
Conservation Actions:

- Continue inventory and monitoring efforts as described in Oakleaf and others (2003);
- Work cooperatively with the US Forest Service and National Park Service to develop monitoring and management schemes for Harlequin Ducks;
- Manage Harlequin Duck nesting areas to minimize the potential for degradation and conflicts with recreation, grazing, and forest management;
- Manage Harlequin Duck nesting areas to minimize human disturbance during the breeding season; and
- In areas where Harlequin Ducks nest, maintain high water quality and streams with high densities of invertebrates.

References and Additional Reading:

- Clark TW, Harvey AH, Dorn RD, Genter DL, Groves C, eds. 1989. Rare, sensitive, and threatened species of the Greater Yellowstone Ecosystem. Northern Rockies Conservation Cooperative, Montana Natural Heritage Program, The Nature Conservancy, and Mountain West Environmental Services. 153 p.
- Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.
- Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.
- Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.
- Oakleaf B, Patla S, Taylor K. 2003. Harlequin duck inventories and technique development. In: Cerovski AO, ed. Threatened, endangered, and nongame bird and mammal investigations. Wyoming Game and Fish Department. p 80-95.
- Robertson GJ, Goudie RI. 1999. Harlequin Duck (*Histrionicus histrionicus*). In: Poole A, Gill F, eds. The birds of North America. Nr 466. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.
- Wallen RL 1993. Status and distribution of Harlequin Ducks in Wyoming. Unpublished report.

Harlequin Duck Breeding Distribution



Juniper Titmouse (*Baeolophus ridgwayi*)

Status: NSS3; NatureServe G5 S1

Abundance: Uncommon

Introduction: The Juniper Titmouse is a year-round resident in western North America from southern Oregon west to Wyoming and south to Arizona, Sonora, and western Texas. In Wyoming, it occurs only in the southwestern portion of the state. The Juniper Titmouse is considered an uncommon resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in distribution, and habitat is restricted, although there is no ongoing significant loss of habitat.

Habitat: The Juniper Titmouse inhabits juniper woodlands and is rarely found far from juniper tree cover, but readily makes use of sagebrush and other shrubs interspersed among junipers. It requires old-growth woodlands with an open canopy and may prefer woodlands on south and west aspects that support more productive understories and higher herbaceous ground cover. It is a secondary cavity nester and requires either a natural cavity or one excavated by a woodpecker.

Problems:

- Population status and trends of the Juniper Titmouse are unknown in Wyoming;
- Suitable juniper woodland habitat is restricted to the extreme southwestern portion of the state; and
- Throughout much of the West, resource managers view juniper as an invasive species that should be controlled or replaced with more desirable habitats.

Conservation Actions:

- Determine statewide population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- Maintain large, old-growth stands of juniper woodlands with a mosaic of large trees and snags in areas where Juniper Titmouse occur; and
- Management of manipulation of juniper in southwestern Wyoming should not favor one of the juniper obligates to the detriment of others. Instead, management should be coordinated to provide a mosaic of juniper woodland conditions.

References and Additional Reading:

Cicero C. 2000. Oak Titmouse (*Baeolophus inornatus*) and Juniper Titmouse (*Baeolophus ridgwayi*). In: Poole A, Gill F, eds. The birds of North America. Nr 485. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Fitton S. 1989. Nongame species accounts: the Utah juniper obligates. Wyoming Game and Fish Department, Nongame Program. 52 p.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.



Lark Bunting (*Calamospiza melanocorys*)**Status: NSS4; NatureServe G5 S4B****Abundance:** Abundant

Introduction: The Lark Bunting breeds from southern Alberta and Manitoba south to New Mexico and Texas. It winters from central California, east to Kansas, and south to central Mexico. During summer, it occurs throughout Wyoming. The Lark Bunting is considered an abundant summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because populations are restricted in distribution, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The Lark Bunting primarily inhabits shortgrass and mixed-grass prairies, as well as disturbed grasslands, sagebrush-grassland and shrub-steppe habitats, mountain-foothill shrublands, and agricultural areas. It prefers grasslands of low to moderate height (60 cm [24 in] or less) with high (45%) vegetative cover and 10% to 15% bare ground, often with a shrub component in the overstory.

Problems: Since the 1800s, range contractions and population declines have occurred across the Lark Bunting's range. The causes of these declines have yet to be precisely identified.

Conservation Actions:

- Determine statewide population trends by implementing "Monitoring Wyoming's Birds: The Plan for Count-based Monitoring" (Leukering and others 2003);
- In areas where Lark Buntings nest, manage for large (at least 10 km² [4 mi²]) areas of grassland with a mosaic of short and tall grasses and forbs and bare ground; and
- Manage Lark Bunting foraging and nesting areas to minimize insecticide use and to minimize field operations that disturb nests.

References and Additional Reading:

Dechant JA, Sondreal ML, Johnson DH, Igl LD, Goldade CM, Zimmerman AL, Euliss BR. 2003. Effects of management practices on grassland birds: Lark Bunting. Jamestown (ND): Northern Prairie Wildlife Research Center. Online: <http://www.npwrc.usgs.gov/resource/literatr/grasbird/larb/larb.htm>.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Shane TG. 2000. Lark Bunting (*Calamospiza melanocorys*). In: Poole A, Gill F, eds. The birds of North America. Nr 542. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.



Lesser Scaup (*Aythya affinis*)

Status: NSS3; NatureServe G5 S3B S4N

Abundance: Uncommon

Introduction: The primary breeding range extends southeast from central Alaska to Hudson Bay and south to northern Wyoming and Central Minnesota. The species will occasionally breed as far south as northeastern California, Colorado, and Nebraska. In Wyoming, lesser scaup breed in south and western regions of the state. Winters from Mid-Atlantic States to the West Indies and Columbia and along the west coast from British Columbia to Mexico. The species is common across the state during fall and spring migration. Spring surveys indicate that the combined populations of greater and lesser scaup declined dramatically from 1984 through 2003. Most of the decline has been recorded in the western Canadian boreal forest. The combined populations are 27 percent below the long-term average. In Wyoming, lesser scaup are less common during the breeding season than during migration. The lesser scaup has low abundance in Wyoming and is considered an uncommon summer resident. The Wyoming Game and Fish Department (WGFD) classifies the lesser scaup as a Species of Special Concern with a Native Species Status of 3 (NSS3) because its breeding population is declining, habitat is restricted and vulnerable but no recent or on-going significant loss.

Habitat:

- Characterized as particularly demanding of specific environmental characteristics and as the least adaptable waterfowl species in relation to changes in reproductive habitat conditions;
- Omnivorous, although feeds primarily and at times almost exclusively, on aquatic invertebrates. Amphipods have been identified as the most important food for migrating and breeding scaup and for ducklings;
- Food availability is more limiting to the population than cover availability;
- Preferred breeding habitat are permanent, intermittently exposed, and semipermanent wetlands \geq 2 acres in size;
- Alkali wetlands are relatively poor for production due to the lack of vegetative cover along the shoreline;
- The primary brood habitat is permanent or semipermanent wetlands with emergent vegetation. However, broods tend to use expansive areas of open water for security and escape cover;
- Decreased water levels result in increased predation and decreased habitat quality due to intensified livestock grazing and encroachment of haying activities;
- Nest in uplands, usually close to the water's edge;
- Has a fairly wide breeding range in both forest and grassland habitats;
- Scaup are strongly philopatric to breeding, migration and wintering areas; and
- Select breeding sites near water bodies that harbor no fish.

Problems:

- Oil spills on wintering and migration areas and the bioaccumulation of agricultural and industrial pollutants in prey items may be contributing to population decline;
- Research indicates that females are losing body condition in the upper Midwest during the spring migration;
- Introduction of fish into previous fishless wetlands resulting in a reduction of amphipods;

- Adult female survival and productivity may be declining;
- Switch in diet dominated by zebra mussels (*Dreissena polymorpha*). This species is a bioaccumulator; and
- Great Lake female were found to have selenium levels above the level at which reproductive impairment could be expected.

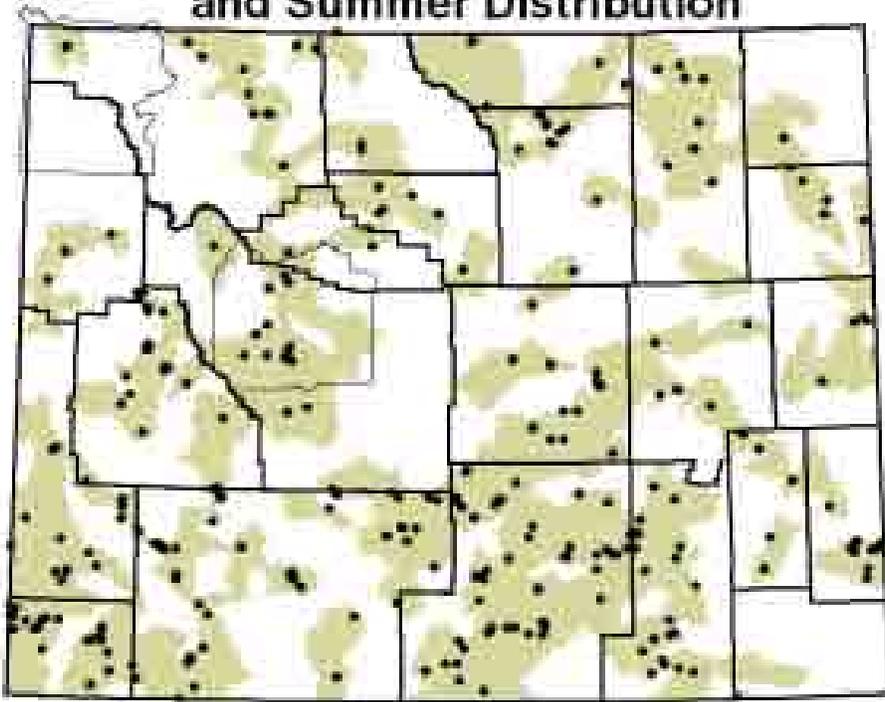
Conservation Actions:

- Protection and creation of islands;
- Do not introduce fish into fishless breeding and migratory areas;
- Manage all current and historic nesting and spring staging sites to minimize the potential for degradation and conflicts with development;
- Manage nesting areas to minimize human disturbance during the breeding season;
- Maintain good water quality;
- Document and prioritize historic and current breeding locations; and
- Identify potential breeding and spring staging sites that may become attractive to female lesser scaup following habitat management.

References and Additional Reading:

- Allen, A.W. 1986. Habitat suitability index models: Lesser scaup (breeding). U.S. Fish and Wildlife Services. Biol. Rep. 82(10.117). 16 pp.
- Allen, G.T, D. F. Caithamer, and M. Otto. 1999. A review of the status of greater and lesser scaup in North America. U.S. Fish & Wildlife. Servs., Arlington, Virginia. 45pp.
- Anteau, M.J. and A. D. Alton. 2001. Nutrient-reserve dynamics of lesser scaup (*Aythya affinis*) during spring migration in the Mississippi Flyway. Progress Rep. Louisiana State University, Baton Rouge. 12 pp.
- Johnsgard, P.A. 1975. Waterfowl of North America. Indiana Univ. Press, Bloomington. 575 pp.
- Petrie, S. undated. High selenium burdens found in adult female lesser and greater scaup collected on the lower Great Lakes. Bird Studies Canada, Port Rowan. 5pp.
- Todd, F. S. 1979. Waterfowl - Ducks, geese & swans of the world. Harcourt Brace Jovanovich, New York, New York. 399 pp.
- USFWS. 2004. Waterfowl population status, 2004. U.S. Dept. of Interior, Washington, D.C. 53 pp.
- Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.
- USGS. 1998. Declines of greater and lesser scaup populations: issues, hypotheses, and research directions. Summary report of the scaup workshop. September 1998, Jamestown, N.D. 28 pp.

Lesser Scaup Breeding and Summer Distribution



Lewis's Woodpecker (*Melanerpes lewis*)**Status: NSS3; NatureServe G4 S2****Abundance:** Uncommon

Introduction: The Lewis's Woodpecker breeds locally from southern British Columbia and Alberta south to south-central California and New Mexico. It winters from central Colorado south to northern and western Mexico. It is scattered throughout Wyoming, although it is very localized in suitable habitat. The Lewis's Woodpecker is considered an uncommon summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because its breeding populations are restricted in distribution and its nesting habitat is restricted, although there is no ongoing significant loss of habitat.

Habitat: The Lewis's Woodpecker inhabits open country with scattered trees, usually below 2700 m (9000 ft). Open or park-like ponderosa pine forests are probably its major breeding habitat. It is attracted to burned-out stands of Douglas-fir, mixed conifer, juniper, and riparian and oak woodlands, but is also found in deciduous forests, especially riparian cottonwoods. It excavates a cavity nest in a live or dead tree or tall stump with an average diameter at breast height of 38 cm (15 in).

Problems:

- The population status and trends of Lewis's Woodpeckers in Wyoming are largely unknown. The Breeding Bird Survey does not adequately census this species because of a lack of routes in preferred Lewis's Woodpecker habitat;
- Concentrations of this species occur in only a few areas in Wyoming;
- Populations using riparian woodlands in arid and semiarid areas may be impacted by the loss and degradation of these habitats; and
- Populations decline with fire suppression in ponderosa pine and Douglas-fir stands.

Conservation Actions:

- Determine statewide population trends by implementing "Monitoring Wyoming's Birds: The Plan for Count-based Monitoring" (Leukering and others 2003);
- Work cooperatively with other agencies to conduct surveys and manage habitat for Lewis's Woodpeckers; and
- Maintain open, park-like stands of cottonwood riparian and low elevation forests with large snags (at least 38 cm [15 in] diameter at breast height at a density of at least 1 snag per 4 ha [10 ac]), mature trees, shrubby understory, and a productive insect fauna.

References and Additional Reading:

Abele SC, Saab VA, Garton EO. 2004. Lewis's Woodpecker (*Melanerpes lewis*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. Online: <http://www.fs.fed.us/r2/projects/scp/assessments/lewisswoodpecker.pdf>.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Linder KA, Anderson SH. 1998. Nesting habitat of Lewis' Woodpeckers in southeastern Wyoming. J Field Ornithol 69(1):109-116.

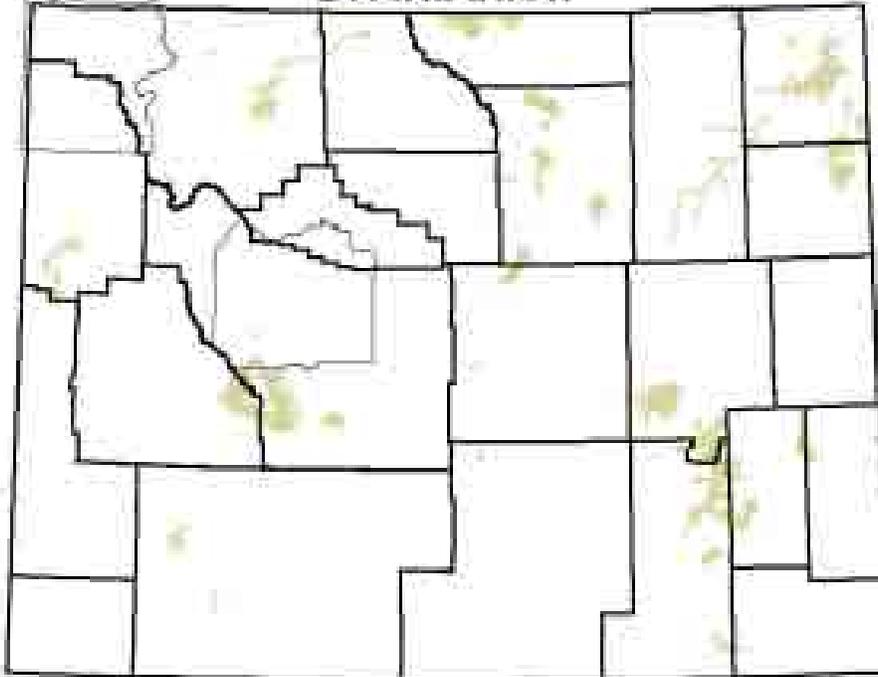
Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Paige C, Koenen M, Mehlman DW. 1999e. Lewis's Woodpecker (*Melanerpes lewis*): species management abstract. The Nature Conservancy. Online: www.conserveonline.org.

Tobalske BW. 1997. Lewis' Woodpecker (*Melanerpes lewis*). In: Poole A, Gill F, eds. The birds of North America. Nr 284. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Lewis's Woodpecker Breeding Distribution



Long-billed Curlew (*Numenius americanus*)**Status: NSS3; NatureServe G5 S3B****Abundance:** Uncommon

Introduction: The Long-billed Curlew breeds in southern Canada south into portions of most of the western US. It winters in California, Arizona, Mexico, Texas, Louisiana, and South Carolina. It occurs and breeds throughout a majority of Wyoming. The Long-billed Curlew is considered an uncommon summer resident in Wyoming. Only those populations near Pinedale, Cody, and Lusk can be considered locally common. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because breeding populations are restricted in distribution, and because its nesting habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The Long-billed Curlew inhabits a variety of grassland types ranging from moist meadow grasslands to agricultural areas to dry prairie uplands, usually near water. It prefers a complex of shortgrass prairies, agricultural fields, wet and dry meadows and prairies, and grazed mixed-grass and scrub communities. It nests on the ground in habitat that usually includes: grass less than 30 cm (12 in) high; bare ground; shade; abundant invertebrate prey; and a minimum of 40 ha (100 ac) of suitable habitat.

Problems:

- Long-billed Curlew populations were impacted by uncontrolled hunting in the late 1800s and early 1900s, widespread conversion of native shortgrass prairie to agricultural fields up to the 1930s, and organochlorine pesticides;
- A variety of anthropogenic and other natural habitat disturbances have prevented recovery in many areas;
- Long-billed Curlew populations in eastern Wyoming may be declining significantly. However, curlew breeding habitat characteristics have not been quantified and evaluated in eastern Wyoming, precluding adequate monitoring and management; and
- Curlew populations in Wyoming are not adequately sampled by existing Breeding Bird Survey routes.

Conservation Actions:

- Continue to conduct annual Long-billed Curlew surveys, in addition to the Breeding Bird Survey, to determine population trends;
- Evaluate potential curlew habitat in eastern Wyoming to determine suitability, quantity, location, land ownership, and land use and expand surveying efforts into these areas;
- Develop and maintain a positive relationship with landowners on whose property Long-billed Curlews nest. Educate and cultivate a feeling of participation in landowners to promote beneficial land use practices and management for Long-billed Curlews on private land;
- Conserve grassland habitats by minimizing the conversion of native prairie to croplands, urban development, and exotic plants;
- Encourage landowners to avoid potentially negative impacts to Long-billed Curlew nesting areas through the use of financial incentives;
- Use rotational burning, mowing, and grazing as tools to create and maintain vegetative diversity and a mosaic of early and late successional stages and open ground within grasslands, meadows, and prairies; and

- Manage Long-billed Curlew nesting areas to minimize conflicts with oil, gas, and recreational activities during the breeding season (April through July).

References and Additional Reading:

Cochran JF. 1983. Long-billed curlew habitat and land-use relationships in western Wyoming. MSc thesis. Laramie: Univ Wyoming. 136 p.

Cochran JF, Anderson SH. 1987. Comparison of habitat attributes at sites of stable and declining Long-billed Curlew populations. *Great Basin Nat* 47:459-66

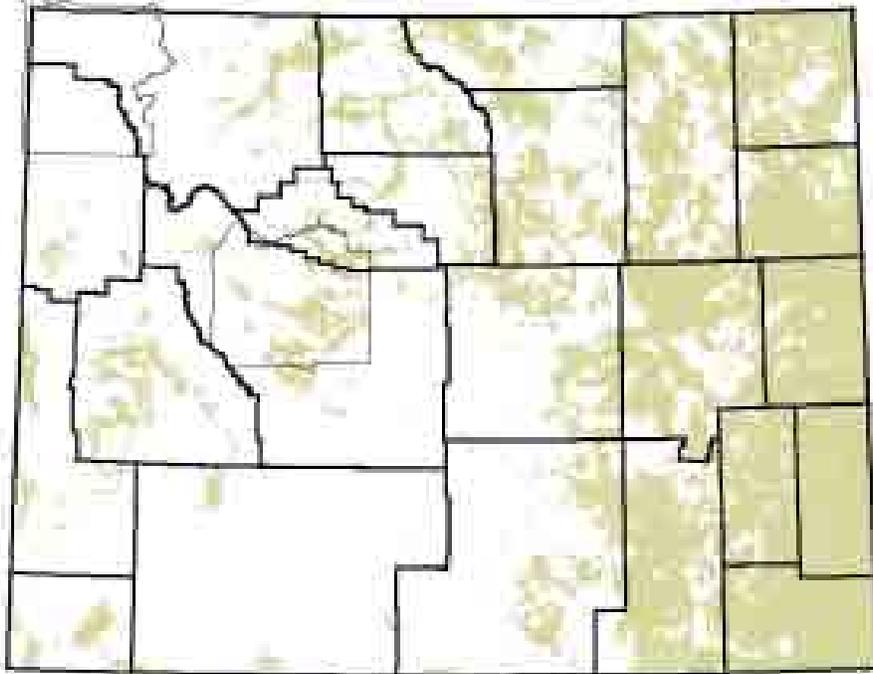
Dechant JA, Sondreal ML, Johnson DH, Igl LD, Goldade CM, Rabie PA, Euliss BR. 2003g. Effects of management practices on grassland birds: Long-billed Curlew. Jamestown (ND): Northern Prairie Wildlife Research Center. Online:
<http://www.npwrc.usgs.gov/resource/literatr/grasbird/fplbcu/fplbcu.htm>.

Dugger BD, Dugger KM. 2002. Long-billed Curlew (*Numenius americanus*). In: Poole A, Gill F, eds. *The birds of North America*. Nr 628. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online:
www.blm.gov/wildlife/plan/WY/menu.htm.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Long-billed Curlew Breeding Distribution



McCown's Longspur (*Calcarius mccownii*)

Status: NSS4; NatureServe G4 S2

Abundance: Common

Introduction: The McCown's Longspur breeds from southern Alberta and Saskatchewan south to north-central Colorado and western Nebraska. It winters from western Oklahoma to southeastern Arizona and south to northern Mexico. It occurs across most of Wyoming, except for the western edge of the state. The McCown's Longspur is considered a common summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because populations are restricted in distribution, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The McCown's Longspur is found in open, dry, sparsely vegetated areas. It prefers shortgrass prairie and basin-prairie shrubland habitats, and also inhabits plowed and stubble fields, grazed pastures, dry lakebeds, and other sparse, bare, dry ground. It prefers 45% to 80% grass cover and 15% to 25% bare ground.

Problems: This species is impacted by the loss of breeding and wintering habitat as a result of fire suppression and conversion of prairie habitat to cropland and urbanization.

Conservation Actions:

- Determine statewide population trends by implementing "Monitoring Wyoming's Birds: The Plan for Count-based Monitoring" (Leukering and others 2003);
- Manage McCown's Longspur nesting areas and shortgrass prairie habitat to minimize the potential for degradation and conflicts with development;
- In areas where McCown's Longspurs nest, manage for short, sparsely-vegetated native grasslands with low forb cover and a bare ground component; and
- Use prescribed burning in late summer or early fall to restore the early seral stage of McCown's Longspur nesting areas and reduce shrub density and structure.

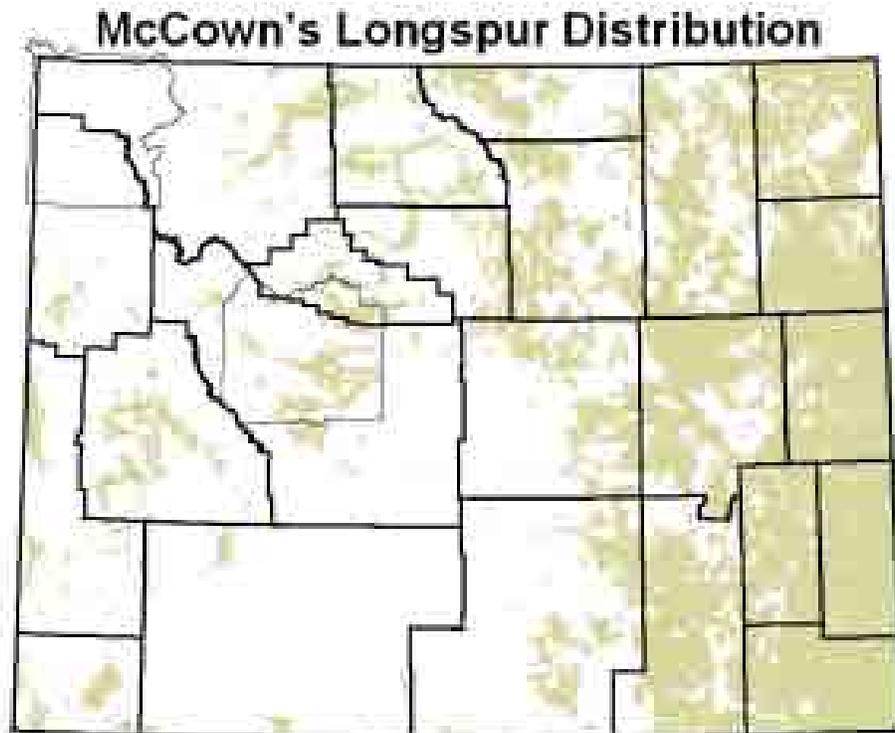
References and Additional Reading:

Dechant JA, Sondreal ML, Johnson DH, Igl LD, Goldade CM, Rabie PA, Euliss BR. 2003. Effects of management practices on grassland birds: McCown's Longspur. Jamestown (ND): Northern Prairie Wildlife Research Center. Online: <http://www.npwr.usgs.gov/resource/literatr/grasbird/mclo/mclo.htm>.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

With KA. 1994. McCown's Longspur (*Calcarius mccownii*). In: Poole A, Gill F, eds. The birds of North America. Nr 96. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.



Merlin (*Falco columbarius*)

Status: NSS3; NatureServe G5 S4

Abundance: Uncommon

Introduction: The Merlin inhabits Eurasia and North America, from the northern tree limit south in North America to Washington, Oregon, Montana, Idaho, Wyoming, and the western borders of North and South Dakota. The North American population winters from British Columbia and western and southern United States south to Venezuela and Peru. It is a year-round resident in Wyoming and is found scattered throughout the state. The Merlin is considered an uncommon resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because its populations are restricted in numbers; its habitat is restricted, although there is no ongoing significant loss of habitat; and it is sensitive to human disturbance.

Habitat: The Merlin occurs in most habitats below 2600 m (8500 ft), primarily open woodlands, savannah, grasslands, and shrub-steppe. In recent decades some individuals have expanded into cities and towns. It nests in large trees (most commonly in ponderosa pines), usually in old domed magpie nests, in open woodlands within a short distance of open sagebrush-grassland for foraging. It tends to select nesting sites that combine the attributes of easy access, a good view of the surrounding area, and maximum concealment of the nest.

Problems:

- Population status of the Merlin is unknown in Wyoming;
- Difficult to survey because of low nest site fidelity and the short time frame in which successful statewide surveys can be conducted in potential nesting habitat. Breeding Bird Survey data are inadequate to determine population trends;
- Legal harvest of Merlins by licensed falconers is allowed in Wyoming, but population data are needed to justify harvest quotas;
- Conversion of sagebrush-grassland to cropland greatly lowers the quality of foraging habitat; and
- Populations were impacted by organochlorine pesticides in the 1950s and 1960s. Pesticide contamination continues to be a concern in this region, as some individuals may still be impacted, although at present it does not appear to be a major factor controlling population size.

Conservation Actions:

- Conduct an intensive survey effort to locate nesting Merlins in Wyoming and determine a reliable statewide population estimate;
- Determine statewide population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- In areas where Merlins occur, maintain open stands of mature low elevation conifer and cottonwood in a matrix with open sagebrush and grasslands; and
- In areas where Merlins occur, use pesticides carefully, and only if absolutely necessary.

References and Additional Reading:

Clark TW, Harvey AH, Dorn RD, Genter DL, Groves C, eds. 1989. Rare, sensitive, and threatened species of the Greater Yellowstone Ecosystem. Northern Rockies

Conservation Cooperative, Montana Natural Heritage Program, The Nature Conservancy, and Mountain West Environmental Services. 153 p.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

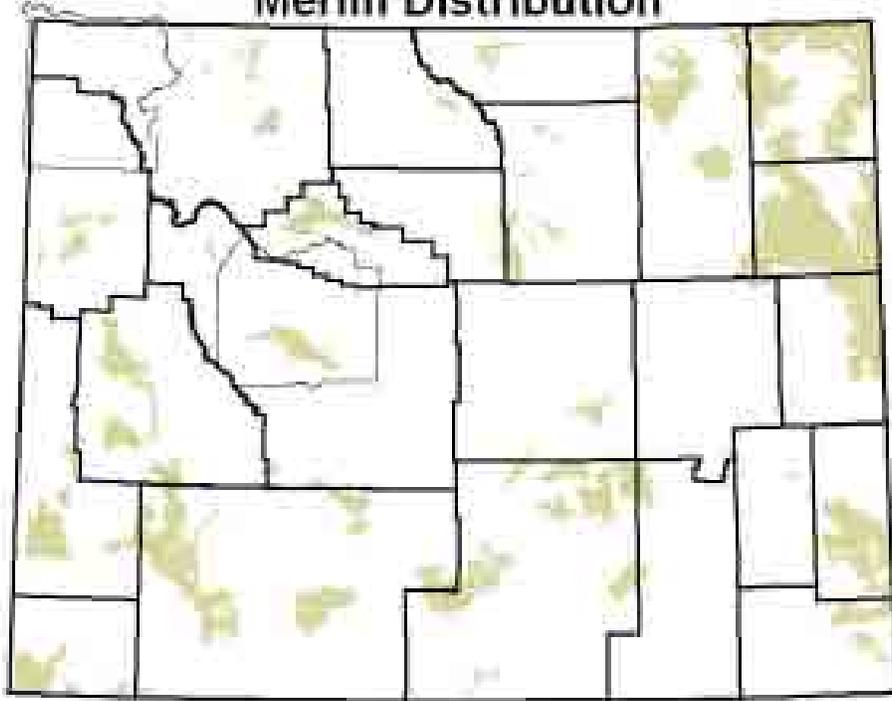
Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Sieg CH, Becker DM. 1990. Nest-site habitat selected by Merlins in southeastern Montana. Condor 92(3):688-94.

Sodhi NS, Oliphant LW, James PC, Warkentin IG. 1993. Merlin (*Falco columbarius*). In: Poole A, Gill F, eds. The birds of North America. Nr 44. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Stephens RM, Anderson SH. 2002. Conservation assessment for the Merlin in the Black Hills National Forest, South Dakota and Wyoming. Custer (SD): USDA Forest Service, Black Hills National Forest. 25 p. Online: <http://www.fs.fed.us/r2/blackhills/projects/planning/assessments/merlin.pdf>.

Merlin Distribution



Mountain Plover (*Charadrius montanus*)**Status: NSS4; NatureServe G2 S2****Abundance:** Common

Introduction: The Mountain Plover nests locally in the western Great Plains from Montana south to New Mexico, in Utah, and in Mexico. It winters in a broad band from Texas west and north to the Central Valley of California. It occurs and breeds throughout most of Wyoming. The Mountain Plover is considered a common summer resident in Wyoming, with a statewide population of approximately 3400 (range 2270 to 4430). The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because its population status and trends are unknown, although they are suspected to be stable; because its habitat is vulnerable, although there is no ongoing significant loss of habitat; and because it is sensitive to human disturbance.

Habitat: The Mountain Plover inhabits low, open habitats such as arid shortgrass and mixed-grass prairies dominated by blue grama and buffalo grass with scattered clumps of cacti and forbs, and saltbush habitats of the shrub-steppe of central and western Wyoming. It prefers to nest in large, flat grassland expanses with sparse, short vegetation (10 cm [4 in] or less), and bare ground. It is adapted to areas that have been disturbed by prairie dogs, heavy grazing, or fire.

Problems:

- Population trends are not well documented, but the species winters in areas (such as southern California) that have experienced intensive conversion of native grasslands to cropland and urbanization;
- A narrow range of habitat requirements combined with a high degree of site fidelity increases its vulnerability to impacts at traditional breeding sites; and
- Crucial breeding areas for Mountain Plovers in Wyoming are only partially identified, so management efforts and habitat maintenance may not be adequate.

Conservation Actions:

- Determine statewide population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003). Implement monitoring in suitable habitat where it is presently not being conducted, and continue monitoring in areas where it is currently in place;
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area;
- Work with private landowners to conserve grassland habitat by providing financial incentives, assistance, and evaluations of management activities;
- Maintain prairie dog colonies where Mountain Plovers are present via conservation easements and voluntary agreements with landowners, and habitat management plans with land managers;
- Manage Mountain Plover nesting areas to minimize the potential for degradation and conflicts with development;

- On a landscape scale, maintain portions of grassland habitat in low structure, an early seral stage, and with some bare ground in a mosaic that is well distributed throughout the habitat. In areas where Mountain Plovers occur, maintain blocks of habitat (at least 20 ha [50 ac] in size) consisting of bare ground and up to 70% short, sparse vegetation on nearly level terrain;
- Manage Mountain Plover nesting areas to minimize insecticide use and human disturbance during the breeding season (early April to mid July); and
- Use prescribed burning in late summer or early fall and rotational grazing to promote vegetation and habitat characteristics required by Mountain Plovers.

References and Additional Reading:

Dechant JA, Sondreal ML, Johnson DH, Igl LD, Goldade CM, Nenneman MP, Euliss BR.

2003e. Effects of management practices on grassland birds: Mountain Plover. Jamestown (ND): Northern Prairie Wildlife Research Center. Online:

<http://www.npwrc.usgs.gov/resource/literatr/grasbird/mtnplove/mtnplove.htm>.

Dinsmore SJ. 2003. Mountain Plover (*Charadrius montanus*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. Online:

<http://www.fs.fed.us/r2/projects/scp/assessments/mountainplover.pdf>.

Knopf FL. 1996. Mountain Plover (*Charadrius montanus*). In: Poole A, Gill F, eds. The birds of North America. Nr 211. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

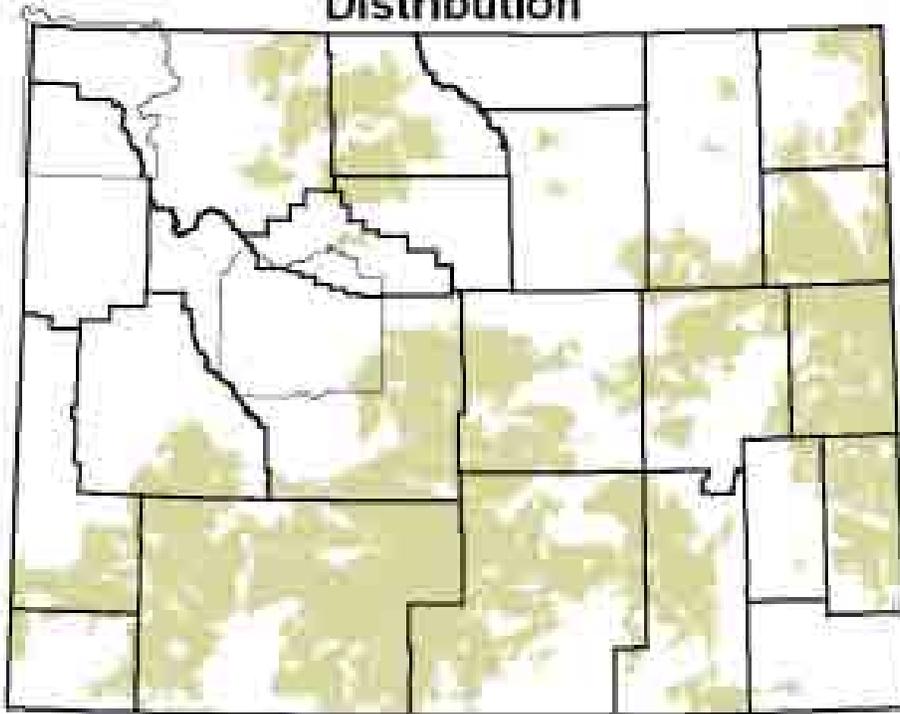
Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Plumb RE. 2004. Minimum population size and concentration areas of Mountain Plovers breeding in Wyoming. MSc thesis. Laramie: Univ Wyoming.

Stephens R. Draft Wyoming Grasslands Conservation Plan. Wyoming Game and Fish Department, Nongame Program. Forthcoming.

Mountain Plover Breeding Distribution



Abundance: Common

Introduction: The Northern Goshawk inhabits both North America and Eurasia. In North America, it breeds from Alaska, east to Newfoundland, and south to the southern Rocky Mountains and the Appalachians. It also occurs locally in the highlands of Mexico. It winters throughout its breeding range and irregularly southward. It is a year-round resident in Wyoming, and is found across most of the state. The Northern Goshawk is considered a common resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because its population status and trends are unknown, although they are expected to be stable; because its habitat is vulnerable, although there is no ongoing significant loss of habitat; and because it is sensitive to human disturbance.

Habitat: The Northern Goshawk inhabits mixed coniferous forest habitat, and makes use of a wide variety of forest ages, structural conditions, and successional stages. The nesting area (about 12 ha [30 ac]) is usually in a mature forest stand that has a multilayered canopy with open understory, small openings, and water within 0.4 km (¼ mi). Nest stands are often on slopes with northerly exposures or in drainages or canyon bottoms protected by such slopes. The post-fledging family area (about 170 ha [420 ac]) is a mosaic of forest types that provide hiding cover for the fledglings and habitat for abundant prey. The foraging area (about 2160 ha [5400 ac]) may include a variety of forest types and structures, but most often consists of forests with a high density of large trees, high canopy closure, high basal area, and relatively open understories, interspersed with shrublands and openings with perching trees to observe prey. Winter habitat is poorly understood, but probably includes a variety of vegetation types, such as forests, woodlands, shrublands, and forested riparian strips.

Problems:

- The population status and trends of Northern Goshawks in Wyoming are largely unknown. The Breeding Bird Survey does not adequately census this species;
- Incompatible timber harvesting techniques may remove suitable nest stands and degrade habitat by reducing stand density and canopy cover;
- Fire suppression, catastrophic fires, loss of vegetative cover, and insect and tree disease outbreaks can result in the deterioration or loss of nesting habitat; and
- Human disturbances (such as timber harvesting) may cause nest abandonment.

Conservation Actions:

- Determine statewide population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- Work cooperatively with other agencies to conduct surveys and manage habitat for Northern Goshawks. Identify and manage large, landscape-level units that provide the necessary habitat attributes for nesting areas, post-fledging family areas, and foraging areas;
- Develop a cooperative, statewide, interagency/non-governmental organization database of Northern Goshawk nest sites, with data sensitivity built in;

- In areas where Northern Goshawks occur, maintain forest stands of at least 20 ha (50 ac) with at least 70% canopy closure, trees at least 20 cm (8 in) in diameter at breast height, abundant snags, an aspen component, adjacent shrub/grass communities, and at least 20% old-growth in the home range; and
- Manage Northern Goshawk nesting areas to minimize human disturbance during the breeding season and avoid conflicts with timber harvesting.

References and Additional Reading:

Graham RT, Rodriguez RL, Paulin KM, Player RL, Heap AP, Williams R. 1999. The Northern Goshawk in Utah: habitat assessment and management recommendations. Gen Tech Rep RMRS-GTR-22. Fort Collins (CO): USDA Forest Service, Rocky Mountain Research Station. Online: http://www.fs.fed.us/rm/pubs/rmrs_gtr022.html.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Pails J, Soule J, Hammer son G, Mehlman DW, Koenen M. 1999. Northern Goshawk (*Accipiter gentiles*): species management abstract. The Nature Conservancy. Online: www.conserveonline.org.

Reynolds RT, Graham RT, Raiser MH, Bassett RL, Kennedy PL, Boyce DA, Goodwin G, Smith R, Fisher EL. 1992. Management recommendations for the Northern Goshawk in the southwestern United States. Gen Tech Rep RM-217. Fort Collins (CO): USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. 90 p. Online: http://www.fs.fed.us/rm/pubs_rm/rm_gtr217.html.

Squires JR, Reynolds RT. 1997. Northern Goshawk (*Accipiter gentilis*). In: Poole A, Gill F, eds. The birds of North America. Nr 298. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Squires JR, Ruggiero LF. 1996. Nest-site preference of Northern Goshawks in south-central Wyoming. J Wildl Manage 60:170-7.

Northern Goshawk Breeding Distribution



Northern Pintail (*Anas acuta*)

Status: NSS3; NatureServe G4 N5B, N5N

Abundance: common

Introduction: The Northern Pintail nests on the ground in good vegetative cover, often far from water. Although new pair bonds are formed each winter, these birds are promiscuous during the nesting season. Females incubate the eggs, which all hatch within 24 hours of one another. Ducklings fledge by July or August. A dabbling duck, it feeds mostly on vegetation, including seeds, grains and green plants, as well as on aquatic invertebrates. The Northern Pintail is one of the first duck species to migrate south in the fall, starting in early August. It returns to its breeding grounds in early April.

Habitat: Northern Pintails can be found in marshes and lakes below 8,000 feet in elevation. It nests mainly in Alaska and the Prairie Pothole Region of southern Canada and the northern Great Plains. Favored breeding sites are shallow ephemeral to semi-permanent wetlands with emergent vegetation and low upland cover interspersed throughout prairie grasslands.

Problems:

- Loss of breeding habitat in the prairies may account for declines of upland-nesting prairie populations.

Conservation Actions:

- Document and prioritize historic and current breeding locations;
- Identify potential breeding sites that may become attractive to female canvasbacks following habitat management;
- Management for Northern Pintails should focus on wetland complexes;
- Insure that wetlands protection laws are enforced;
- Work with agricultural interests to minimize loss of water in important breeding areas to irrigation demands and destruction of emergent vegetation around marsh edges;
- Manage all current and historic nesting and brood rearing habitat to minimize the potential for degradation and conflicts with development; and
- Maintain good water quality.

References and Additional Reading:

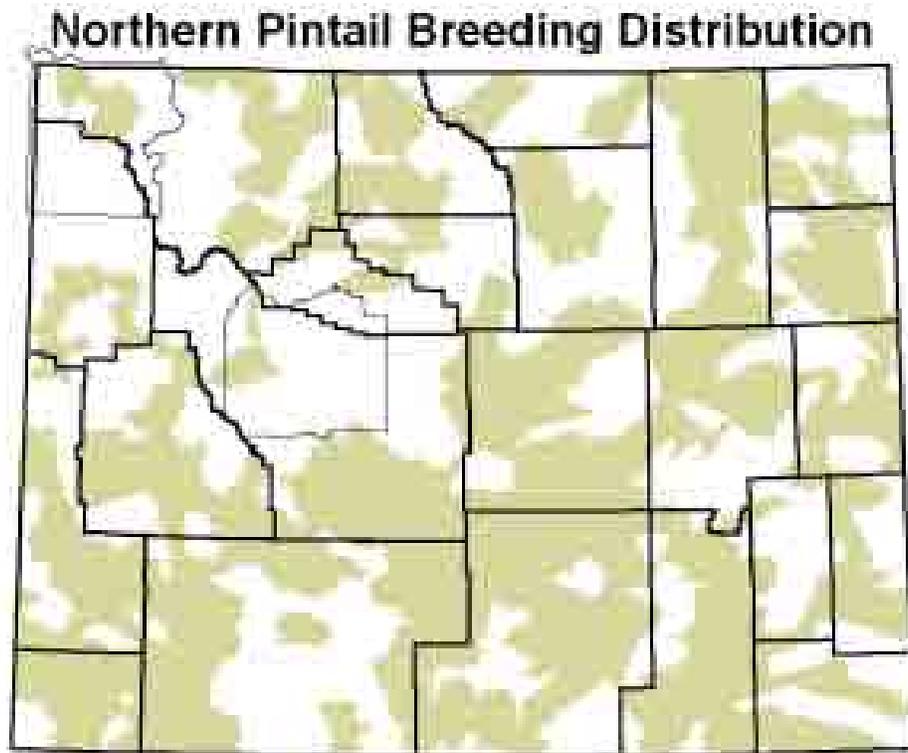
Austin, J.E., and M.R. Miller. 1995. Northern Pintail (*Anas acuta*). In *The Birds of North America*, No. 163 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA; The American Ornithologists' Union, Washington, DC. 32pp.

Barker, W.T., et al. 1990. Effects of specialized grazing systems on waterfowl production in southcentral North Dakota. *Trans. 55th North American Wildl. & Nat. Res. Conf.*, pp. 462-474.

Marcy, L.E. 1986. Waterfowl nest baskets. Section 5.1.3, US Army Corps of Engineers Wildlife Resources Management Manual. Tech. Rep. EL-86-15. Waterways Expt. Station, Vicksburg, Mississippi. 16pp.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: May 8, 2004).

Wyoming Game and Fish Department. 1999. Atlas of birds, mammals, reptiles, and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne, WY. 189pp.



Northern Pygmy-Owl (*Glaucidium gnoma*)

Status: NSS4; NatureServe G5 S2

Abundance: Unknown

Introduction: The Northern Pygmy-Owl inhabits British Columbia, south through the western US and Mexico to Guatemala, and east to Colorado and western Texas. It winters mainly in its breeding range. It is a year-round resident in Wyoming, and is scattered throughout the mountainous areas of the state. The abundance of the Northern Pygmy-Owl is unknown in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because its population status and trends are unknown, although they are expected to be stable, and because its habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The Northern Pygmy-Owl inhabits forests or open woodlands in foothills and mountains, including pure and mixed coniferous forest, riparian woodlands, and aspen stands. It forages in meadows and other openings, and is not usually found in unbroken dense forest. It nests in abandoned woodpecker holes and natural tree cavities.

Problems:

- The population status and trends of Northern Pygmy-Owls in Wyoming are largely unknown;
- The natural history, biology, and habitat needs of this species are poorly known; and
- May be impacted by timber harvesting practices that remove older trees and snags, affect foraging habitat, or reduce avian prey or primary cavity excavator (woodpecker) populations.

Conservation Actions:

- Determine statewide population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- Work cooperatively with other agencies to conduct surveys and manage habitat for Northern Pygmy-Owls; and
- Define and maintain suitable forest habitat for Northern Pygmy-Owls and avoid conflicts with timber harvesting.

References and Additional Reading:

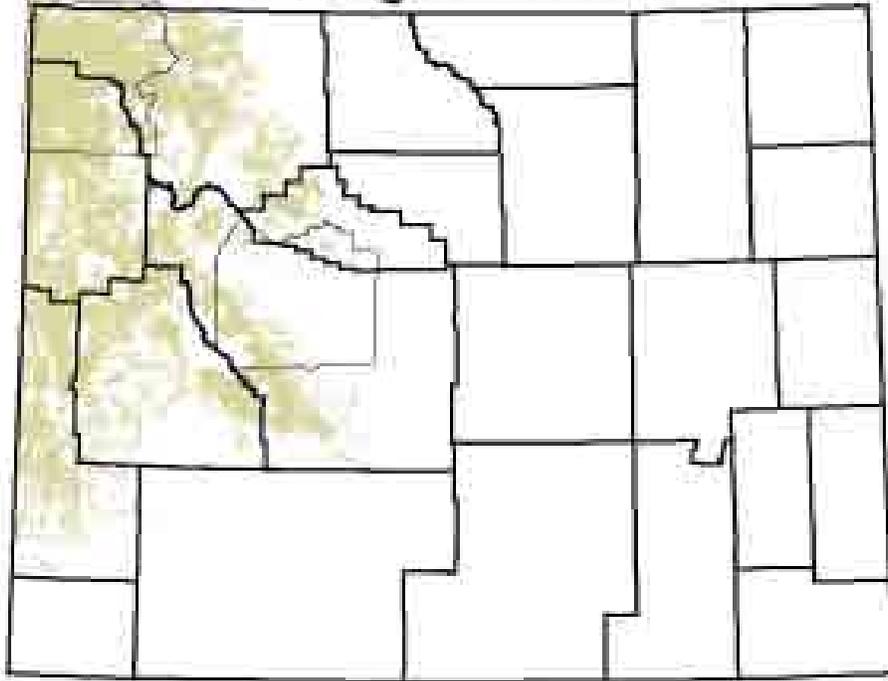
Cerovski AO, Grenier M, Oakleaf B, Van Fleet L, Patla S. 2004. Atlas of birds, mammals, amphibians, and reptiles in Wyoming. Lander: Wyoming Game and Fish Department, Nongame Program. 206 p.

Holt DW, Peterson JL. 2000. Northern Pygmy-Owl (*Glaucidium gnoma*). In: Poole A, Gill F, eds. The birds of North America. Nr 494. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming’s birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

NatureServe. 2004. NatureServe explorer: an online encyclopedia of life. Version 1.8. Arlington (VA): NatureServe. Online <http://www.natureserve.org/explorer>.

Northern Pygmy Owl Breeding Distribution



Peregrine Falcon (*Falco peregrinus*)

Status: NSS3; NatureServe G4 S1B S3N

Abundance: Rare

Introduction: The Peregrine Falcon is cosmopolitan and breeds on every continent except Antarctica. It is found scattered throughout most of Wyoming, but breeds mostly in the western half of the state. Some individuals are year-round residents in Wyoming, while others winter south to Mexico. The Peregrine Falcon is considered a rare resident in Wyoming. The species suffered severe population declines and was extirpated from much of its range because of widespread use of pesticides, especially DDT, that caused extensive eggshell thinning and reproductive failure. By the late 1970s, viable breeding populations no longer existed in Wyoming. In 1972 the use of many pesticides, including DDT, was limited by federal legislation, and in 1980 the Wyoming Game and Fish Department formed a partnership with The Peregrine Fund, Inc., and began a 15-year cooperative reintroduction effort. Since 1984, Wyoming's nesting population has increased by about 35% every year, and more than 60 pairs nested in the state in 2002. The WGFD classifies the Peregrine Falcon as a Species of Special Concern with a Native Species Status of 3 (NSS3) because its populations are restricted in distribution; its habitat is restricted, although there is no ongoing significant loss of habitat; and it is sensitive to human disturbance.

Habitat: The Peregrine Falcon preys on smaller birds and forages in a variety of open habitats from open woodlands and forests to shrub-steppe, grasslands, marshes, and riparian habitats. It nests cliffs that are usually proximate to habitats with abundant prey.

Problems:

- The development and use of new chemicals along with growing pollution could increase environmental contamination and again threaten production and nesting populations; and
- Increasing numbers and distribution of peregrines in Wyoming mean a dramatic increase in survey efforts to continue adequate documentation of the population increase, but funding is increasingly inadequate to monitor peregrine populations.

Conservation Actions:

- Continue to conduct annual monitoring surveys of peregrine nests to determine territory occupancy, nest success, and productivity;
- Maintain more than 70 nesting pairs and fledge more than 100 juveniles annually in Wyoming; and
- Maintain cliffs with minimal disturbance and open habitats for peregrines to use for nesting and foraging.

References and Additional Reading:

Cade TJ, Enderson JH, Thelander CG, White CM, eds. 1988. Peregrine Falcon populations: their management and recovery. Boise (ID): The Peregrine Fund.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Oakleaf B, Craig GR. 2003. Peregrine restoration from a state biologist's perspective. In: Cade TJ, Burnham W, Burnham P. Return of the peregrine. The Peregrine Fund. p 297-311.

US Fish and Wildlife Service. 1984. American Peregrine Falcon recovery plan (Rocky Mountain/Southwest population). Prepared in cooperation with the American Peregrine Falcon Recovery Team. Denver: US Fish and Wildlife Service. 105 p.

US Fish and Wildlife Service. 2003. Monitoring plan for the American Peregrine Falcon, a species recovered under the Endangered Species Act. Portland (OR): US Fish and Wildlife Service, Pacific Region. 53 p. Online:
<http://endangered.fws.gov/recovery/peregrine/plan2003.pdf>.

White CM, Clum NJ, Cade TJ, Hunt WG. 2002. Peregrine Falcon (*Falco peregrinus*). In: Poole A, Gill F, eds. The birds of North America. Nr 660. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.



Pygmy Nuthatch (*Sitta pygmaea*)

Status: NSS4, NatureServe G5 S2

Abundance: Uncommon

Introduction: The Pygmy Nuthatch is patchily distributed from south-central British Columbia and the mountains of the western US to central Mexico. It is a year-round resident throughout its range, including Wyoming, although it may move to lower elevations during winter. It is scattered throughout most of Wyoming, although it primarily occurs in the ponderosa pine forests of eastern Wyoming. The Pygmy Nuthatch is considered an uncommon resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because its population status and trends are unknown, although they are expected to be stable, and because its habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The Pygmy Nuthatch is considered a pine specialist; it is restricted mainly to ponderosa pine forests, although it also occurs in other coniferous habitats. It prefers mature to old-growth stands that are fairly open (less than 70% canopy cover), with a component of vigorous trees of intermediate age. It excavates cavities for nesting and night-roosting and is therefore dependent on high densities of large snags.

Problems:

- The population status and trends of Pygmy Nuthatches in Wyoming are largely unknown; and
- May be impacted by timber harvesting practices that remove older trees and snags and affect foraging habitat.

Conservation Actions:

- Determine statewide population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- Maintain open stands of mature to old-growth ponderosa pine containing large trees, large snags, and vigorous trees of intermediate age in areas where Pygmy Nuthatches occur;
- Manage Pygmy Nuthatch habitat to avoid conflicts with timber harvesting; and
- Work to better understand the effects of long-term fire suppression on Pygmy Nuthatch habitats.

References and Additional Reading:

Clark TW, Harvey AH, Dorn RD, Genter DL, Groves C, eds. 1989. Rare, sensitive, and threatened species of the Greater Yellowstone Ecosystem. Northern Rockies Conservation Cooperative, Montana Natural Heritage Program, The Nature Conservancy, and Mountain West Environmental Services. 153 p.

Ghalambor C. 2003. Conservation assessment of the Pygmy Nuthatch in the Black Hills National Forest, South Dakota and Wyoming. Custer (SD): USDA Forest Service, Black Hills National Forest. Online www.fs.fed.us/r2/scp/species_assessment_reports.shtml.

Kingery H, Ghalambor CK. 2001. Pygmy Nuthatch (*Sitta pygmaea*). In: Poole A, Gill F, eds. The birds of North America. Nr 567. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.



Abundance: Common

Introduction: The redhead breeds from Alaska and central Canada southward to southern California, New Mexico, Nebraska, and Minnesota, with occasional breeding further east. Winters from the southern part of its breeding range from Washington eastward to the Middle Atlantic States and south to the Gulf coast, Mexico and Guatemala. Approximately 80% of all redheads in North America winter in the western Gulf of Mexico with the Laguna Madre of Texas and Tamaulipas. Its range in Wyoming is widespread being found throughout the state during fall and spring migrations, nesting has been documented for most of western two-thirds of the state. The estimated breeding population for redheads has varied from about 350,000 to nearly 1 million over the last 50 years. The population is presently about 3% below its long-term average. The redhead has moderate abundance in Wyoming and is considered a common summer resident. Breeding has been documented in 75% of the latilongs in the state. The Wyoming Game and Fish Department (WGFD) classifies the redhead as a Species of Special Concern with a Native Species Status of 3 (NSS3) because its breeding population in Wyoming is restricted in numbers, habitat is restricted and vulnerable but no recent or on-going significant loss.

Habitat:

- On the prairies and in the intermountain West, redheads use two types of permanently and semipermanently flooded palustrine wetlands for breeding;
- During the prelaying period redheads feed in large, deep, open areas (>1 acre) with submersed aquatic vegetation;
- They use smaller, shallower permanent to semipermanent wetlands with blocks of dense emergent vegetation for nesting (laying and incubating eggs);
- Wetlands that redheads use during prelaying and brood rearing are similar;
- Essential elements include a good supply of preferred foods (invertebrates and submergent plants), ample water depth for escape (> 4 feet), and large open areas where approaching predators are visible;
- Wetlands that are 5 acres or larger and not farther than 0.25 miles from large permanent or semipermanent lakes provide optimum nesting habitat;
- The presence of water seems more important than specific vegetation for nesting;
- Stable water levels are important to nesting success;
- Usually nests over shallow water in dense emergent vegetation, usually bulrushes and cattails;
- Use of permanent and semi-permanent wetlands for breeding provides some buffer from the negative effects of drought;
- Redheads don't show strong fidelity to breeding sites, allowing opportunistic use of periodically available suitable water conditions; and
- Redheads may also inhabit cropland ponds, alkali lakes, sewage ponds, reservoirs, streams and oxbows.

Problems:

- A fairly specialized species, and the population is subject to much fluctuation from year to year;
- The introduction of Eurasian carp has resulted in reduction of favored aquatic plants;

- Breeding habitat is restricted in Wyoming and may be declining;
- Continued losses of easily drained shallow wetlands may impede efforts to maintain current population levels; and
- Heavy predation during low water years.

Conservation Actions:

- Management for redheads should focus on wetland complexes;
- Water levels should be kept constant during the laying and incubation periods to reduce losses from flooding and predation;
- Protect large lakes that support large post-breeding populations;
- Reduce loss of productive wetlands for nesting by protecting quality nesting and brood rearing habitat;
- Insure that wetlands protection laws are enforced;
- Work with agricultural interests to minimize loss of water in important breeding areas to irrigation demands and destruction of emergent vegetation around marsh edges;
- Determine the factors limiting aquatic vegetation and redhead use;
- Manage all current and historic nesting sites to minimize the potential for degradation and conflicts with development;
- Manage nesting areas to minimize human disturbance during the breeding season;
- Maintain good water quality;
- Document and prioritize historic and current breeding locations; and
- Identify potential breeding sites that may become attractive to female redheads following habitat management.

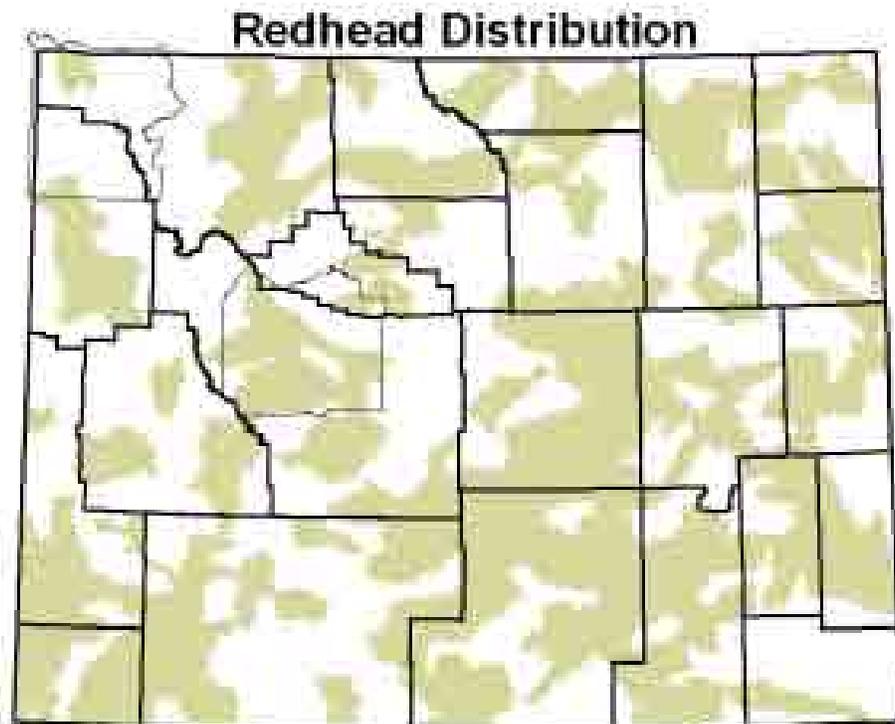
References and Additional Reading:

- Custer, C.M. 1993. Life history traits and habitat needs of the redhead. Waterfowl management handbook. U.S. Fish & Wildl. Serv. Leaflet 13.1.11. 7pp.
- Johnsgard, P.A. 1975. Waterfowl of North America. Indiana Univ. Press, Bloomington. 575 pp.
- NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8.
- NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: May 8, 2004).
- Smith, L.H. 1999. Redhead blurb. Texas A&M Univ, Corpus Christi. 1pp.
- Todd, F. S. 1979. Waterfowl - Ducks, geese & swans of the world. Harcourt Brace Jovanovich, New York, New York. 399 pp.
- USFWS. undated. Redhead duck (*Aythya americana*) management plan for North America. draft. 9 pp.

Woodin, M.C., and G.A. Swanson. 1989. Foods and dietary strategies of prairie-nesting ruddy ducks and redheads. *Condor* 91:280-287.

Woodin, M.C., and T.C. Michot. 2002. Redhead (*Aythya americana*). In *The Birds of North America*, No. 695 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA. 40pp.

Wyoming Game and Fish Department. 2004. *Atlas of birds, mammals, reptiles and amphibians in Wyoming*. Wyoming Game and Fish Department, Cheyenne. 206pp.



Sage Sparrow (*Amphispiza belli*)

Status: NSS4; NatureServe G5 S3

Abundance: Common

Introduction: The Sage Sparrow breeds from central Washington, east to northwestern Colorado, and south to Baja California and northwestern New Mexico. It winters from central California, east to central New Mexico, and south to northwestern Mexico. During summer, it occurs throughout most of Wyoming where sagebrush is present. The Sage Sparrow is considered a common summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because populations are declining, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: Considered a sagebrush obligate, the Sage Sparrow inhabits prairie and foothills shrubland habitat where sagebrush is present. It prefers shrublands with tall shrubs (1 to 2 m [3 to 6 ft]) and low grass cover, where sagebrush is clumped in a patchy landscape. Also, it is area-sensitive and requires a large block of unfragmented habitat to successfully breed and survive.

Problems:

- The Sage Sparrow is impacted by fragmentation and removal of sagebrush habitat.

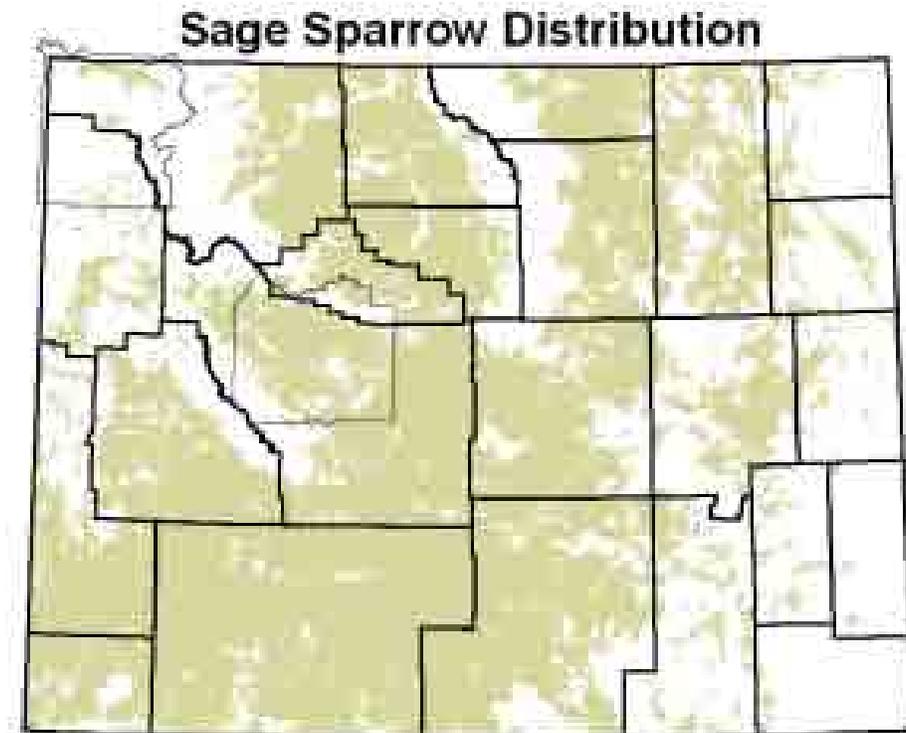
Conservation Actions:

- Determine statewide population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- In areas where Sage Sparrows occur, maintain large (at least 130 ha [50 ac]), unfragmented stands of sagebrush habitat with a mosaic of open (5%) to moderate (25%) shrub cover; a variety of ages and heights; patchy distribution; and a component of tall, older shrubs; and
- Manage Sage Sparrow habitat to avoid conflicts with range improvement projects and agricultural development, and to reduce the risk of habitat loss to fire.

References and Additional Reading:

- Leukering T, Carter MF, Panjabi A, Faulkner D, Leivad R. 2003. Monitoring Wyoming’s birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.
- Martin JW, Carlson BA. 1998. Sage Sparrow (*Amphispiza belli*). In: Poole A, Gill F, eds. The birds of North America. Nr 326. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.
- Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.
- Paige C, Koenen M, Kwan D, Mehlman DW. 1999b. Sage Sparrow (*Amphispiza belli*): species management abstract. The Nature Conservancy. Online: www.conserveonline.org.

Paige C, Ritter SA. 1999. Birds in a sagebrush sea: managing sagebrush habitats for bird communities. Boise (ID): Partners In Flight, Western Working Group. 47 p.



Sage Thrasher (*Oreoscoptes montanus*)

Status: NSS4; NatureServe G5 S5

Abundance: Common

Introduction: The Sage Thrasher breeds from southern British Columbia south through the Great Basin to Arizona and New Mexico. It winters from central California, east to central Texas, and south to central Mexico. During summer, it occurs throughout most of Wyoming where sagebrush is present. The Sage Thrasher is considered a common summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because populations are declining, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: Considered a sagebrush obligate, the Sage Thrasher inhabits prairie and foothills shrubland habitat where sagebrush is present. It prefers shrublands with tall shrubs and low grass cover, where sagebrush is clumped in a patchy landscape.

Problems:

- The Sage Thrasher is impacted by fragmentation and removal of sagebrush habitat.

Conservation Actions:

- Determine statewide population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- In areas where Sage Thrashers occur, maintain large (at least 130 ha [50 ac]), unfragmented stands of sagebrush habitat with a mosaic of open (5%) to moderate (25%) shrub cover; a variety of ages and heights; patchy distribution; and a component of tall, older shrubs; and
- Manage Sage Thrasher habitat to avoid conflicts with range improvement projects and agricultural development, and to reduce the risk of habitat loss to fire.

References and Additional Reading:

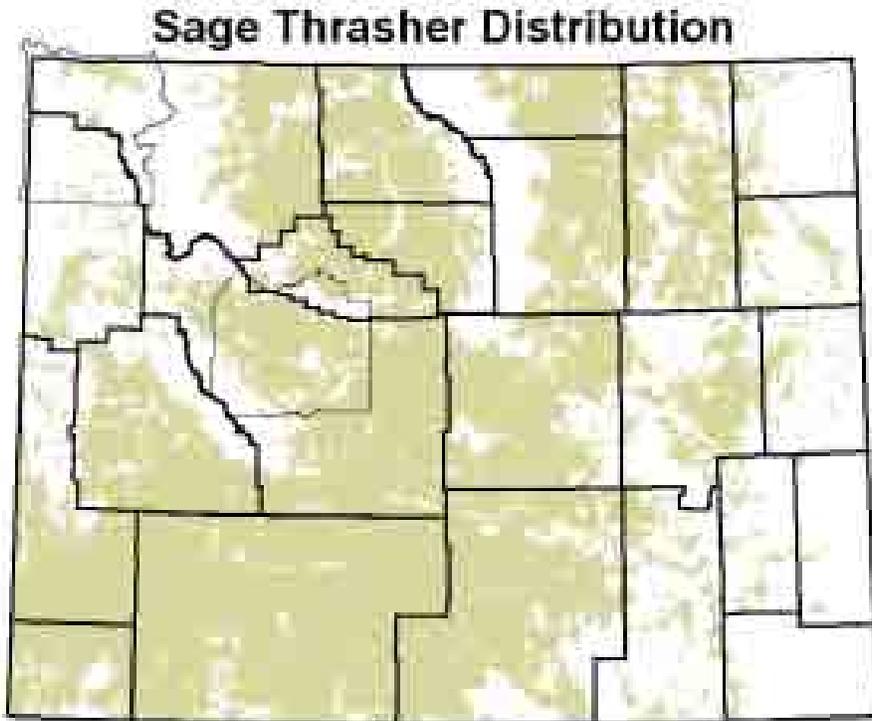
Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming’s birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Paige C, Koenen M, Kwan D, Mehlman DW. 1999c. Sage Thrasher (*Oreoscoptes montanus*): species management abstract. The Nature Conservancy. Online: www.conserveonline.org.

Paige C, Ritter SA. 1999. Birds in a sagebrush sea: managing sagebrush habitats for bird communities. Boise (ID): Partners In Flight, Western Working Group. 47 p.

Reynolds TD, Rich TD, Stephens DA. 1999. Sage Thrasher (*Oreoscoptes montanus*). In: Poole A, Gill F, eds. The birds of North America. Nr 463. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.



Scott's Oriole (*Icterus parisorum*)

Status: NSS3; NatureServe G5 S1

Abundance: Rare

Introduction: The Scott's Oriole breeds in western North America from southern Idaho and Wyoming to northern Mexico. It winters from southeastern Arizona south to southern and southwestern Mexico. In Wyoming, it nests only in the southwestern portion of the state. The Scott's Oriole is considered a rare summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because breeding populations are restricted in distribution, and nesting habitat is restricted, although there is no ongoing significant loss of habitat.

Habitat: The Scott's Oriole occupies mature juniper woodlands with moderate to sparse canopy closure. It nests at lower elevations where junipers create a savannah with herbaceous vegetation and desert shrubs.

Problems:

- Population status and trends of the Scott's Oriole are unknown in Wyoming. Breeding Bird Survey data are inadequate to determine population trends;
- Readily abandons historical nesting areas and establishes new ones, making the monitoring of population trends difficult;
- Suitable juniper woodland breeding habitat is restricted to the extreme southwestern portion of the state;
- Natural history and habitat requirements are poorly known; and
- Throughout much of the West, resource managers view juniper as an invasive species that should be controlled or replaced with more desirable habitats.

Conservation Actions:

- Determine statewide population trends by implementing "Monitoring Wyoming's Birds: The Plan for Count-based Monitoring" (Leukering and others 2003);
- Maintain mature stands of juniper in a savannah with herbaceous vegetation and shrubs in areas where Scott's Orioles nest;
- Use prescribed and natural fire to maintain open stands of juniper woodland where Scott's Orioles occur; and
- Management of manipulation of juniper in southwestern Wyoming should not favor one of the juniper obligates to the detriment of others. Instead, management should be coordinated to provide a mosaic of juniper woodland conditions.

References and Additional Reading:

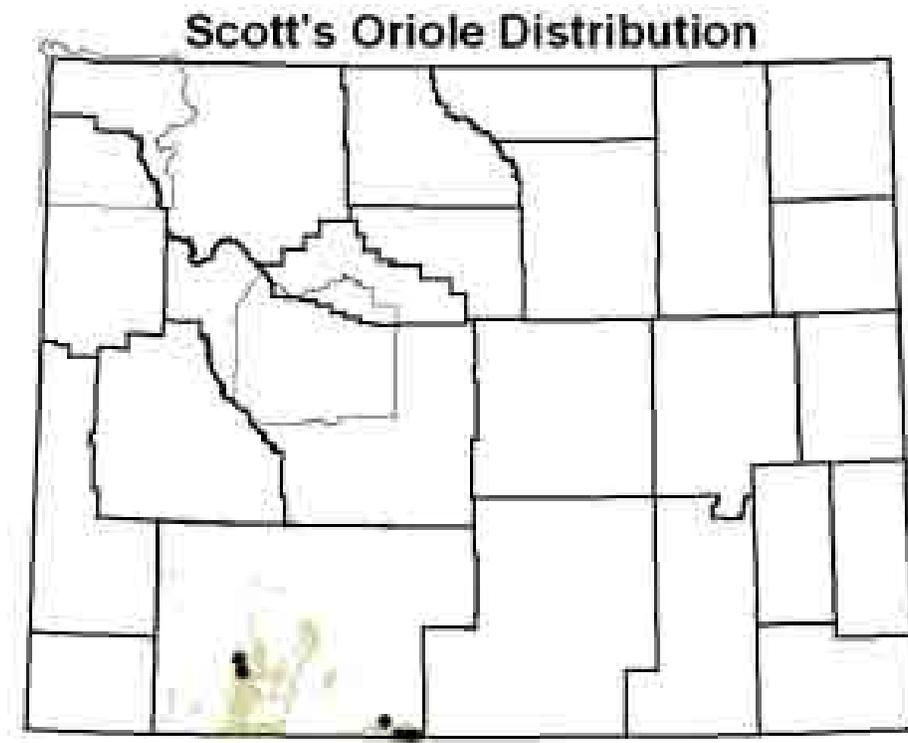
Fitton S. 1989. Nongame species accounts: the Utah juniper obligates. Wyoming Game and Fish Department, Nongame Program. 52 p.

Flood NJ. 2002. Scott's Oriole (*Icterus parisorum*). In: Poole A, Gill F, eds. The birds of North America. Nr 608. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.



Short-eared Owl (*Asio flammeus*)**Status: NSS4; NatureServe G5 S2****Abundance:** Common

Introduction: The Short-eared Owl occurs on all continents except Australia and Antarctica. In North America, it breeds from Alaska and continental Canada south to central California, and east to Maryland. It winters from southern Canada south to southern Mexico. It occurs year-round in Wyoming and is scattered across most of the state in open habitats. The Short-eared Owl is considered a common resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because populations are restricted in distribution, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The Short-eared Owl occupies broad expanses of open habitat with dense, low vegetation, including prairies, grasslands, meadows, marshes, and open sagebrush shrublands. It is strongly associated with ungrazed and undisturbed native grasslands and wetlands that support dense small mammal populations. It is dependent on the meadow vole, which comprises at least 90% of its diet.

Problems:

- Habitat fragmentation can accentuate the impacts of fluctuations of prey populations; and
- This species is impacted by the loss or degradation of both breeding and wintering habitats.

Conservation Actions:

- Determine statewide population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- In areas where Short-eared Owls nest, provide large, continuous areas of grassland and wetland habitat with dense vegetation, grasses shorter than 0.5 m (1.6 ft), and high densities of voles; and
- Manage Short-eared Owl habitat to minimize conflicts with agriculture, livestock grazing, urban and suburban development, and habitat fragmentation.

References and Additional Reading:

- Clark RJ. 1975. A field study of the Short-eared Owl, *Asio flammeus* (Pontoppidan), in North America. Wildl Monogr 47:1-67.
- Dechant JA, Sondreal ML, Johnson DH, Igl LD, Goldade CM, Nenneman MP, Euliss BR. 2003f. Effects of management practices on grassland birds: Short-eared Owl. Jamestown (ND): Northern Prairie Wildlife Research Center. Online: <http://www.npwr.usgs.gov/resource/literatr/grasbird/seow/seow.htm>.
- Holt DW, Leasure SM. 1993. Short-eared Owl (*Asio flammeus*). In: Poole A, Gill F, eds. The birds of North America. Nr 62. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Howard JL. 1994. *Asio flammeus*. In: Fire effects information system. USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Online: <http://www.fs.fed.us/database/feis/>.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Paige C, Ritter SA. 1999. Birds in a sagebrush sea: managing sagebrush habitats for bird communities. Boise (ID): Partners In Flight, Western Working Group. 47 p.



Snowy Egret (*Egretta thula*)

Status: NSS3; NatureServe G5 S3B

Abundance: Uncommon

Introduction: The Snowy Egret breeds along the coastal areas of North America and in disjunct inland areas in the western United States south to South America. It winters from northern California, southwestern Arizona, the Gulf coast, and coastal South Carolina south into South America. Although it has been found in most parts of Wyoming, the Snowy Egret is considered an uncommon summer resident in Wyoming. It was documented nesting at 9 different sites between 1982 and 1994, although Bamforth Lake is the only location where it has consistently nested. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because breeding populations are restricted in numbers and distribution; nesting habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat; and it is sensitive to human disturbance.

Habitat: The Snowy Egret inhabits grassy marshes, reservoirs, lakes, ponds, and wet meadows. It nests in mixed colonies in emergent vegetation or in shrubs on islands.

Problems:

- Breeding habitat in Wyoming is disjunct and secure breeding sites are limited in distribution;
- The availability and suitability of breeding sites can be unstable between years as a result of fluctuating water levels and changes in land use practices;
- Sensitive to human disturbance during nesting;
- Human activities have caused the loss of suitable wetland nesting habitat; and
- Pesticide contamination is a threat to some populations, especially those that migrate to Mexico where they may accumulate DDT and DDE.

Conservation Actions:

- Continue annual inventory and monitoring efforts and implement “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003) to determine statewide population trends;
- Maintain a minimum of two Snowy Egret breeding locations and 15 breeding pairs of Snowy Egrets in Wyoming;
- Maintain stable water levels throughout the nesting season in wetlands where Snowy Egrets are breeding; and
- Manage Snowy Egret nesting areas to minimize human disturbance during the breeding season.

References and Additional Reading:

Findholt SL. 1985. Status and distribution of colonial nesting waterbirds in Wyoming. Nongame Special Report. Cheyenne: Wyoming Game and Fish Department. 67 p.

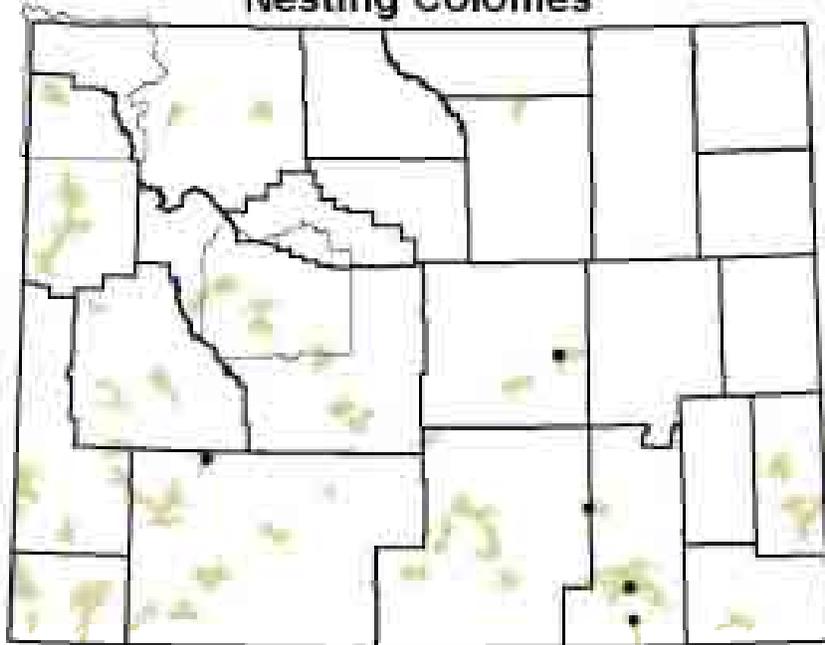
Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming’s birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

NatureServe. 2004. NatureServe explorer: an online encyclopedia of life. Version 1.8. Arlington (VA): NatureServe. Online <http://www.natureserve.org/explorer>.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Parsons KC, Master TL. 2000. Snowy Egret (*Egretta thula*). In: Poole A, Gill F, eds. The birds of North America. Nr 489. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Snowy Egret Foraging Areas and Nesting Colonies



Swainson's Hawk (*Buteo swainsoni*)**Status: NSS4; NatureServe G5 S4B****Abundance:** Common

Introduction: The Swainson's Hawk breeds primarily in western North America from Alaska and western Canada, south into northern Mexico, and east to Oklahoma and Iowa. It winters primarily in southern South America, irregularly north to Costa Rica and Panama, and sometimes north to the southwestern US and southern Florida. During summer, it occurs and breeds throughout most of Wyoming. The Swainson's Hawk is considered a common summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because population status and trends are unknown, although they are suspected to be stable, and because its habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The Swainson's Hawk inhabits semi-open and open areas below 2700 m (9000 ft), including prairies, plains, shrub-steppe, large mountain valleys, savannahs, open pine-juniper woodlands, and cultivated lands with scattered trees. It nests in trees that are either isolated or in riparian areas or shelterbelts. Nesting trees may be almost any species of suitable size—taller than 3 m (10 ft) with a diameter at breast height of at least 5 cm (2 in).

Problems: The Swainson's Hawk is impacted by the loss of native grasslands and nest trees, conversion of suitable agricultural land to urbanization, pesticide use (especially on the wintering grounds), and shooting during migration.

Conservation Actions:

- Determine statewide population trends by implementing "Monitoring Wyoming's Birds: The Plan for Count-based Monitoring" (Leukering and others 2003);
- Implement long-term (minimum 5 to 10 years) population trend monitoring using aerial surveys that determine nest occupancy and productivity in years with normal or high prey availability, and presence/absence (total number) monitoring in years with low prey availability;
- Develop a cooperative, statewide, interagency/non-governmental organization database of Swainson's Hawk nest sites, with data sensitivity built in;
- Manage Swainson's Hawk nesting areas to minimize the loss of nesting trees and small wooded areas, the potential for degradation of grassland habitat, and conflicts with development and pesticide use; and
- Maintain native grass and forb habitats for rodent and insect prey.

References and Additional Reading:

Dechant JA, Dinkins MF, Johnson DH, Igl LD, Goldade CM, Euliss BR. 2003a. Effects of management practices on grassland birds: Swainson's Hawk. Jamestown (ND): Northern Prairie Wildlife Research Center. Online:
<http://www.npwr.usgs.gov/resource/literatr/grasbird/swha/swha.htm>.

Dunkle SW. 1977. Swainson's Hawk on the Laramie Plains, Wyoming. *Auk* 94:65-71.

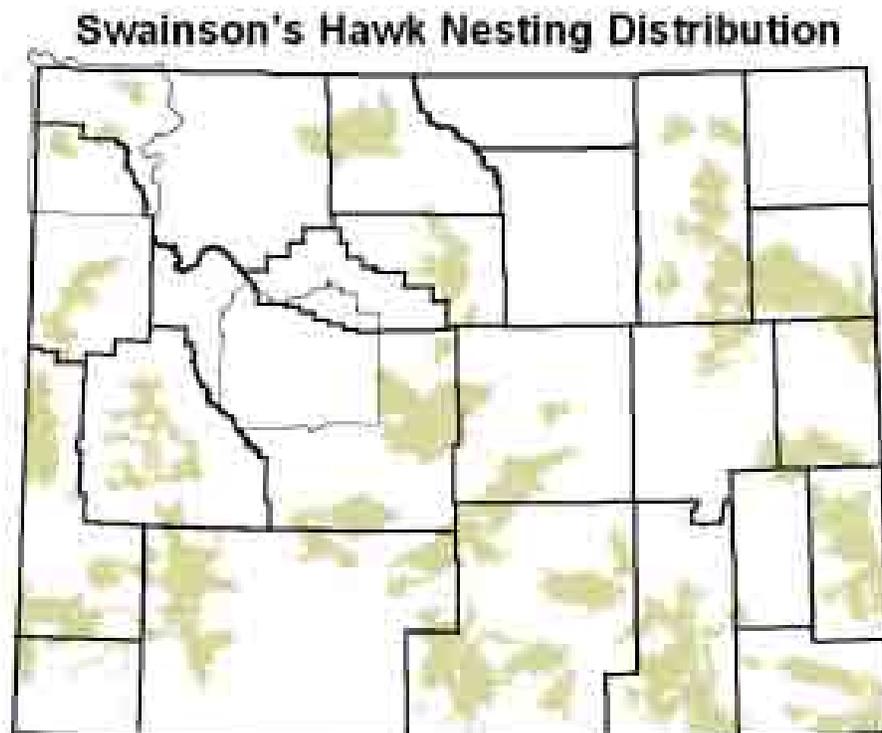
England AS, Bechard MJ, Houston CS. 1997. Swainson's Hawk (*Buteo swainsoni*). In: Poole A, Gill F, eds. The birds of North America. Nr 265. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Paige C, Ritter SA. 1999. Birds in a sagebrush sea: managing sagebrush habitats for bird communities. Boise (ID): Partners In Flight, Western Working Group. 47 p.

Tesky JL. 1994c. *Buteo swainsoni*. In: Fire effects information system. USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Online: <http://www.fs.fed.us/database/feis/>.



Trumpeter Swan (*Cygnus buccinator*)

Status: NSS2; NatureServe G4 S2

Abundance: Uncommon

Introduction: The Trumpeter Swan was once distributed across most of North America and currently occurs locally from Alaska south to Oregon and east to Michigan. Although it has been found in many parts of Wyoming, the most significant concentrations of resident birds are in western Wyoming along the Snake, Salt, and Green River drainages. Most of Wyoming's resident swans winter in Idaho, although their numbers increase during winter, when they are joined by swans that nest in Canada. The Trumpeter Swan was nearly exterminated by unregulated hunting and habitat loss, and by 1933 only 66 birds remained in the tri-state flocks inhabiting Wyoming, Montana, and Idaho. The tri-state flocks increased to over 500 during the 1950s, but numbers have fluctuated since then. Currently the number of resident adults in western Wyoming averages around 100. The Wyoming Game and Fish Department classifies the Trumpeter Swan as a Species of Special Concern with a Native Species Status of 2 (NSS2) because breeding populations are restricted in numbers and distribution, there is ongoing significant loss of nesting habitat, and it is sensitive to human disturbance.

Habitat: The Trumpeter Swan inhabits shallow marshes, ponds, lakes, and river oxbows. It prefers stable, quiet, and shallow waters where small islands, muskrat houses, or dense emergent vegetation provide nesting and loafing sites. Nutrient-rich waters, with dense aquatic plant and invertebrate growth, provide the most suitable habitat. Adequate forage in the pre-nesting period (April to May) is critical for nesting success. Winter habitat must provide extensive beds of aquatic plants that remain ice-free. In Wyoming, cold temperatures and ice restrict trumpeters to sites where geothermal waters, springs, or outflow from dams maintain ice-free areas.

Problems:

- The rapidly increasing number of swans migrating from Canada and wintering in the Greater Yellowstone Area could out-compete the resident swans for the limited amount of winter and early spring forage. Early spring habitat is necessary for the reproductive success of swans nesting in Wyoming and is probably a primary limiting factor;
- The Wyoming nesting population appears stagnant and unable to expand into adjacent habitats;
- Collisions with power lines and fences and illegal shooting are responsible for nearly 60% of Trumpeter Swan deaths in Wyoming
- For as yet undetermined reasons, the number of Trumpeter Swans that successfully nest in Wyoming is extremely limited and recruitment of subadults into the population is low;
- Many of the historical nesting sites are not occupied by nesting pairs or are not productive; and
- Human activity in swan habitat, including housing developments, tourism, and recreation, is increasing dramatically.

Conservation Actions:

- Conduct habitat surveys of potential nesting and transitional habitat in the Green, Salt, and Snake River drainages, and work with private landowners and agencies to enhance and protect suitable habitat;

- Continue to coordinate with the Greater Yellowstone Trumpeter Swan Working Group, which includes Yellowstone and Grand Teton national parks and wildlife agencies in Montana and Idaho, to promote and conduct swan research and management;
- Continue to research and monitor early spring nesting and winter habitat use;
- Reduce swan mortality from illegal shooting and collisions with power lines and fences;
- Continue to reintroduce swans into suitable habitats that promote migration to new winter habitat;
- Continue to work closely with regional land trusts to identify potential habitat, obtain conservation easements, and develop wetland management plans; and
- Conduct educational programs, wetland seminars, and field trips with local schools in an effort to involve the public in swan conservation.

References and Additional Reading:

- Banko WE. 1960. The Trumpeter Swan: its history, habits, and population in the United States. North American Fauna Nr 63. Washington: US Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife.
- Lockman DC, Wood R, Burgess H, Burgess R, Smith H. 1987. Rocky Mountain Trumpeter Swan population: Wyoming flock, 1982-1986. Cheyenne: Wyoming Game and Fish Department.
- Mitchell CD. 1994. Trumpeter Swan (*Cygnus buccinator*). In: Poole A, Gill F, eds. The birds of North America. Nr 105. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.
- Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.
- Patla S, Oakleaf B. 2003. Trumpeter Swan restoration and migration study. Unpublished report. Wyoming Game and Fish Department, Nongame Program.
- Pacific Flyway Study Committee. 2002. Pacific Flyway implementation plan for the Rocky Mountain population of Trumpeter Swans. Portland (OR): US Fish and Wildlife Service, Migratory Bird Management Office. 27 p.
- Squires JR, Anderson SH, Lockman DC. 1992. Habitat selection of nesting and wintering Trumpeter Swans. In: McCullough DR, Barrett RH, eds. Wildlife 2001: populations. New York: Elsevier Applied Sciences. p 665-75.

Trumpeter Swan Nesting Areas and Winter Distribution



Upland Sandpiper (*Bartramia longicauda*)**Status: NSS4; NatureServe G5 S3B****Abundance:** Uncommon

Introduction: The Upland Sandpiper breeds locally from Alaska across central Canada to southern New Brunswick, and south to Colorado, Texas, and Virginia. It winters in South America. During summer, it occurs primarily in the eastern half of Wyoming, although it has also been observed in north-central and northwestern Wyoming. The Upland Sandpiper is considered an uncommon summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because its population status and trends are unknown, although they are suspected to be stable; because its habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat; and because it is sensitive to human disturbance.

Habitat: The Upland Sandpiper inhabits open grassland habitats, including prairies, meadows, pastures, hayfields, alfalfa fields, and highway right-of-ways. It requires large areas of short grasses for foraging and courtship, interspersed with or adjacent to taller grasses for nesting and short to medium grasses for brood cover.

Problems: The Upland Sandpiper is impacted by the loss of habitat to urbanization and conversion of grasslands to woodlands and cultivated croplands. This species is also impacted by loss of vegetative cover during the nesting season.

Conservation Actions:

- Determine statewide population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area;
- Work with private landowners to conserve grassland habitat by providing financial incentives, assistance, and evaluations of management activities;
- Maintain large tracts of contiguous grassland habitat and avoid fragmenting existing grassland tracts. Tracts should be no smaller than 50 ha (125 ac), and preferably 100 ha (250 ac) or more, and should be located within 1.6 km (1 mi) of each other;
- Manage Upland Sandpiper nesting areas to provide a mosaic of short grass for feeding and courtship, interspersed with taller grasses and forbs for nest concealment and brood-rearing cover, and rock piles, fence posts, or stumps for display perches; and
- Manage Upland Sandpiper nesting areas to minimize disturbances such as haying, burning, grazing, and tilling during the breeding season.

References and Additional Reading:

Carter JW, Hammerson G, Mehlman DW. 1992. Upland Sandpiper (*Bartramia longicauda*): species management abstract. The Nature Conservancy. Online: www.conserveonline.org.

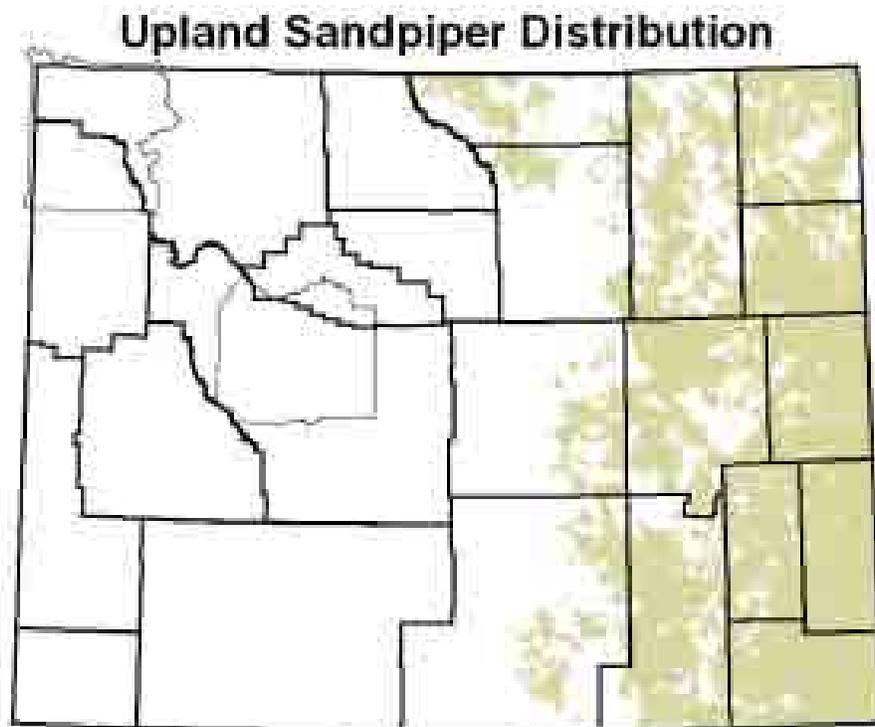
Clark TW, Harvey AH, Dorn RD, Genter DL, Groves C, eds. 1989. Rare, sensitive, and threatened species of the Greater Yellowstone Ecosystem. Northern Rockies Conservation Cooperative, Montana Natural Heritage Program, The Nature Conservancy, and Mountain West Environmental Services. 153 p.

Dechant JA, Dinkins MF, Johnson DH, Igl LD, Goldade CM, Parkin BD, Euliss BR. 2003b. Effects of management practices on grassland birds: Upland Sandpiper. Jamestown (ND): Northern Prairie Wildlife Research Center. Online: <http://www.npwrc.usgs.gov/resource/literatr/grasbird/upsa/upsa.htm>.

Houston CS, Bowen DE. 2001. Upland Sandpiper (*Bartramia longicauda*). In: Poole A, Gill F, eds. The birds of North America. Nr 580. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.



Virginia Rail (*Rallus limicola*)

Status: NSS3; NatureServe G5 S3B

Abundance: Unknown

Introduction: The Virginia Rail breeds from southern British Columbia to Newfoundland, south to North Carolina, central Mexico, and South America. The northern population winters from southern British Columbia, down the Pacific coast, across Mexico, and south to Guatemala. In Wyoming, it occurs across most of the state, but its abundance is unknown. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in numbers and distribution, and habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The Virginia Rail inhabits shallow marshes of every size and type, from roadside ditches and borders of lakes and streams to large cattail marshes. It nests over or next to water in robust, moderately dense emergent vegetation, such as cattails, reeds, and deep grasses. Interspersion of open water and vegetation is an important habitat component.

Problems: The Virginia Rail's breeding habitat in Wyoming is disjunct and secure breeding sites are limited in distribution. Likewise, the availability and suitability of breeding sites can be unstable between years as a result of fluctuating water levels and changes in land use practices.

Conservation Actions:

- Determine statewide population trends by implementing "Monitoring Wyoming's Birds: The Plan for Count-based Monitoring" (Leukering and others 2003);
- In areas where Virginia Rails are nesting, maintain seasonal and semipermanent wetlands with water depths ranging from 0 to 15 cm (0 to 6 in); with high invertebrate abundance; and with moderate proportions (30 to 70%) of emergent vegetation interspersed with open water, mudflats, and some floating residual vegetation; and
- Maintain stable water levels throughout the nesting season in wetlands where Virginia Rails are breeding.

References and Additional Reading:

Conway CJ. 1995. Virginia Rail (*Rallus limicola*). In: Poole A, Gill F, eds. The birds of North America. Nr 116. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

NatureServe. 2004. NatureServe explorer: an online encyclopedia of life. Version 1.8. Arlington (VA): NatureServe. Online <http://www.natureserve.org/explorer>.

Zimmerman AL, Dechant JA, Jamison BE, Johnson DH, Goldade CM, Church JO, Euliss BR.
2003. Effects of management practices on wetland birds: Virginia Rail. Jamestown (ND):
Northern Prairie Wildlife Research Center. Online:
<http://www.npwrc.usgs.gov/resource/literatr/wetbird/vira/vira.htm>.



Western Grebe (*Aechmophorus occidentalis*) Status: NSS4; NatureServe G5 S4B

Abundance: Common

Introduction: The Western Grebe breeds from British Columbia, east to Saskatchewan, and south to California and western Nebraska. It also occurs locally in Mexico. It winters mainly along the Pacific coast from southeastern Alaska south to northwestern Mexico. During summer, it is scattered across most of Wyoming. The Western Grebe is considered a common summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because population status and trends are unknown, although they are suspected to be stable; because its habitat is restricted and vulnerable, although there is no ongoing significant loss; and because it is sensitive to human disturbance.

Habitat: The Western Grebe inhabits marshes and lakes, usually with extensive areas of open water and bordered by tall emergent vegetation. Ideal nesting areas provide large clumps of emergent vegetation interspersed with open water so that the vegetation blocks wave action. Large bulrush “islands” with inner open water areas and channels are good nesting sites.

Problems:

- The availability and suitability of breeding sites can be unstable between years as a result of fluctuating water levels and changes in land use practices. The Western Grebe often nests late in the season, and is threatened by low water levels in late summer;
- Sensitive to human disturbance during nesting. Entire colonies will leave their nests when approached by humans, leaving them vulnerable to predators; repeated disturbances early in the nesting cycle can cause nest abandonment; and
- Breeding habitat in Wyoming is disjunct and secure breeding sites are limited in distribution.

Conservation Actions:

- Determine statewide population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- Manage Western Grebe nesting areas to maintain extensive complexes of marshes with stands of emergent vegetation greater than 6 m (20 ft) wide and interspersed with patches of shallow open water;
- Maintain stable water levels throughout the nesting season in wetlands where Western Grebes are breeding; and
- Manage Western Grebe nesting areas to minimize human disturbance during the breeding season.

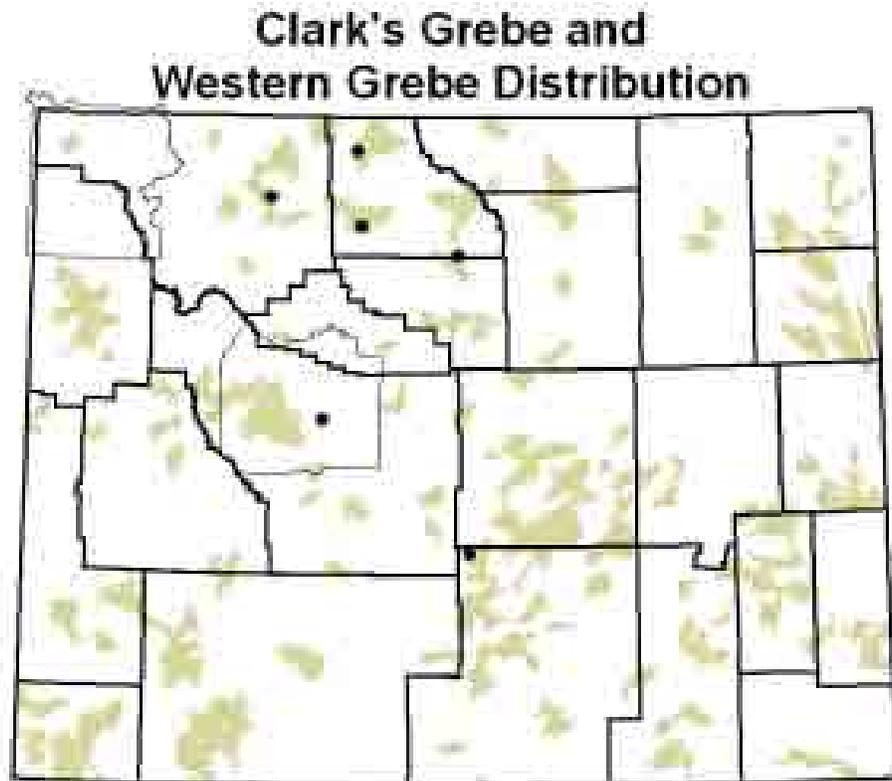
References and Additional Reading:

DeGraaf RM, Scott VE, Hamre RH, Ernst L, Anderson SH. 1991. Forest and rangeland birds of the United States: natural history and habitat use. Agriculture Handb 688. USDA Forest Service. 625 p.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Storer RW, Nuechterlein GL. 1992. Western and Clark's Grebe (*Aechmophorus occidentalis* and *A. clarkii*). In: Poole A, Gill F, eds. The birds of North America. Nr 26. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.



Western Scrub-Jay (*Aphelocoma californica*)

Status: NSS3; NatureServe G5 S1

Abundance: Uncommon

Introduction: The Western Scrub-Jay inhabits southwestern Washington southeast to central Texas, and through the southwestern US to southern Mexico. In Wyoming, it nests only in the southwestern corner of the state, and pairs or family groups remain year-round on a permanent territory. Individuals found elsewhere in the state are probably dispersing juveniles. The Western Scrub-Jay is considered an uncommon resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because populations are restricted in distribution, and habitat is restricted, although there is no ongoing significant loss of habitat.

Habitat: The Western Scrub-Jay nests only in juniper woodlands in Wyoming. Mature trees and high canopy cover are important to nesting, and large trees also function as sentinel posts. The area around the nest usually has relatively sparse canopy cover and moderate amounts of exposed rock. It forages in open sagebrush-grasslands, as well as the juniper woodlands in which it nests.

Problems:

- Population status and trends of the Western Scrub-Jay are unknown in Wyoming;
- Suitable juniper woodland habitat is restricted to the extreme southwestern portion of the state;
- Sensitive to human activities around the nest and has been known to abandon nests rather quickly; and
- Throughout much of the West, resource managers view juniper as an invasive species that should be controlled or replaced with more desirable habitats.

Conservation Actions:

- Determine statewide population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- Maintain mature juniper woodlands with an open canopy and well interspersed with sagebrush and other shrubs in areas where Western Scrub-Jays nest; and
- Management of manipulation of juniper in southwestern Wyoming should not favor one of the juniper obligates to the detriment of others. Instead, management should be coordinated to provide a mosaic of juniper woodland conditions.

References and Additional Reading:

- Curry RL, Peterson AT, Langen TA. 2003. Western Scrub-Jay (*Aphelocoma californica*). In: Poole A, Gill F, eds. The birds of North America. Nr 712. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.
- Fitton S. 1989. Nongame species accounts: the Utah juniper obligates. Wyoming Game and Fish Department, Nongame Program. 52 p.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.



White-faced Ibis (*Plegadis chihi*)

Status: NSS3; NatureServe G5 S1B

Abundance: Uncommon

Introduction: The breeding range of the White-faced Ibis includes several discrete populations in South America, Mexico, the western US, and the Gulf coast. It winters from southern California, east to Louisiana, and south to South America. Although it is scattered across most of Wyoming, the White-faced Ibis is considered an uncommon summer resident. It was documented nesting at 6 different sites between 1982 and 1994. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because breeding populations are restricted in numbers and distribution; nesting habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat; and it is sensitive to human disturbance.

Habitat: The White-faced Ibis inhabits marshes, wet-moist meadows, lakes, and irrigated meadows. It nests on the ground in bulrushes, cattails, or reeds; on a floating mat; or in a low tree. It usually forages close to emergent vegetation.

Problems:

- Breeding habitat in Wyoming is disjunct and secure breeding sites are limited in distribution;
- The availability and suitability of breeding sites can be unstable between years as a result of fluctuating water levels and changes in land use practices; and
- Sensitive to human disturbance during nesting.

Conservation Actions:

- Continue annual inventory and monitoring efforts and implement “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003) to determine statewide population trends;
- Maintain a minimum of 3 White-faced Ibis breeding locations and 50 breeding pairs of White-faced Ibises in Wyoming;
- Maintain stable water levels throughout the nesting season in wetlands where White-faced Ibises are breeding; and
- Manage White-faced Ibis nesting areas to minimize human disturbance during the breeding season.

References and Additional Reading:

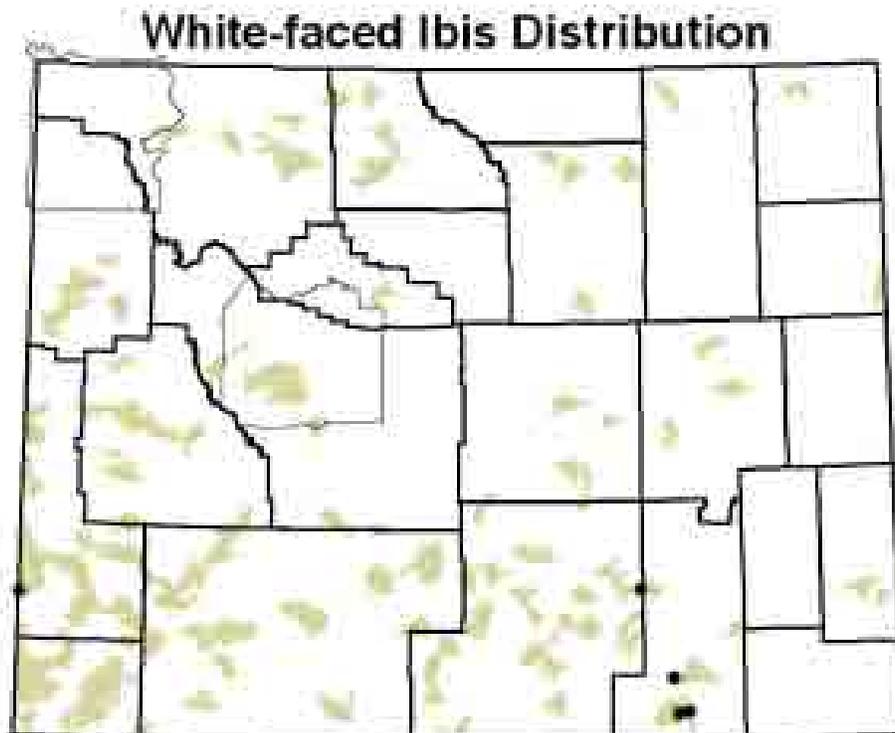
Findholt SL. 1985. Status and distribution of colonial nesting waterbirds in Wyoming. Nongame Special Report. Cheyenne: Wyoming Game and Fish Department. 67 p.

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming’s birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.

Ryder RA, Manry DE. 1994. White-faced Ibis (*Plegadis chihi*). In: Poole A, Gill F, eds. The birds of North America. Nr 130. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.

Taylor DM, Trost CH, Jamison B. 1989. The biology of the White-faced Ibis in Idaho. Western Birds 20:125-33.



Willow Flycatcher (*Empidonax traillii*)

Status: NSS3; NatureServe G5 S4B

Abundance: Common

Introduction: The Willow Flycatcher breeds from central British Columbia across southern Canada to Nova Scotia, and south to southern California, central Texas, and Virginia. It winters from southern Mexico to Colombia. It is scattered throughout most of Wyoming during the breeding season. The Willow Flycatcher is considered a common summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 3 (NSS3) because breeding populations are declining, and nesting habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat.

Habitat: The Willow Flycatcher is a riparian obligate that uses willow or alder thickets along streams, especially where streams are bordered by open stands of cottonwoods. It is also found in brushy fields, and along edges of bogs, thickets, or groves of small trees in grasslands. The presence of water and deciduous riparian shrubs are essential habitat elements.

Problems:

- Populations of the Willow Flycatcher are declining in Wyoming;
- Impacted by a combination of factors that degrade shrubby riparian habitat, including loss of vegetative cover, recreation and development pressure, heavy nest parasitism by cowbirds, willow control activities, flooding of nest sites, and water diversions and flood control that prevent shrub and tree regeneration; and
- Deforestation on the wintering grounds may impact population stability.

Conservation Actions:

- Determine statewide population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003); and
- Maintain communities of deciduous shrubs in riparian areas and meadows, at least 2 ha (5 ac) in size, with patches of dense shrubs interspersed with openings, and with open water nearby to facilitate Willow Flycatcher nesting success.

References and Additional Reading:

Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming’s birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

McCabe RA. 1991. The little green bird: ecology of the Willow Flycatcher. Madison (WI): Rusty Rock Pr. 171 p.

Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.

Paige C, Koenen M, Mehlman DW. 1999f. Willow Flycatcher (*Empidonax traillii*): species management abstract. The Nature Conservancy. Online: www.conserveonline.org.

Sedgwick JA. 2000. Willow Flycatcher (*Empidonax traillii*). In: Poole A, Gill F, eds. The birds of North America. Nr 533. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.



Yellow-billed Cuckoo (*Coccyzus americanus*)

Status: NSS2; NatureServe G5 S1

Abundance: Uncommon

Introduction: The Yellow-billed Cuckoo is found from southern Canada to South America, breeding across most of the United States (except Oregon, Washington, Idaho, and Montana) and wintering in South America. It is found mainly along the eastern edge of Wyoming, with a few scattered reports from elsewhere in the state. The only areas that currently support the large cottonwood-riparian stands that are required by this species occur in isolated stands along the Bighorn, Powder, and North Platte rivers. The Yellow-billed Cuckoo is considered an uncommon summer resident in Wyoming. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 2 (NSS2) because breeding populations are restricted in numbers and distribution, and there is ongoing significant loss of nesting habitat. The population of Yellow-billed Cuckoos, which occupies areas west of the Continental Divide in Wyoming, is included within a distinct population that is a candidate for listing under the Endangered Species Act.

Habitat: The Yellow-billed Cuckoo nests primarily in large stands of cottonwood-riparian habitat below 2100 m (7000 ft), including such habitats that occur in urban areas. It is a riparian obligate species that prefers extensive areas of dense thickets and mature deciduous forests near water, and requires low, dense, shrubby vegetation for nest sites.

Problems:

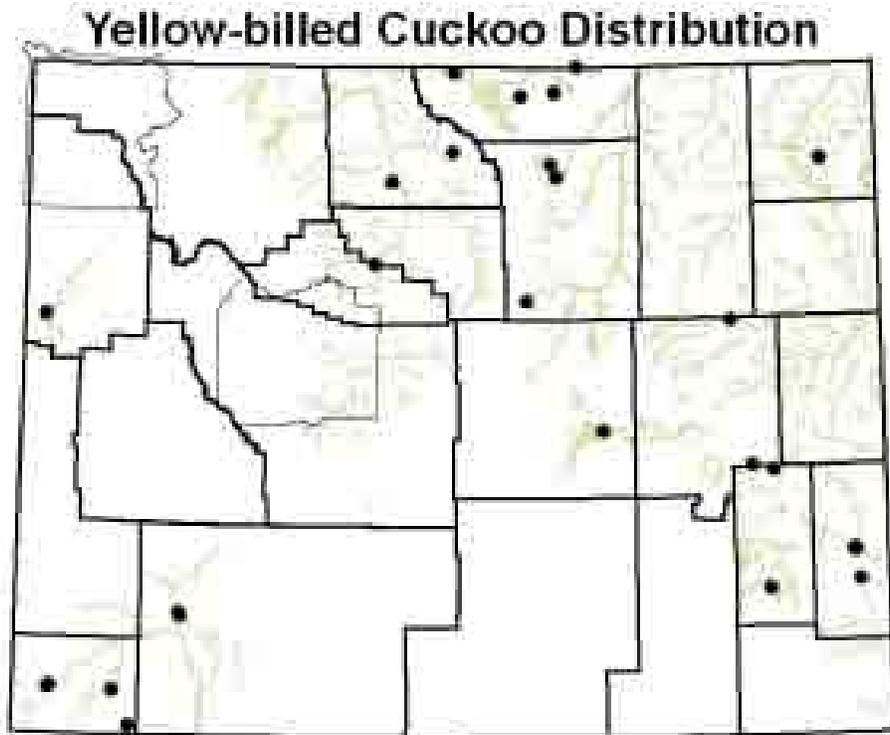
- Population status and trends of the Yellow-billed Cuckoo are unknown in Wyoming. The Breeding Bird Survey does not adequately census this species because of a lack of routes in preferred cuckoo habitat;
- The large stands of cottonwood-riparian habitat required by this species for breeding are extremely limited in distribution throughout the state and are vulnerable to loss and/or degradation as a result of human activities;
- The Yellow-billed Cuckoo is extremely sensitive to habitat fragmentation, and population declines in parts of its range are a result of deterioration and fragmentation of riparian woodland habitat; and
- Also impacted by prey scarcity as a result of pesticides.

Conservation Actions:

- Determine statewide population trends by implementing “Monitoring Wyoming’s Birds: The Plan for Count-based Monitoring” (Leukering and others 2003);
- Delineate crucial range and work cooperatively with land management agencies to maintain habitat within the designated area;
- Manage Yellow-billed Cuckoo nesting areas to maintain large, mature cottonwood-riparian stands (at least 10 ha [25 ac] in size and 100 m [330 ft] wide) with dense shrubs and diverse vegetation heights, and minimize habitat fragmentation; and
- Manage Yellow-billed Cuckoo nesting areas to minimize pesticide use during the nesting season.

References and Additional Reading:

- Hughes JM. 1999. Yellow-billed Cuckoo (*Coccyzus americanus*). In: Poole A, Gill F, eds. The birds of North America. Nr 418. Philadelphia: Academy of Natural Sciences; Washington: American Ornithologists' Union.
- Leukering T, Carter MF, Panjabi A, Faulkner D, Levad R. 2003. Monitoring Wyoming's birds: the plan for count-based monitoring. In: Nicholoff SH, compiler. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. p 575-601. Online: www.blm.gov/wildlife/plan/WY/menu.htm.
- Nicholoff SH, compiler. 2003. Wyoming bird conservation plan. Version 2.0. Wyoming Partners In Flight. Lander: Wyoming Game and Fish Department. 668 p. Online: www.blm.gov/wildlife/plan/WY/menu.htm.
- Oakleaf B, Cerovski AO, Luce B. 1996. Nongame bird and mammal plan: a plan for inventories and management of nongame birds and mammals in Wyoming. Wyoming Game and Fish Department, Nongame Program. 183 p.



Black Hills Red-bellied Snake (*Storeria occipitomaculata pahasapae*)

Status: NSS3; NatureServe G5 T3

Abundance: Uncommon

Introduction: A small, slender snake that reaches a maximum of 15 inches in total length. It is dark gray or brown with two dorso-lateral stripes. The ventral surface of this snake is red, thus its common name. This snake bears its young live and is known to have clutches of 1 to 21 young. They have been found at elevations up to 7,000 feet above sea level. Their diet is known to include slugs, earthworms and grubs.

Habitat: This snake occupies mountainous or hilly woodlands in the Black Hills. It is commonly found under rocks and logs in moist areas. This species may go unnoticed unless these microhabitats are searched. Wyoming, this snake is found only in Crook and Weston counties.

Problems: The population status, distribution and habitat data are lacking for this species. Likewise, habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

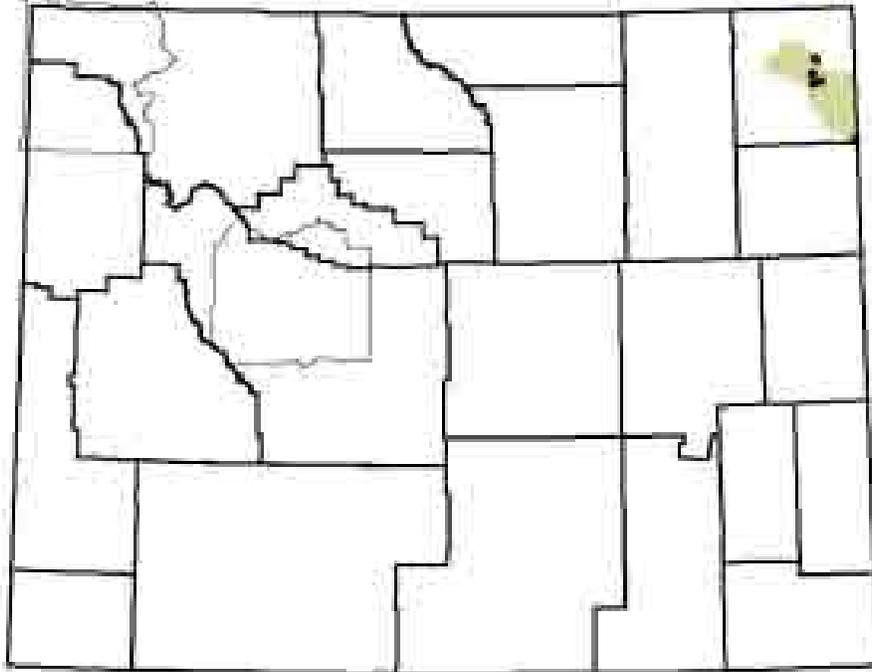
Hammerson, G.A. 1999. Amphibians and Reptiles in Colorado: A Colorado Field Guide, Second Edition. University Press of Colorado and Colorado Division of Wildlife. 484 pp.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 19, 2004).

Stebbins, R. C. 1985. A Field Guide to Western Reptiles and Amphibians. Houghton Mifflin Company Boston New York. 336 pp.

Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.

Black Hills Redbelly Snake Distribution



Bullsnake (*Pituophis melanoleucas sayi*)

Status: NSS4; NatureServe G5 T5 S4

Abundance: Common

Introduction: The bullsnake is the largest snake found in Wyoming, reaching a maximum length of 7 feet. It prefers a diet of rodents, including ground squirrels, mice, wood rats and small cottontail rabbits. It may also eat nestling birds, eggs and lizards. Females deposit clutches of about 10 to 20 eggs. Bullsnakes overwinter in deep underground crevices in large aggregations, sometimes sharing their den with eastern yellowbelly racers, pale milk snakes, garter snakes and rattlesnakes.

Habitat: This common snake can be found in the plains grasslands, sagebrush, sandhills, riparian areas, marshes, rocky canyons, mountain shrublands, and suburban and agricultural areas. It also occurs in the foothills and woodlands of the Black Hills. Bullsnakes are found east of the Continental Divide in Wyoming, below 6,000 feet in elevation. Elsewhere, they range throughout the Great Plains from Alberta to Northern Mexico, east across Iowa and Missouri and north into Wisconsin.

Problems:

Population status, distribution and habitat data are lacking for this species. Habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; NS
- Develop management recommendations based on resulting data.

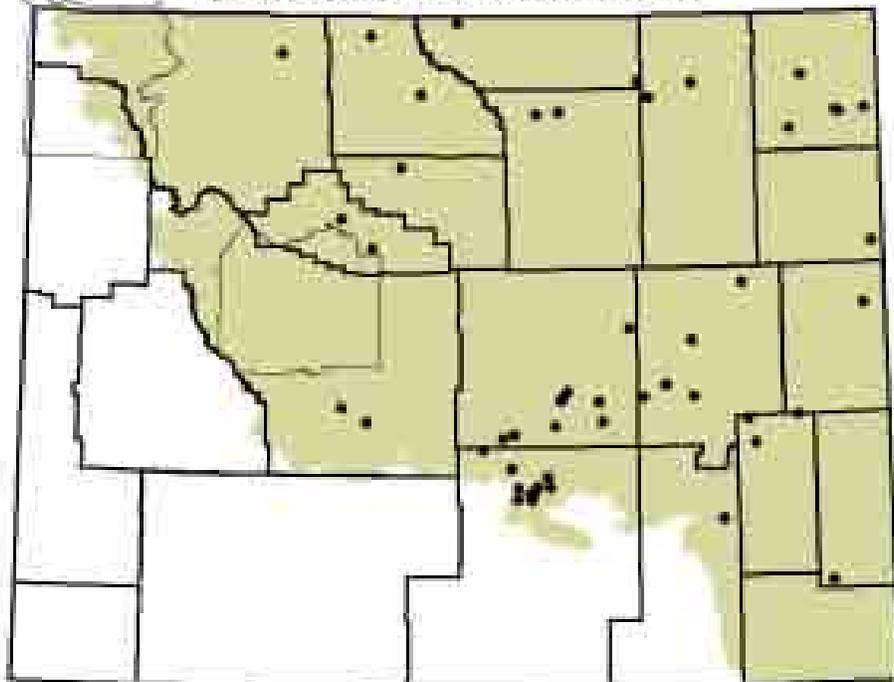
References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

Scott, N.J., Jr. 1996. Ecosystem disturbance and wildlife conservation in western grasslands: A symposium proceedings. USDA Forest Service. General Technical Report RM-GTR-285. Fort Collins, Colo. pp 40-53.

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Bullsnake Distribution



Cliff Tree Lizard (*Urosaurus ornata wrighti*)

Status: NSS2; NatureServe G5 S2

Abundance: Uncommon

Introduction: While not much is known about the northern tree lizard's breeding habits, it's believed to produce two clutches of 3 to 5 eggs annually. Its diet consists of spiders and a variety of insects, including thrips, plant bugs, aphids, beetles, caddisflies, moths, butterflies, flies, wasps and ants.

Habitat: This lizard prefers cliffs and rocky canyon slopes in sagebrush desert habitats. It's often found on the vertical surfaces of large boulders or rock cliffs. In Wyoming, the cliff tree lizard occurs in the extreme southwestern part of the state. It also ranges south through Utah and western Colorado to northern Arizona and northern New Mexico.

Problems: Population status, distribution and habitat data are lacking for this species. Habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

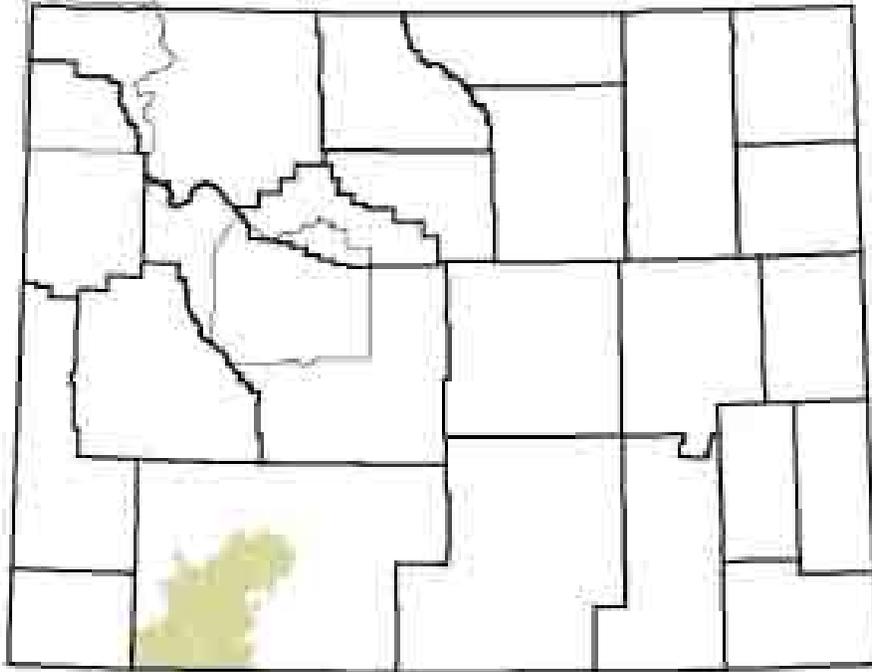
- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

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Cliff Tree Lizard Distribution



Common Garter Snake (*Thamnophis sirtalis*)

Status: NSS4; NatureServe G5 P3

Abundance: Common

Introduction: There are two sub-species of this snake in Wyoming: valley garter snakes (*T. s. fitchi*) and red-sided garter snakes (*T. s. parietalis*). Valley garter snakes are found in the western portion of the state, west of the continental divide, and red-sided garter snakes are found east of the continental divide. Both animals are very similar, reaching a maximum size of 46 inches. The background color of these snakes is olive or brown, with a single lightly colored mid-dorsal stripe and two lateral stripes of the same color. Between the dorsal and lateral stripes there are usually some red or orange markings. This coloration distinguishes these snakes from the other garter snakes in the area. These animals are found most commonly in riparian areas. They spend the winters in dens that may contain hundreds of individuals. They are known to be active as early as March. These snakes bear their young live with clutches that may contain as many as 85 young snakes born between May and November. Males are known to follow the scent trails of females to breed. These snakes eat frogs, toads, fishes and earthworms.

Habitat: These snakes are known to inhabit grasslands, woodlands, shrub brush, chaparral and forests. They are most commonly found near water

Problems: The population status, distribution and habitat data are lacking for this species. Likewise, habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

References and Additional Reading:

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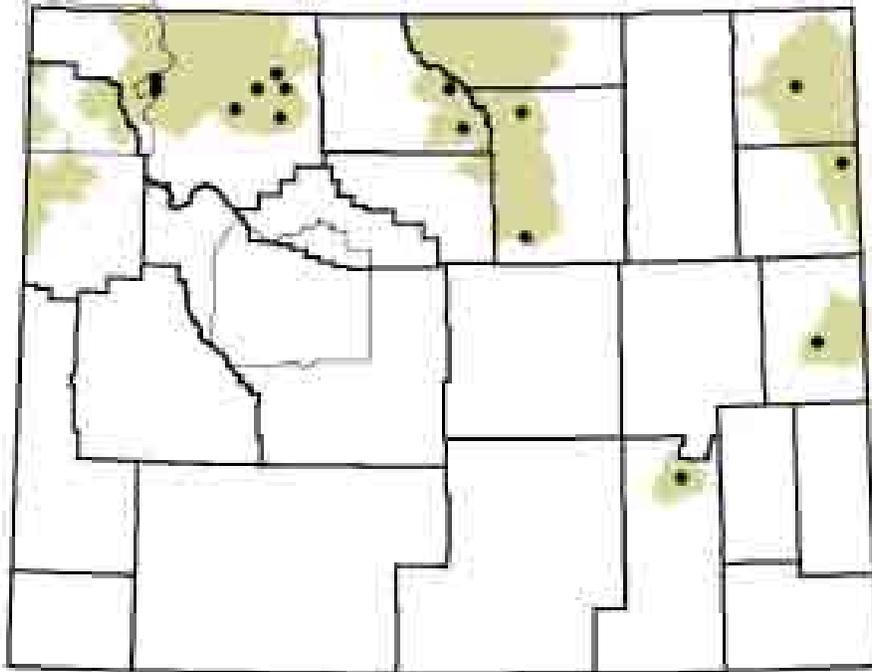
Hammerson, G.A. 1999. Amphibians and Reptiles in Colorado: A Colorado Field Guide, Second Edition. University Press of Colorado and Colorado Division of Wildlife. 484 pp.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 19, 2004).

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Common Garter Snake Distribution



**Eastern Yellow-bellied Racer (*Coluber constrictor flaviventris*) Status: NSS4;
NatureServe G5 T5 S4**

Abundance: Common

Introduction: The eastern yellow-bellied racer's preferred diet consists of a variety of insects, including grasshoppers, crickets and katydids. It also feeds on small mammals, frogs and snakes. Females deposit clutches of from eight to 21 eggs in soft soil or rodent burrows. Eggs are probably laid in June and July and hatch after mid-August. These snakes overwinter in dens, often with other snake species.

Habitat: Strong swimmers that are often found near water, the eastern yellow-bellied racer occupies scarp woodlands of the plains and foothills zones, and woodland communities of the Black Hills. It ranges throughout most of Wyoming's counties east of the Continental Divide, below about 7,000 feet in elevation. This species prefers mostly open areas, although when found in shortgrass communities, it's usually close to streams or rocky outcrops with cover nearby. The eastern yellow-bellied racer ranges from Michigan and Ohio west through the upper Mississippi Valley and the Great Plains of the Rocky Mountains.

Problems:

- Population status, distribution and habitat data are lacking for this species.
- Habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

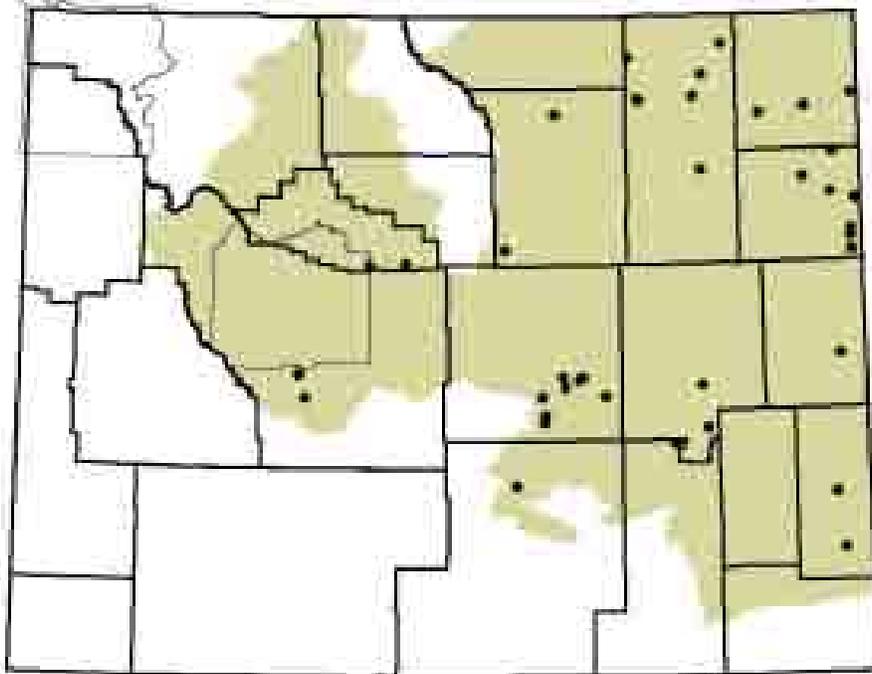
References and Additional Reading:

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Scott, N.J., Jr. 1996. Ecosystem disturbance and wildlife conservation in western grasslands: A symposium proceedings. USDA Forest Service. General Technical Report RM-GTR-285. Fort Collins, Colo. pp 40-53.

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Eastern Yellow-bellied Racer Distribution



Great Basin Gophersnake (*Pituophis melanoleucas deserticola*)

**Status: NSS2
NatureServe G5T5S3**

Abundance: Uncommon

Introduction: While not much is known about the habits of the Great Basin gophersnake, they are probably similar to those of the bullsnake. The gophersnake's diet includes mice, gophers, chipmunks and rabbits. It is oviparous, laying eggs in loose soil. In Utah, it was noted that the eggs likely hatch in August or September. This snake is also known as *P. catenifer deserticola*.

Habitat: This snake prefers sagebrush communities and deserts in the plains zone. In Wyoming, it can be found in the south-central counties at lower elevations, and west of the Continental Divide in the Wyoming Basin. Elsewhere, it is distributed from the Great Basin to eastern California, Oregon and Washington.

Problems:

- Population status, distribution and habitat data are lacking for this species; and
- Habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

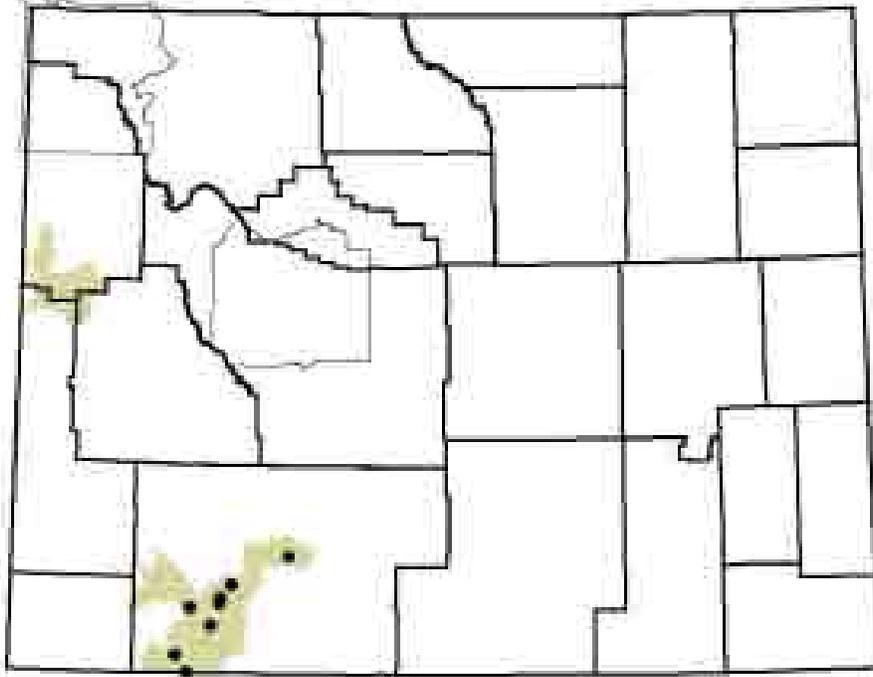
References and Additional Reading:

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Great Basin Gophersnake Distribution



Great Plains Earless Lizard (*Holbrookia maculata maculata*)

**Status: NSS4;
NatureServe G5 P3**

Abundance: Common

Introduction: These are slender lizards that reach only two inches in length. The tail is almost as long as the body. They have a brown, red, pinkish or green background color, with a lighter colored mid-dorsal stripe. These lizards lack an external ear opening. This feature distinguishes them from all other lizards in Wyoming and is the reason for their common name. They are known to eat small invertebrates, including grasshoppers. Earless lizards lay clutches of 1 - 12 eggs.

Habitat: These lizards favor grasslands and in Wyoming appear to have a preference for yucca plants. They are restricted to Goshen and Laramie counties at elevations below 6,000 feet.

Problems: The population status, distribution and habitat data are lacking for this species. Likewise, habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

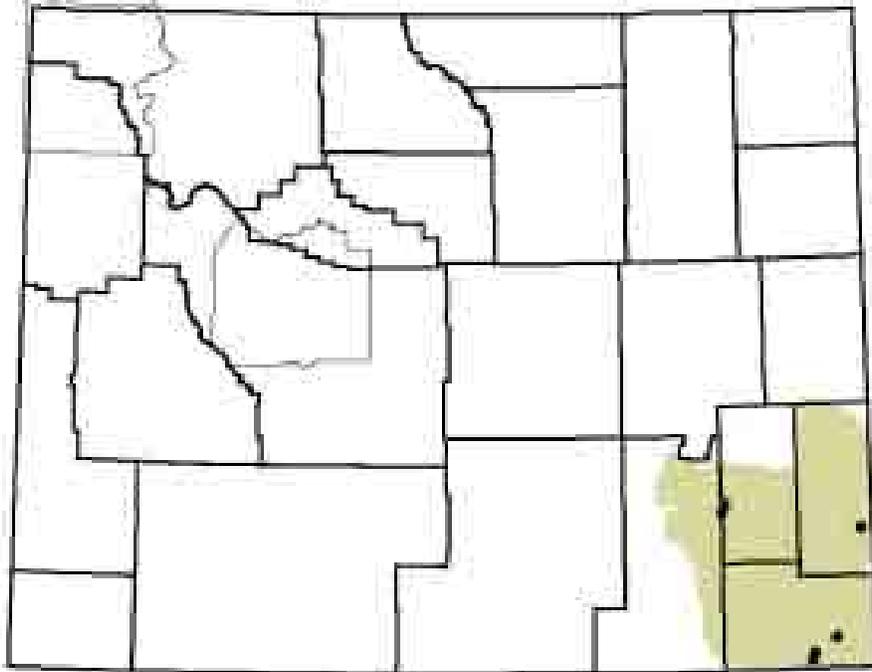
Hammerson, G.A. 1999. Amphibians and Reptiles in Colorado: A Colorado Field Guide, Second Edition. University Press of Colorado and Colorado Division of Wildlife. 484 pp.

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Great Plains Earless Lizard Distribution



Greater Short-horned Lizard (*Phrynosoma hernandesi hernandesi*)

**Status: NSS4
NatureServe G5 S4**

Abundance: Common

Introduction: Although identified as common anecdotal evidence indicates many populations are in decline throughout this species' range. This lizard bears live young, with litters ranging in size from 12 to 24. Its preferred diet consists of ants and beetles, but it will also feed on grasshoppers and other insects. Primarily a surface dweller, it forages most often during the day. Although commonly found in flat, arid areas with firm soil, the eastern short-horned lizard will burrow where loose sand is available. This species is active from May to September or October. Its protective coloration provides defense against predators.

Habitat: The greater short-horned lizard prefers grassland and sagebrush habitats. In Wyoming, its range encompasses the entire state below 6,500 feet in elevation. It can also be found in Montana east of the Rocky Mountains south through western South Dakota, western Nebraska and Colorado.

Problems:

- Population status, distribution and habitat data are lacking for this species; and
- Habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

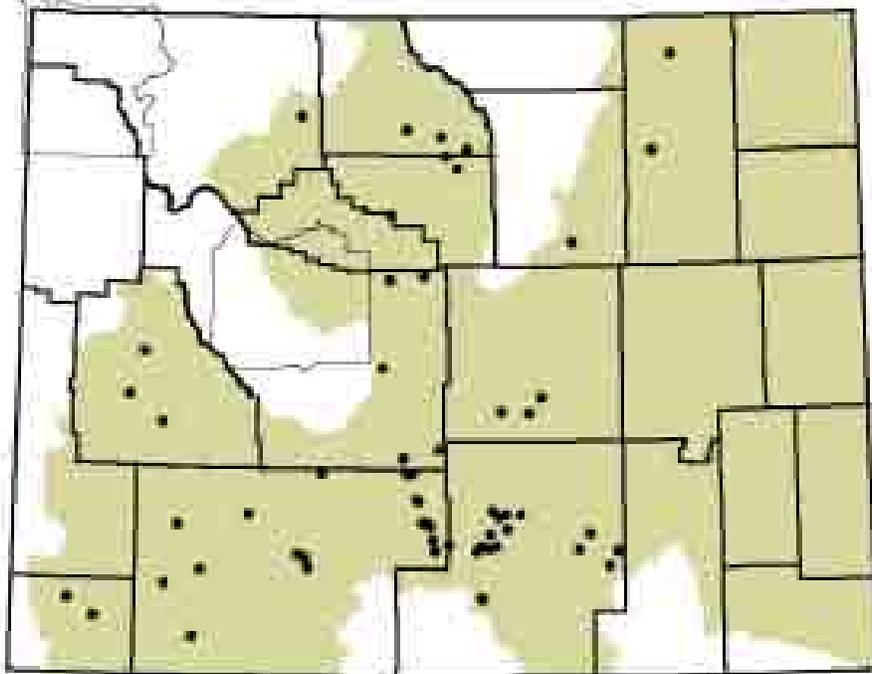
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Greater Short-horned Lizard Distribution



Intermountain Wandering Gartersnake (*Thamnophis elegans vagrans*)

Status: NSS4; NatureServe G5 T5 SNR

Abundance: Common

Introduction: The Intermountain wandering gartersnake bears its young live, with about seven to fourteen per litter. Its diet includes fish, frogs, small mammals, earthworms, slugs, grasshoppers and other small invertebrates. It will even feed on dead fish along the edges of fish-rearing ponds. This gartersnake may spend the winter in small mammal burrows or crevices, usually with other snake species.

Habitat: Wyoming's most common and widely distributed snake, this species can be found in all habitat zones other than the alpine zone. It is frequently found near water. It occurs in every county in the state. This snake is usually found above 5,500 feet, but has been known to occur at elevations as high as 10,000 feet. Its abundance is greatest in and along the rubbled shorelines of large streams. Elsewhere, the intermountain wandering gartersnake ranges from southern Canada and the Pacific Northwest across the Great Basin and Rocky Mountains to New Mexico and Arizona.

Problems:

- Population status, distribution and habitat data are lacking for this species; and
- Habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

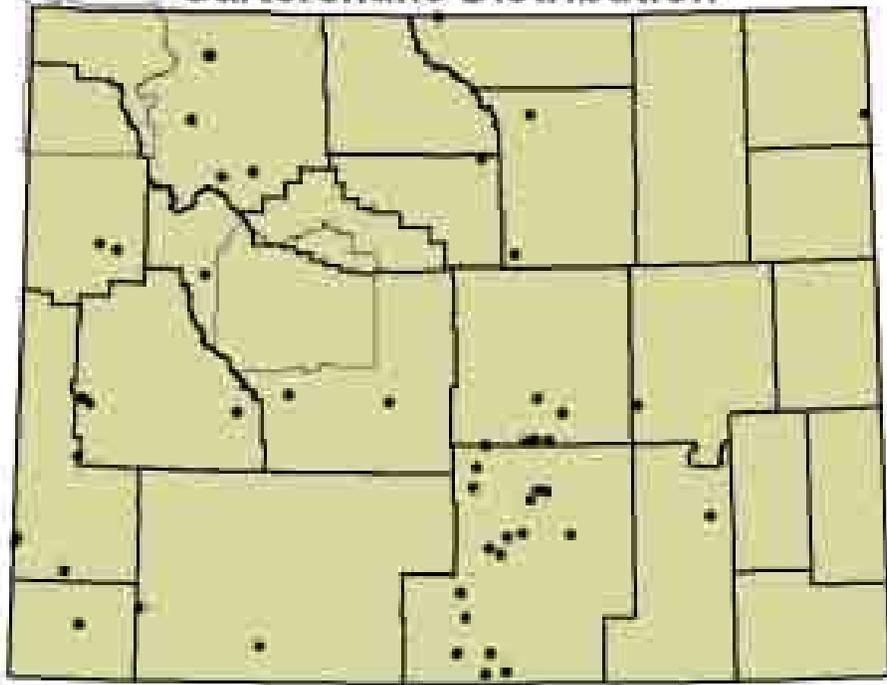
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Wyoming Game and Fish Department. 1999. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 189pp.

Intermountain Wandering Gartersnake Distribution



Many-lined Skink (*Eumeces multivirgatus multivirgatus*)

Status: NSS4;NatureServe S4

Abundance: Common

Introduction: These lizards are slender and reach three inches in length. They have a very long tail and many dark and light lengthwise stripes, thus their name. Their tails may be blue in young animals. They can detach their tail to confuse predators. They may be active from April to October in warmer years. They lay eggs in the spring. In Colorado this occurs in late May or Early June with hatchlings appearing as early as mid-June. They are thought to eat invertebrates. They spend the winter underground.

Habitat: These lizards prefer loose soil that is good for burrowing. They are often found near prairie dog colonies. They seek cover readily and are often found under objects such as logs, cow dung, trash and rocks.

Problems: The population status, distribution and habitat data are lacking for this species. Likewise, habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

References and Additional Reading:

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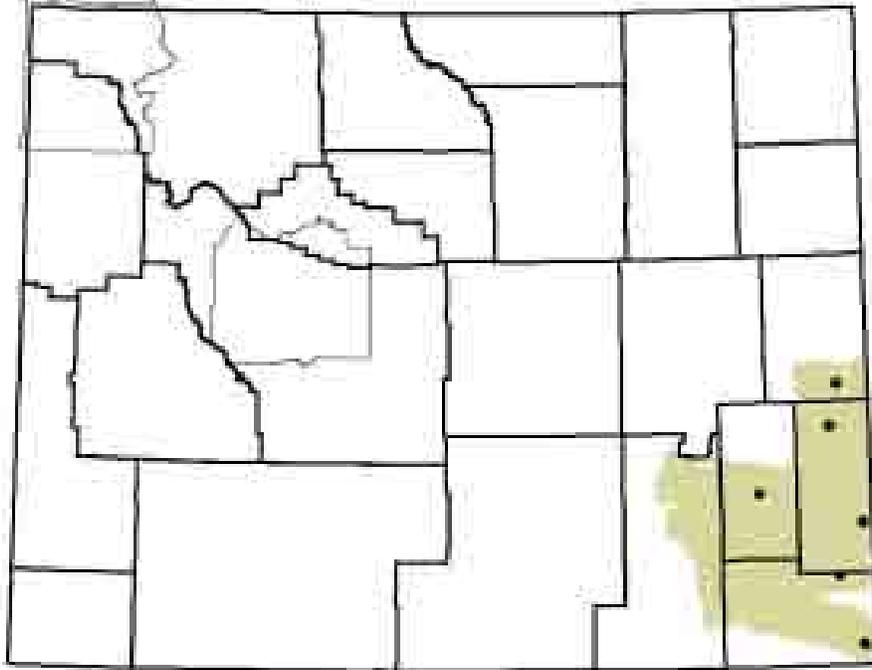
Hammerson, G.A. 1999. Amphibians and Reptiles in Colorado: A Colorado Field Guide, Second Edition. University Press of Colorado and Colorado Division of Wildlife. 484 pp.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 19, 2004).

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Many-lined Skink Distribution



Midget Faded Rattlesnake (*Crotalus viridis concolor*) Status: NSS2; NatureServe G5 T3 S1

Abundance: Rare

Introduction: Little information is available about the midget faded rattlesnake, but it is assumed that the breeding and feeding habits of this snake are similar to those of the prairie rattlesnake.

Habitat: This rattlesnake inhabits rock outcrops in sagebrush desert. Its range in Wyoming is limited to the lower Green River valley from Green River and Rock Springs to the Utah-Wyoming border. Elsewhere it occurs in northeastern Utah and northwestern Colorado.

Problems: A variety of factors are felt to be impacting this species. These include; unregulated collection by reptile enthusiasts, and higher mortality due to more contact with humans and vehicles relating to increased mineral exploration and recreational ATV use within its range

Conservation Actions:

- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs;
- Develop management recommendations based on resulting data; and
- Determine the impacts of unregulated collection has on the overall population.

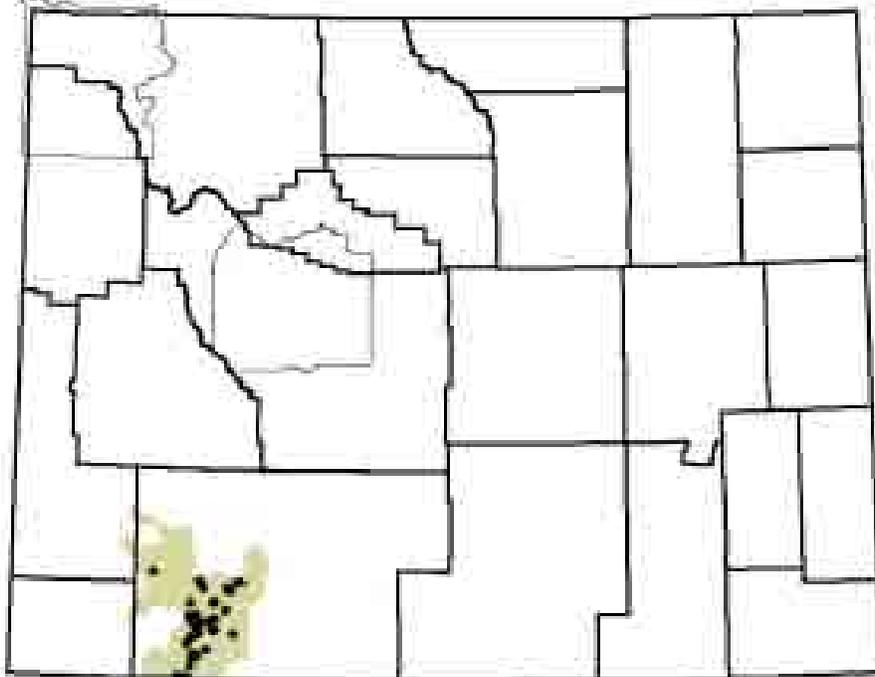
References and Additional Reading:

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Midget Faded Rattlesnake Distribution



Northern Plateau Lizard (*Sceloporus undulates elongatus*)

**Status: NSS3
NatureServe G5 T5 S1**

Abundance: Uncommon

Introduction: The northern plateau lizard feeds on grasshoppers, crickets, leaf hoppers, flying ants, moths and other insects. In Utah, this species lays three clutches of eggs, with about 6 eggs per clutch. It's believed that females live to reproduce no longer than three or four years.

Habitat: This lizard lives in rock outcrops and canyon walls in sagebrush communities. In Wyoming, it can be found in the extreme southwest, where it occurs mainly at low elevations in the lower Green River valley in Sweetwater County. The northern plateau lizard was also documented in the North Platte River valley in Carbon County. Its range includes eastern Utah, much of Colorado, northwestern New Mexico and northeastern Arizona, as well.

Problems: Population status, distribution and habitat data are lacking for this species. Likewise, habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

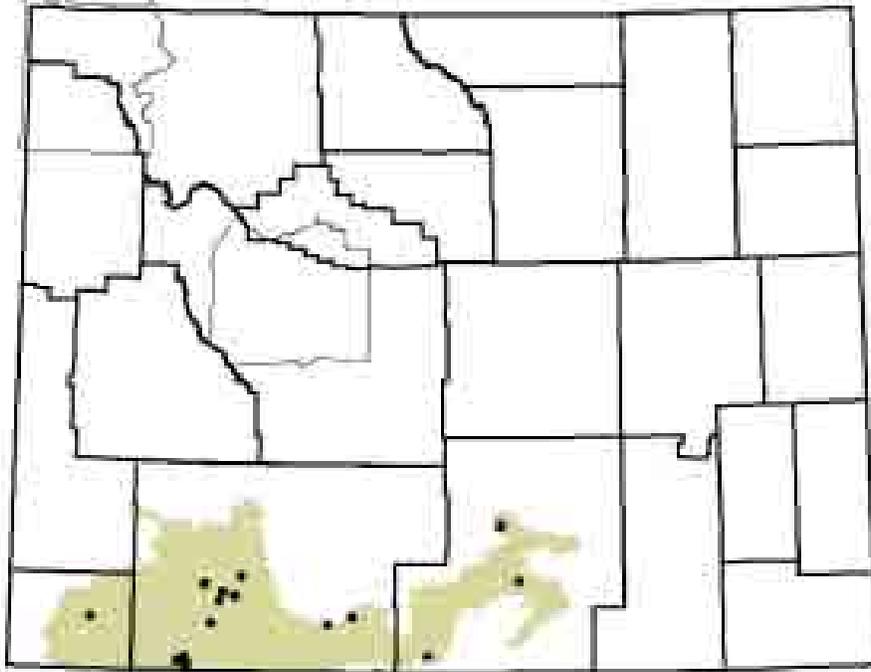
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Northern Plateau Lizard Distribution



Northern Prairie Lizard (*Sceloporus undulatus garmani*) **Status: NSS4; NatureServe N5**

Abundance: Common

Introduction: This is a rough scaled lizard of the prairie, closely related to the eastern fence lizard. These animals have blue and black markings on their bellies and chins. They engage in courtship behaviors included doing “push ups”. They are generally less than three inches in size. The diet of these lizards probably consists of small invertebrates including grasshoppers and small beetles. They lay eggs in clutches of one to seventeen from April to August. A female was collected in May near Wheatland, WY that had eggs measuring about a half inch in width. There is some evidence to indicate that these lizards may lay two clutches of eggs per breeding season.

Habitat: These lizards are found in the southeastern counties of Wyoming. They are typically found below 6,000 feet elevation. Their preferred habitat is grassland, sand stone cliffs, dry areas with yucca, and scarp woodlands.

Problems: The population status, distribution and habitat data are lacking for this species. Likewise, habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

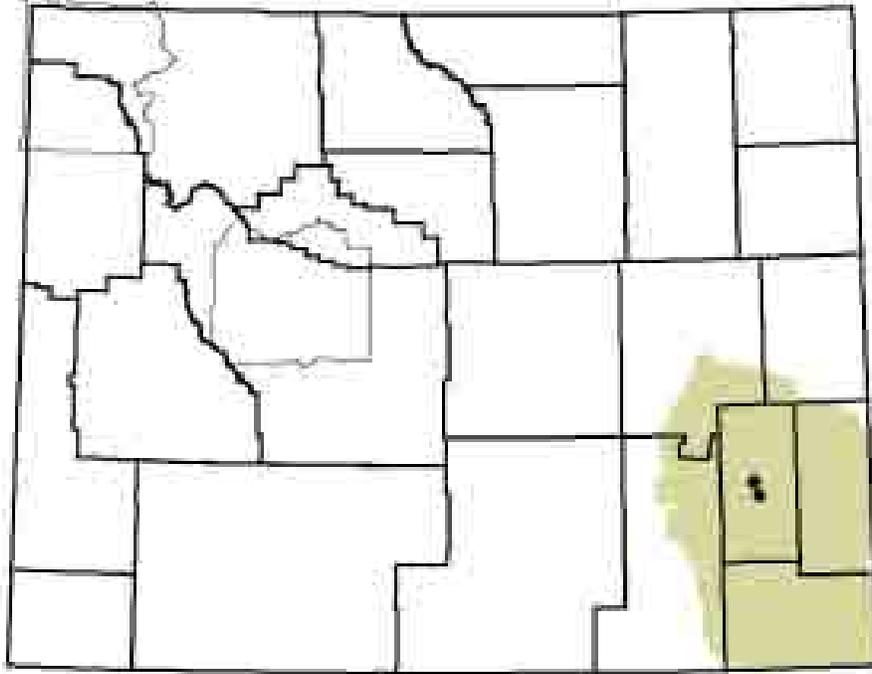
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Northern Prairie Lizard Distribution



Northern Sagebrush Lizard (*Sceloporus graciosus graciosus*)

Status: NSS4
NatureServe: G5 T5 SNR

Abundance: Common

Introduction: The northern sagebrush lizard's diet consists of ants, beetles, termites, leaf hoppers, butterflies, moths, flies and other insects, as well as spiders. It becomes active in May, with mating and egg-laying occurring in early summer. Females of this species in Colorado and Utah lay two clutches of about four or five eggs each year, but it's not known if two clutches are common to this species in Wyoming. These lizards reach their adult size in their second summer, with most females reproducing at the age of two years.

Habitat: This lizard occurs in rock outcrops in sagebrush and juniper communities, as well as semi-arid and mountain shrublands, usually below 6,000 feet in elevation. It is also found at 7,500 feet in association with the geothermal features of Yellowstone National Park. The northern sagebrush lizard is widespread in the western two-thirds of Wyoming. It's common in the Big Horn Basin, but rare in the lower Snake River valley. Elsewhere, it can be found in western Colorado, northern New Mexico, and across the Great Basin to the Pacific coast in northern California.

Problems: Population status, distribution and habitat data are lacking for this species. Likewise, habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

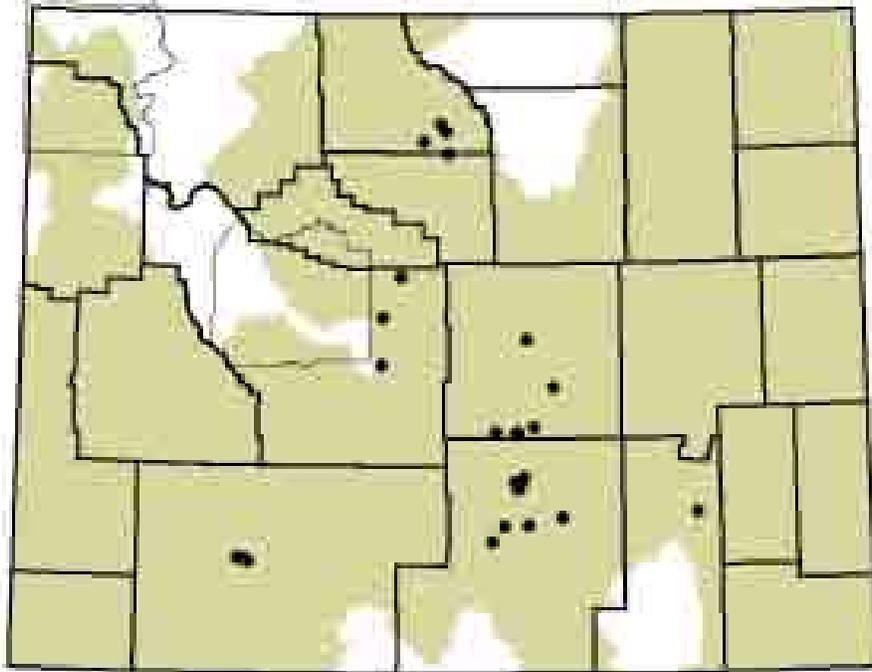
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Northern Sagebrush Lizard Distribution



Ornate Box Turtle (*Terrapene ornata ornata*)

Status: NSS4; NatureServe S5

Abundance: Common but not wide spread.

Introduction: These are small, mostly terrestrial turtles, reaching only five and three quarter inches. They do sometimes enter the water although they are not strong swimmers. They have hinged plastrons (ventral shell) and can close themselves completely in their shells. Hatchlings lack the hinges. The males have reddish eyes; the eyes of female box turtles are brown. They lay eggs in clutches of two to eight eggs from May to August. Nesting activity may be stimulated by rainfall. Their name comes from the pale radiating lines on their dorsal shell. These turtles are omnivorous with a diet that includes earthworms, grasshoppers, crayfish, eggs, cactus, grass and leaves. They may even dig through cow dung to find invertebrates. Box turtles burrow to escape the elements and prefer loose soil that allows them to dig.

Habitat: These turtles favor prairies, but may also occur in woodlands. They will seek areas with loose soils to burrow.

Problems: The population status, distribution and habitat data are lacking for this species. Likewise, habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations. Populations in adjoining states have undergone dramatic declines. In some areas, this species may have been over harvested for the pet trade.

Conservation Actions:

- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

Hammerson, G.A. 1999. Amphibians and Reptiles in Colorado: A Colorado Field Guide, Second Edition. University Press of Colorado and Colorado Division of Wildlife. 484 pp.

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Ornate Box Turtle Distribution



Pale Milksnake (*Lampropeltis triangulum multistrata*) Status: NSS2; NatureServe G5 S3

Abundance: Rare

Introduction: This snake feeds on small mammals, birds, lizards, other snakes, and bird and reptile eggs. It overwinters in dens, often with other snake species. Secretive and mainly nocturnal, the pale milksnake can be found under logs or in other hiding places during the day. . Milksnakes typically lay a clutch of 2 to 17 eggs in June or July. The eggs hatch in August or September.

Habitat: The pale milksnake prefers grasslands, sandhills and scarp woodlands below 6,000 feet in elevation. It is distributed throughout the northern Great Plains. In Wyoming, it can be found in the eastern counties and the Big Horn Basin.

Problems: The population status, distribution and habitat data are lacking for this species. Likewise, habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

References and Additional Reading:

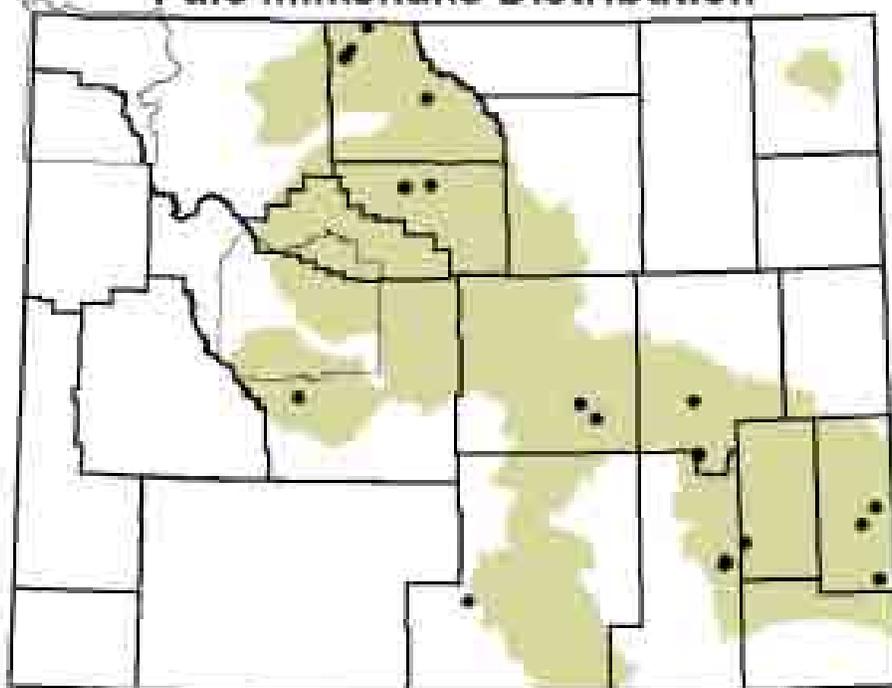
Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 11, 2004).

Scott, N.J., Jr. 1996. Ecosystem disturbance and wildlife conservation in western grasslands: A symposium proceedings. USDA Forest Service. General Technical Report RM-GTR-285. Fort Collins, Colo. pp 40-53.

Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.

Pale Milksnake Distribution



Plains Black-headed Snake (*Tantilla nigriceps*)

Status: NSS3; NatureServe G5

Abundance: Unknown

Introduction: A small brown snake with a black head, this species is secretive and often overlooked. Its belly has a reddish or orange strip along its mid-line. This species reaches about 15 inches in total length. In neighboring states, plains black-headed snakes lay from one to three eggs in June or July. Eggs hatch in about 60 days. These snake are most often active at night or in overcast conditions. They prefer humid, warm weather. Plains black-headed snakes seek shelter under rotting logs, rocks, wood or dung during the day. They probably spend the winter underground. In Kansas they have been found more than six feet underground in January. They are probably most active from April to September in Wyoming.

Habitat: This snake occupies plains grasslands, sand hills, foothills and rocky canyons in Colorado. It prefers spending much of its time under rocks, logs and other objects. In Wyoming they are known to be near the Glendo Dam, in Platte County, WY.

Problems: The population status, distribution and habitat data are lacking for this species. Likewise, habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

- Determine if species is still present in state;
- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

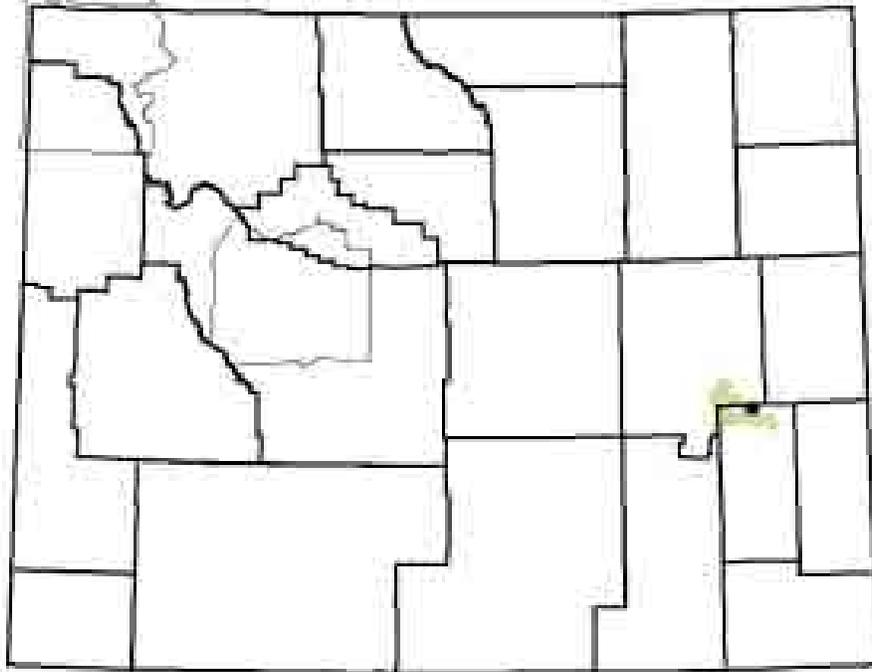
Hammerson, G.A. 1999. Amphibians and Reptiles in Colorado: A Colorado Field Guide, Second Edition. University Press of Colorado and Colorado Division of Wildlife. 484 pp.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 19, 2004).

Stebbins, R. C. 1985. A Field Guide to Western Reptiles and Amphibians. Houghton Mifflin Company Boston New York. 336 pp.

Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.

Plains Black-headed Snake Distribution



Plains Gartersnake (*Thamnophis radix*)

**Status: NSS4;
NatureServeG5 S5**

Abundance: Common

Introduction: This snake bears its young live, with litters ranging in size from nine to 21 young. Mating takes place in either spring or fall and is associated with congregating for denning. When mating occurs in the fall, the sperm remain active in the female over the winter, and fertilization takes place in spring. The plains gartersnake feeds on fish, frogs, small mammals, insects and earthworms. When overwintering, it often forms large aggregations with bullsnakes, rattlesnakes, pale milksnakes and eastern yellow-bellied racers.

Habitat: The plains gartersnake may be found in residential areas, dry grasslands and sandhills near small streams, sloughs, marshes and ponds. In Wyoming, it occurs east of the Continental Divide below 6,500 feet in elevation. Elsewhere, this gartersnake ranges in the Great Plains from Minnesota and Iowa to the Rocky Mountains, and in southern Canada to northern New Mexico and Texas.

Problems:

- Population status, distribution and habitat data are lacking for this species; and
- Habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

Scott, N.J., Jr. 1996. Ecosystem disturbance and wildlife conservation in western grasslands: A symposium proceedings. USDA Forest Service. General Technical Report RM-GTR-285. Fort Collins, Colo. pp 40-53.

Wyoming Game and Fish Department. 1999. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 189pp.

Plains Gartersnake Distribution



Plains Hog-nosed Snake (*Heterodon nasicus nasicus*) Status NSS4; NatureServe G5 S4

Abundance: Common

Introduction: The plains hog-nosed snake feeds on toads, lizards, small mammals, frogs, birds and a variety of invertebrates. Females breed every other year, depositing their eggs in soft soil or sand. Clutches contain an average of nine eggs. . If threatened, the hog-nosed snake will spread its head and hiss, but if harassed further will only play dead. It is not considered a dangerous snake.

Habitat: This snake prefers plains grasslands and sandhills, where it is known to burrow in loose soils. In Wyoming, it's found in the eastern counties, but rarely in the foothills. The plains hog-nosed snake ranges from southern Canada and the Dakotas south in the Great Plains to Texas, New Mexico and Arizona, and east into Illinois and Arkansas.

Problems: The threatening behavior of this snake and its resemblance to the rattlesnake often cause it to be killed needlessly by those thinking it is venomous. Population status, distribution and habitat data are lacking for this species. Likewise, habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

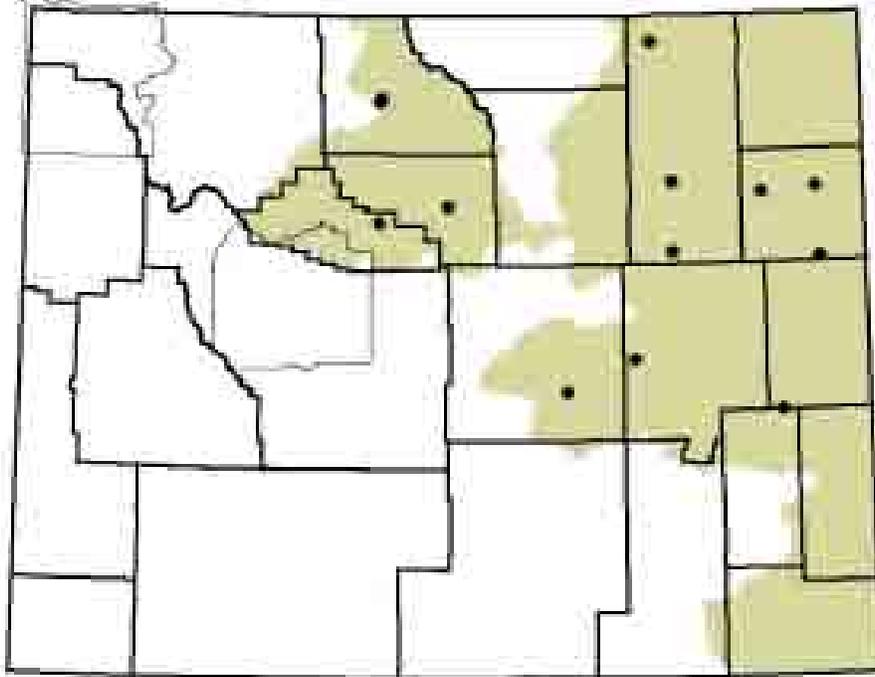
References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

Scott, N.J., Jr. 1996. Ecosystem disturbance and wildlife conservation in western grasslands: A symposium proceedings. USDA Forest Service. General Technical Report RM-GTR-285. Fort Collins, Colo. pp 40-53.

Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.

Plains Hog-nosed Snake Distribution



Prairie Racerunner (*Cnemidophorus sexlineatus viridis*) **Status:** NSS4; NatureServe N5

Abundance: Common

Introduction: This is a small lizard whose snout-vent length rarely exceeds three inches. Its tail is usually twice that length. The dorsal color is brown to grayish with greenish tint on the sides. These lizards have seven narrow but well-defined lengthwise stripes. The stripes maybe yellow, blue or green and run the length of the body. In Wyoming, these lizards are known mainly from the Wheatland area in Platte County. The diet of this species is made of small invertebrates including grasshoppers, spiders, wasps, snails, beetles, flies, cockroaches and worms. These lizards lay two clutches of eggs in June or July, which hatch in August or September. Racerunners may be active until October in warm years.

Habitat: These lizards prefer open areas in grasslands, sand hills, floodplains and woodlands. They seek cover under objects, use other animal's burrows or dig their own.

Problems: The population status, distribution and habitat data are lacking for this species. Likewise, habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

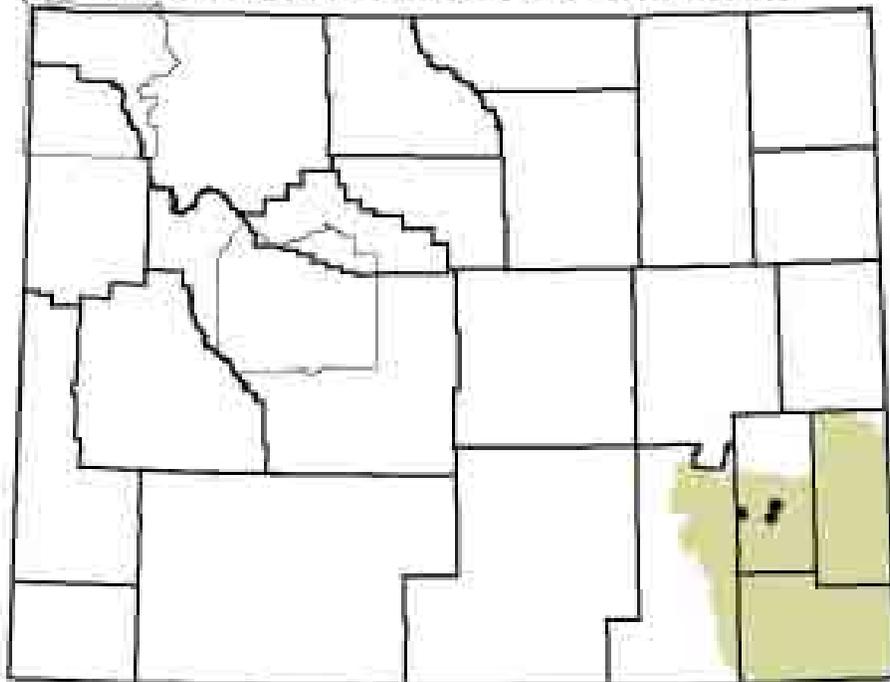
Conservation Actions:

- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

References and Additional Reading:

- Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.
- Hammerson, G.A. 1999. Amphibians and Reptiles in Colorado: A Colorado Field Guide, Second Edition. University Press of Colorado and Colorado Division of Wildlife. 484 pp.
- NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 19, 2004).
- Stebbins, R. C. 2003. A Field Guide to Western Reptiles and Amphibians: Third Edition. Houghton Mifflin Company Boston New York. 336 pp.
- Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.

Prairie Racerunner Distribution



Prairie Rattlesnake (*Crotalus viridis viridis*)

Status: NSS3; NatureServe G5 T5 SNR

Abundance: Common

Introduction: The prairie rattlesnake's diet consists of rodents such as ground squirrels, prairie dogs, chipmunks and cottontail rabbits, as well as frogs, toads, lizards, other snakes and birds. They hunt during the cooler parts of the day; Wyoming nights are too cold for them to be very active. Prairie rattlers bear an average of ten live young in August or September. They may only reproduce every other year. This snake overwinters in large aggregations in deep underground crevices, prairie dog burrows and other abandoned mammal burrows, usually emerging in April or May. Not averse to water, prairie rattlers are occasionally found swimming in the middle of large reservoirs.

Habitat: The prairie rattlesnake can be found in the plains, foothills and scarp woodlands, preferring areas near granite or limestone outcrops. They can also be found along creeks and rivers. In Wyoming, this species occurs in all counties east of the Continental Divide and in Carbon County west of the Divide, usually under 7,000 feet in elevation. In shortgrass plains, this snake favors black-tailed prairie dog towns as habitat, but populations in these areas have declined. Elsewhere, the prairie rattler ranges in the Great Plains from eastern Nebraska and South Dakota and central Kansas west to the Rocky Mountains, and from southern Canada to northern Mexico.

Problems: The population status, distribution and habitat data are lacking for this species. Likewise, habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

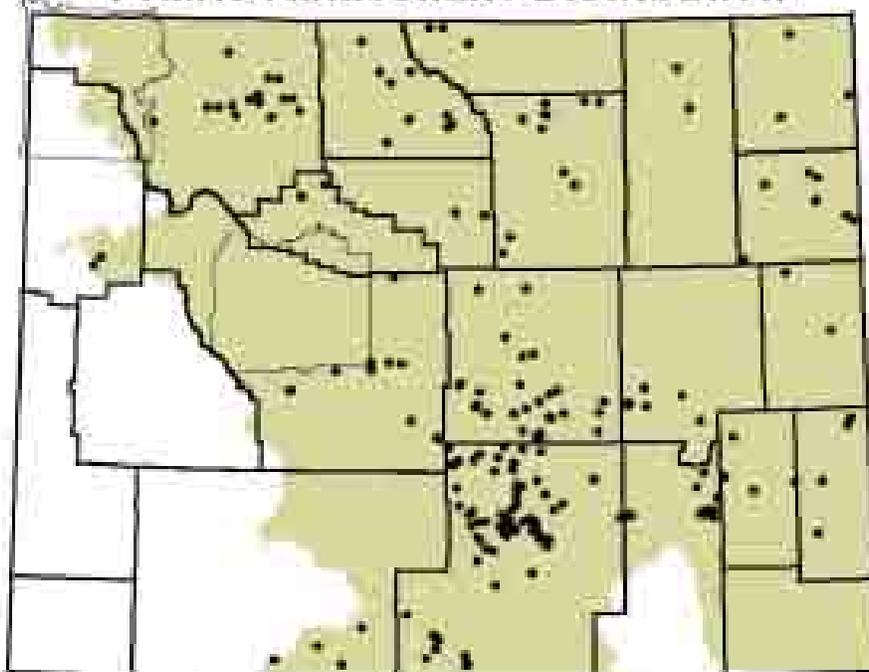
References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

Scott, N.J., Jr. 1996. Ecosystem disturbance and wildlife conservation in western grasslands: A symposium proceedings. USDA Forest Service. General Technical Report RM-GTR-285. Fort Collins, Colo. pp 40-53.

Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.

Prairie Rattlesnake Distribution



Red-lipped Plateau Lizard (*Sceloporus undulatus erythrocheilus*)

**Status: NSS4
NatureServe G5 T5 S1**

Abundance: Unknown

Introduction: This is one of three subspecies of the fence lizard found in Wyoming. Its food habits have not been studied but are thought to be similar to that of others in its genus, mainly consisting of small insects, spiders and other similarly sized animals. The females reach nearly three inches in snout-vent length, while the average size of males is a half-inch shorter. The snout is red at the tip, thus the common name. The red-lipped plateau lizard is active from May to October. A female was collected with 16 eggs.

Habitat: This subspecies has a narrow range in Wyoming, occurring along the first hogback encountered at the east edge of the Laramie Mountains in Laramie, Platte and Converse counties. Its habitat is restricted to large boulders and rock cliffs in this area. It may live on sandstone cliffs, and occasionally individuals, especially juveniles, can be found near abandoned buildings. From Wyoming, this lizard ranges south to northern New Mexico and western Oklahoma.

Problems: The population status, distribution and habitat data are lacking for this species. Likewise, habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

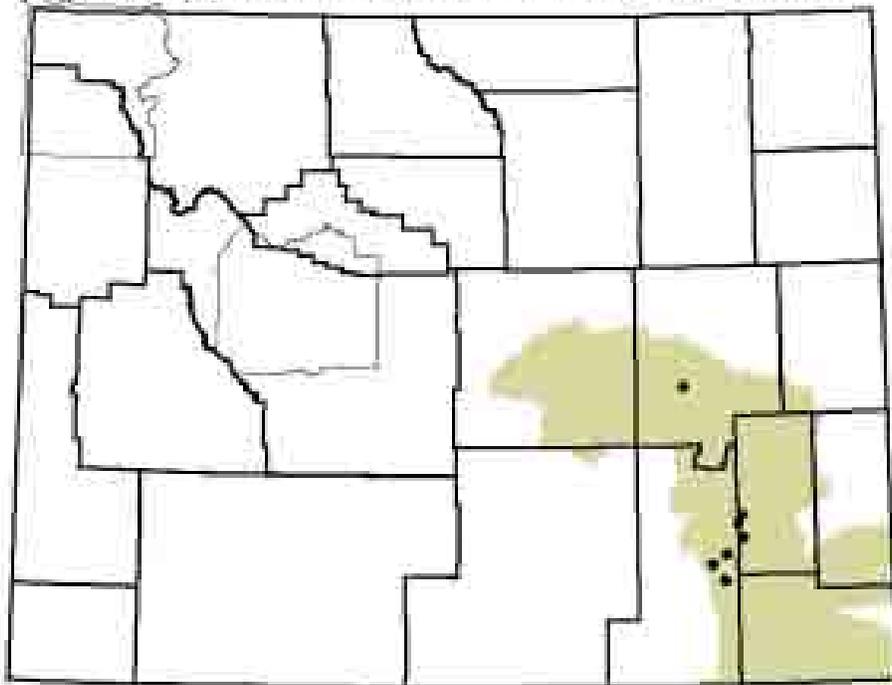
- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.

Red-lipped Plateau Lizard Distribution



Rubber Boa (*Charina bottae*)

Status: NSS2; NatureServe G5 S2

Abundance: Rare

Introduction: The rubber boa bears live young. A secretive snake, it often spends its time beneath logs, flat rocks and other objects, and possibly in rodent burrows, as well. This boa feeds on rodents, lizards and invertebrates. Males have spurs that flank their cloacae. Its common name refers to the rubber-like appearance of its skin. These snakes are highly prized by the pet industry due to their calm nature.

Habitat: The rubber boa prefers areas with an abundance of flat rocks and water nearby. It does not inhabit Wyoming's arid regions, but may be found in the foothills and lower mountain zones of the northwestern corner of the state, south into Star Valley and east to the Big Horn Mountains. It is also distributed west of Wyoming to the Pacific Coast from British Columbia to northern California.

Problems: The population status, distribution and habitat data are lacking for this species. Likewise, habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations. In some parts of the country they have been the target of collection for the pet trade.

Conservation Actions:

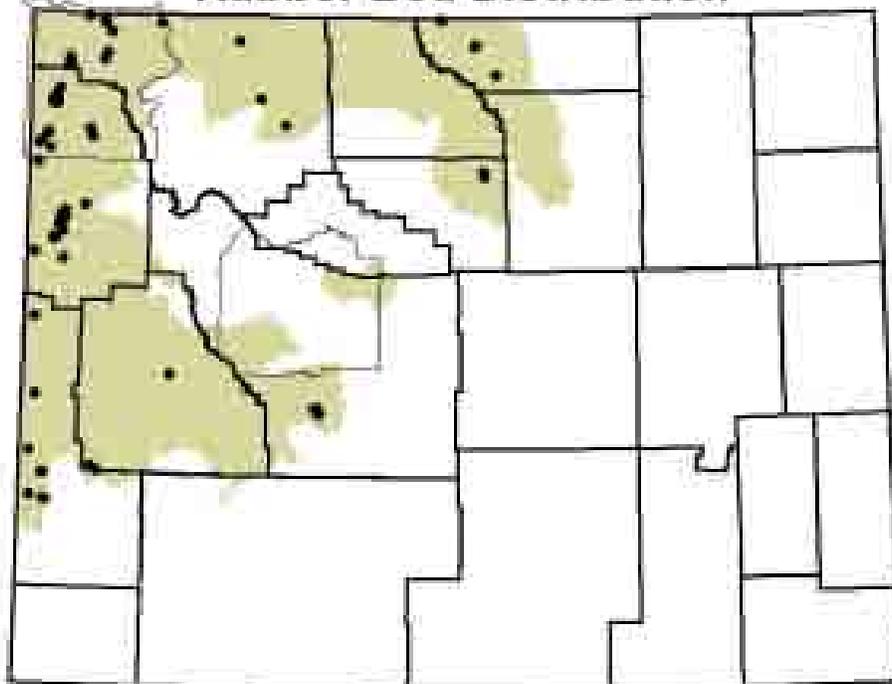
- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs;
- Develop management recommendations based on resulting data; and
- Work to determine if unregulated collection by the pet industry has a significant impact on the larger population.

References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.

Rubber Boa Distribution



Smooth Green Snake (*Opheodrys vernalis*)

Status: NSS2; NatureServe G5 S2

Abundance: Rare

Introduction: The smooth green snake feeds on insects and spiders. Eggs are laid in the summer under rotting wood, rocks or underground, and take up to 30 days to hatch. The average clutch size is four to nine eggs. This snake hibernates from November to March, often in groups of 100 or more.

Habitat: This snake occupies forested areas of the foothills and montane zones, preferring to spend much of its time under rocks, logs and other objects. It's usually associated with lush vegetation. Two subspecies occur in Wyoming. *O. vernalis vernalis*, the eastern smooth green snake, is a relict population that occurs only in the Black Hills of Wyoming and South Dakota. *O. vernalis blanchardi* is the western subspecies, and can be found in southeast and south-central Wyoming. Additionally, the smooth green snake occurs in parts of Canada, the northeastern and north-central United States, and as far west as Utah, Idaho and New Mexico. In the west, the snake's distribution is highly disjointed.

Problems: Although this species is thought to be declining in many parts of its range, the population status, distribution and habitat data are lacking for this species in Wyoming. Likewise, habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

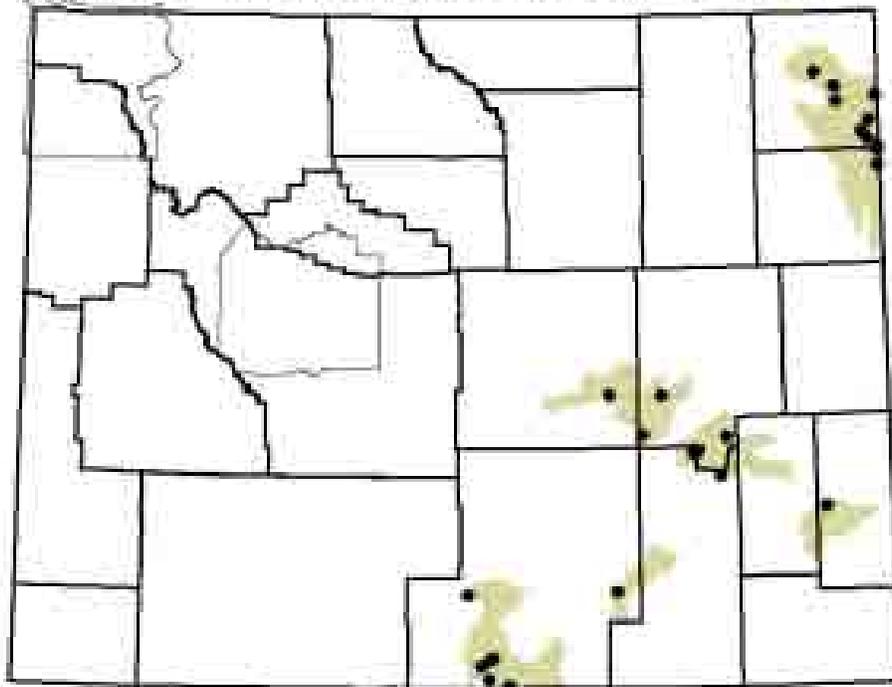
References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 11, 2004).

Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.

Smooth Green Snake Distribution



Western Painted Turtle (*Chrysemys picta belli*) Status: NSS4; NatureServe G5 T5 SNR

Abundance: Common

Introduction: The western painted turtle forages in water, feeding on fish, live and dead plants, vertebrates and invertebrates. Females deposit eggs in soft soil in a funnel-shaped hole that they dig with their hind legs. Hatchlings probably overwinter in the nest. Painted turtles are not as highly aquatic as some other turtle species. They often can be found sunning themselves on logs at the edge of the water. Western painted turtles sometimes carry salmonella due to their diet of fish; because of this, they are less commonly sold as pets than they once were. These turtles generally have a stripe down their carapace (dorsal shell). Males have elongate fore-claws and longer tails than females. Females are larger and tend to be more robust.

Habitat: This species lives in swampy habitats, small lakes, ponds and muddy streams below 6,000 feet in elevation in the plains zone. In Wyoming, it occurs only in the eastern counties, and is abundant near Wheatland, the Powder River and in Muddy Creek in Laramie County. Elsewhere, it ranges from Michigan's Upper Peninsula, through Wisconsin, Illinois and Missouri west to Colorado and Wyoming, and in the north through Montana, eastern Washington and southern British Columbia.

Problems: The population status, distribution and habitat data are lacking for this species. Likewise, habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

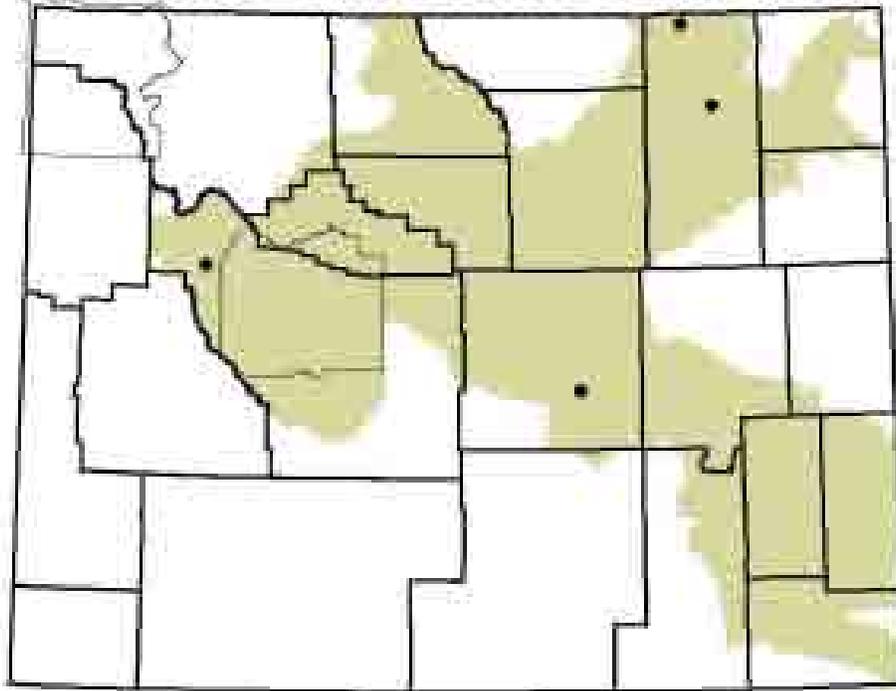
References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

Scott, N.J., Jr. 1996. Ecosystem disturbance and wildlife conservation in western grasslands: A symposium proceedings. USDA Forest Service. General Technical Report RM-GTR-285. Fort Collins, Colo. pp 40-53.

Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.

Western Painted Turtle Distribution



Western Spiny Softshell (*Trionyx spiniferus hartwegi*)

Status: NSS4 NatureServe G5 T5 SNR

Abundance: Common

Introduction: This turtle forages in water, feeding on fish, frogs, tadpoles, crayfish and aquatic insects. In the spring, females deposit about 20 eggs on sand or fine gravel near water, with the young appearing in August or September. Highly aquatic and an excellent, fast swimmer, the western spiny softshell enjoys basking on sand bars along water banks. They also use their elongate neck and pointed snout to “snorkel” without surfacing.

Habitat: The western spiny softshell inhabits permanent lakes, ponds and large streams below 6,000 feet in elevation in the plains. Reports indicate that this turtle occurs in all major river drainages in Wyoming, but is most frequently found in the eastern and northern counties including the Big Horn Basin. It also can be found in the central United States and parts of Montana, North Dakota, Colorado, Oklahoma and Arkansas.

Problems: The population status, distribution and habitat data are lacking for this species. Likewise, habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

Scott, N.J., Jr. 1996. Ecosystem disturbance and wildlife conservation in western grasslands: A symposium proceedings. USDA Forest Service. General Technical Report RM-GTR-285. Fort Collins, Colo. pp 40-53.

Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.

Western Spiny Softshell Turtle Distribution



American Bullfrog (*Rana catesbeiana*)

Status: NSS4; NatureServe G5 S5

Abundance: Uncommon

Introduction: Reaching 8 inches, the bullfrog is the largest frog in the United States. This species may or may not be native to Wyoming. It is considered native east of the Rocky Mountains, thus the eastern populations in Wyoming may be native. It is distinguished from other frogs in by its size and its dorsolateral fold, which begins behind the eyes and terminates just behind the tympanum. Bullfrogs can be brown, green or rarely blue. A carnivore, the adult bullfrog feeds on insects, crayfish and small vertebrates such as birds, frogs and small snakes. Bullfrogs breed in lakes and large ponds. Their call is said to sound like “jug-o-rum”. Breeding probably occurs in July in Wyoming. Data on breeding seasons and rates of development in Wyoming are lacking. Eggs are deposited in permanent waters and tadpoles may reach a length of 3 inches or more before metamorphosis. Larvae will eat suspended matter, organic debris, algae, plant tissue and small aquatic invertebrates. Bullfrog tadpoles may take as long as a year to fully develop.

Habitat: In Wyoming, the bullfrog prefers lower elevations on the eastern plains, where it may be found in permanent water, heavily vegetated sloughs and ponds. In other states, bullfrogs have been found at elevations of 9,000 feet. This species has also been introduced to warm springs, and is occasionally been seen along irrigation canals (near Torrington). Bullfrogs usually remain in one pond or cluster of ponds throughout the season, but they may move up to a mile away from one year to the next. The bullfrog has spread in Wyoming up the lower North Platte River valley from Nebraska to Douglas in Converse County, and up the Laramie River valley to Wheatland in Platte County. Bullfrogs have been introduced to most western states, and also range from southern Canada to Mexico, east of the Continental Divide.

Problems: The status of bullfrogs in Wyoming is largely unknown. These creatures feed on other frogs and may present a problem to native anuran species. The introduction of Bullfrogs has been postulated as a cause of several declines and extirpations of native western anurans.

Conservation Actions:

- The geographic distribution and abundance of this species in Wyoming needs to be determined;
- The disease status of this species in Wyoming needs to be studied;
- The effects of bullfrogs on native wildlife need to be determined;
- A management/control plan needs to be developed to reduce the spread of non-native bullfrogs in Wyoming.

References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

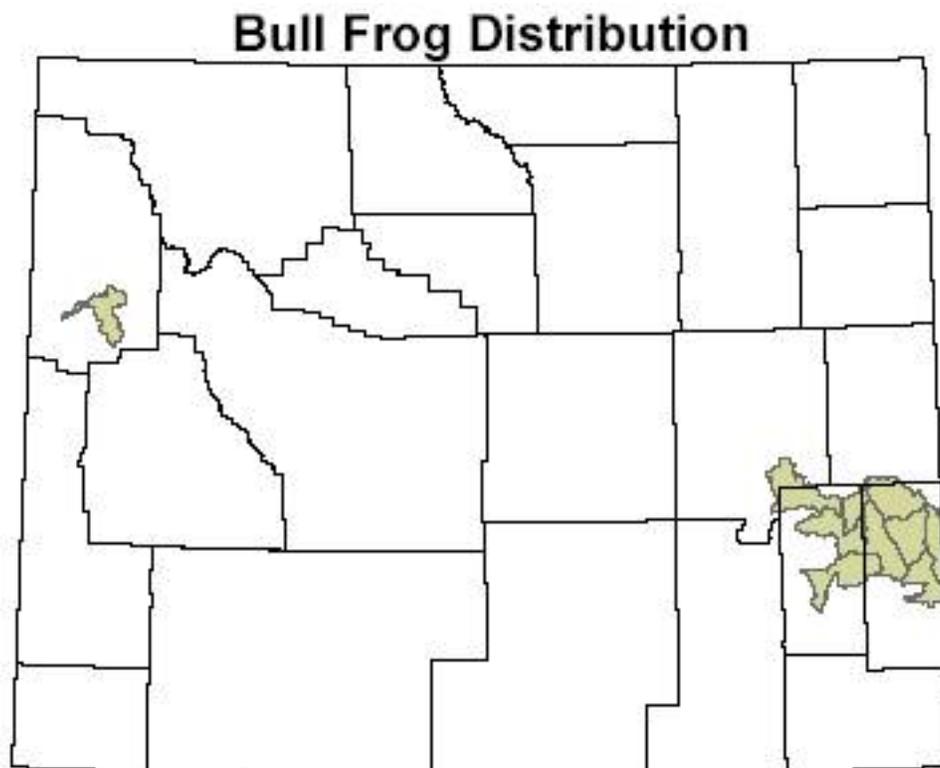
Bury, R.B., and J.A. Whelan. 1984. Ecology and management of the bullfrog. USFWS Resource Pub. 155:1-23.

Hayes, M. P., and M. R. Jennings. 1986. Decline of ranid frog species in western North America: are bullfrogs (*Rana catesbeiana*) responsible? *Journal of Herpetology* 20:490-509.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 1, 2004).

Stebbins, R. C. 1985. *A Field Guide to Western Reptiles and Amphibians*. Houghton Mifflin Company, Boston, New York. 338 pp.

Wyoming Game and Fish Department. 2004. *Atlas of birds, mammals, reptiles and amphibians in Wyoming*. Wyoming Game and Fish Department, Cheyenne. 206pp.



Boreal Chorus Frog (*Pseudacris maculata*)

Status: NSS4; NatureServe G5 S5

Abundance: Common

Introduction: The boreal chorus frog is Wyoming's smallest frog, rarely exceeding 1.5 inches in length. The dorsal surface has three broken or entire dark stripes. These frogs can be brown, gray, green, yellow or even dull red. They are found in every county in Wyoming. They are one of the first amphibians to appear in spring. Adult males call with a distinctive *preep preep* that has been compared to running one's thumbnail across a comb. They are frequently heard calling during the day. Their breeding begins as early as March and may continue through July. Eggs are deposited in rain pools, marshes, bog ponds, lakes, reservoirs, flooded areas and other water sources. Preferred breeding sites have little or no current. Groups of 20 to 100 eggs are clustered together on submerged vegetation. Adult frogs feed on insects and small invertebrates.

Habitat: The boreal chorus frog lives in marshes, ponds and small lakes. It has even been known to utilize temporary water bodies. It is widespread in Wyoming, occurring throughout the state and even ranging above timberline in the mountains. These frogs are rarely found away from permanent water. Elsewhere, the boreal chorus frog is found throughout central Canada, northern Minnesota, North Dakota and all of the Rocky Mountain states except parts of Arizona and New Mexico.

Problems: Chorus frogs carrying chytrid fungus have been found in Colorado. It is not known how this disease will affect Wyoming populations of this species, but it will probably cause a reduction.

- Population status, distribution and habitat data are lacking for this species; and
- Habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

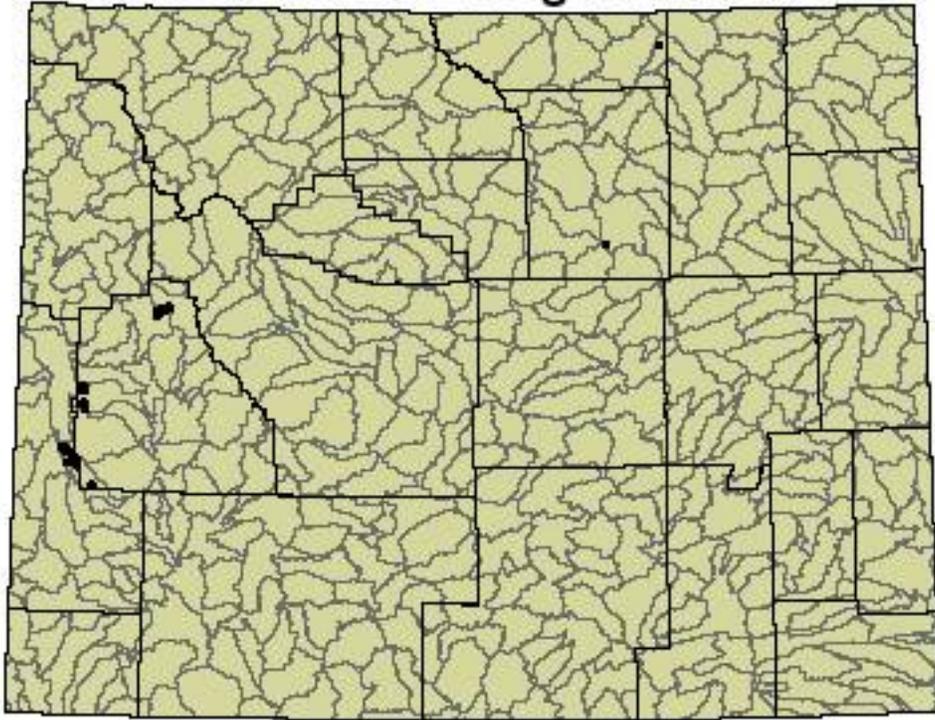
- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.

Boreal Chorus Frog Distribution



Boreal Toad (*Bufo boreas boreas*)**Status: NSS1; NatureServe G4 T4 S1****Abundance:** Common (northern population, southern population is rare)

Introduction: The Boreal Toad is a large toad that can reach five inches in length. The conspicuous lack of cranial crests differentiates this toad from others in Wyoming. Juvenile toads of most species lack cranial crest, making this trait only useful in adults. This sub-specie is thought to have two distinctive population segments, a Northern Rocky Mountain Population and a Southern Rocky Mountain Population. The southern population is currently (2004) a candidate for protection under the Endangered Species Act, largely on the basis of disease issues. There are individuals from both population segments in Wyoming. The northern population is found in the western part of the state (Fremont, Hot Springs, Lincoln, Park, Sublette, and Uinta counties, including Yellowstone National Park) and the southern population is found in the southeastern part of the state (Albany, Carbon and Laramie counties). The boreal toad has a distinctive musky odor, due to skin gland secretions. Found near water during the day, this toad travels quite some distance from water at night to forage. Boreal toads feed primarily on ants, but also on beetles, moths and other insects, as well. Breeding occurs from April to early August depending on climatic conditions and elevation. They deposit their eggs in ponds and small lakes. Egg incubation and development times are temperature dependent and may take as long as 92 and 45 days respectively. Tadpoles are dark with some gold flecking. Due to long incubation times, some tadpoles may not metamorphose before winter. Whether they survive the winter or not is unknown.

Habitat: In Wyoming, the boreal toad inhabits wet areas in foothills, montane and subalpine zones from 6,500 to 12,000 feet in elevation. They range from Alaska to northern New Mexico in the Rocky Mountains and west to the Pacific Coast. In Wyoming, the boreal toad is found in the central and western mountain ranges but has not been found in the Big Horn Mountains or the Black Hills.

Problems: Boreal toad populations appear to be in a state of severe decline. Numerous factors may be contributing to these declines, such as habitat alteration, pollutants, climatic changes and pathogens, but at this time, *Batrachochytrium dendrobatidis*, a chytrid fungus, is considered to be the main cause. In Colorado, it has been blamed for recent mass die-offs. To facilitate the protection, study and recovery of boreal toads, a working group called the Boreal Toad Recovery Team has been formed. This group is based in Colorado, but includes federal and state participants. The main focuses of the recovery efforts are captive breeding and reintroduction. An experimental reintroduction is currently (2004) underway in Grand Mesa, CO.

Conservation Actions:

- With boreal toad populations in decline, research needs to focus on possible causes and population stability. Data from this research is required to create a management strategy to minimize for the recovery of the boreal toad;
- A systematic study of these animals with respect to distribution, abundance, habitat requirements and disease status needs to be conducted;
- The basic biology and transmission of *Batrachochytrium dendrobatidis* (chytrid) needs to be studied;

- Studies need to be conducted to delineate critical anuran habitat and address management requirements;
- When population baseline data are collected, a monitoring strategy needs to be formulated and implemented; and
- Continue to support efforts of the Boreal Toad Recovery Team.

References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

Garber, C.S. 1995. A survey for U.S. Forest Service listed "Sensitive" amphibians including the spotted frog (*Rana pretiosa*), leopard frog (*Rana pipiens*), tiger salamander (*Ambystoma tigrinum*) and the boreal toad (*Bufo boreas*) on the north half of the Shoshone National Forest. Unpublished report. Wyoming Natural Diversity Data base, Laramie, WY, for U.S. Forest Service, Shoshone National Forest, Cody, WY.

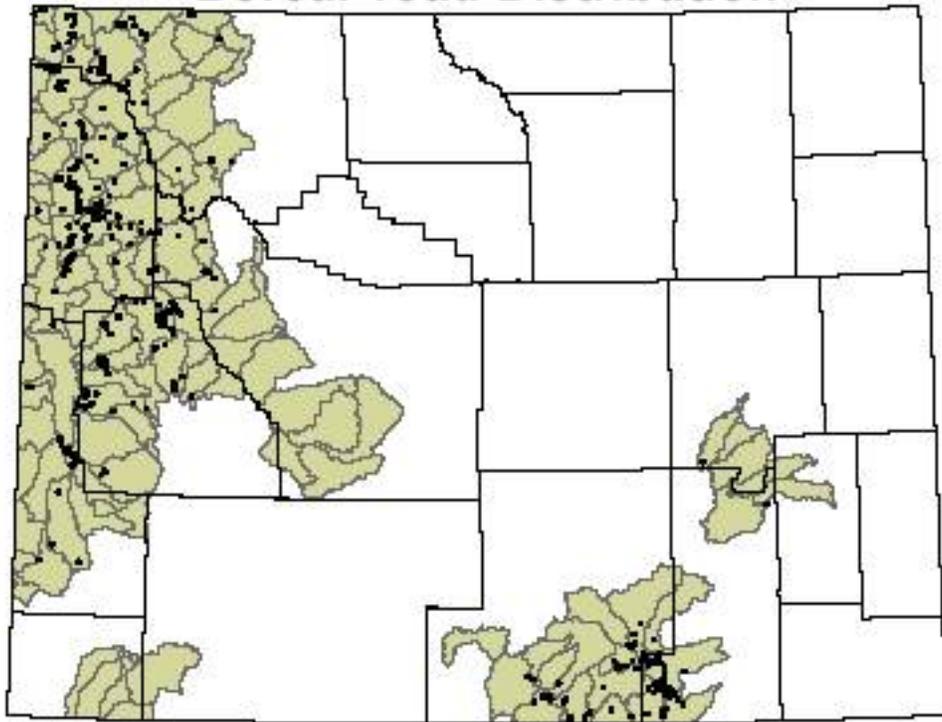
Garber, C.S. 1995. Addendum #1 to "A status survey for spotted frogs (*Rana pretiosa*), wood frogs (*Rana sylvatica*) and boreal toads (*Bufo boreas*) in the mountains of southern and eastern Wyoming." Unpublished report. Wyoming Natural Diversity Database, Laramie, WY, for U.S. Fish & Wildlife Service, Denver, Co.

Loeffler, Chuck, 2000. Report on the Status and Conservation of the Boreal Toad *Bufo boreas boreas* in the Rocky Mountains 2000. Boreal Toad Recovery Team. 58 pp.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 2, 2004).

Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.

Boreal Toad Distribution



Columbia Spotted Frog (*Rana luteiventris*)

Status: NSS4; NatureServe G4 S3

Abundance: Common

Introduction: The Columbia spotted frog is a medium-sized frog. Females reach four inches in length, while males rarely exceed three inches. They generally have dark spots on a dark gray, red or even yellow background. Dorsolateral folds are present on this frog, in much the same manner as northern leopard frogs, but Columbia spotted frogs have a bumpy or warty skin. Except for the extensive webbing between their toes and dorsolateral folds, they could be confused with toads. This webbing indicates their highly aquatic nature. They are strong swimmers and will often escape by jumping into water. Columbia spotted frogs remain close to water during the breeding season, but may wander far from it afterwards. The preferred diet of these animals includes earthworms, mollusks, and crustaceans. Columbia spotted frogs breed when ice begins to recede from their preferred breeding habitats (slow moving water or ponds with grasses and rushes). Breeding may occur as early as February in warm years. Males call with a “knocking-on-wood” sound. Eggs masses float conspicuously on the surfaces of breeding sites. A single egg mass may contain more than 1,200 eggs. Breeding sites will usually contain numerous egg masses. Breeding ends sometime in early July. Tadpoles require about a month to mature, although this is dependant on habitat parameters such as temperature and food supply. Tadpoles may reach four inches in length. Sub-adults require from two to five years to reach sexual maturity.

Columbia spotted frogs range from southeastern Alaska to Washington, Oregon, Utah, Wyoming and Canada. In Wyoming, the Columbia spotted frog is found in the following counties: Bighorn, Sheridan, Johnson, Teton, Sublette, Fremont and Lincoln. A large population of these frogs is located in Yellowstone National Park. The Bighorn Mountain population is probably limited in its range and vulnerable to extirpation.

Habitat: Columbia spotted frogs can be found in sub-alpine forests grasslands and sagebrush habitats at elevations from 1,700 feet to 6,400 feet.

Problems: Introduced species, such as the bullfrog, are thought to be a factor in the decline of this species. Other factors such as alterations in habitat quality may be a factor as well. The source and extent of these alterations is not well understood.

Conservation Actions:

The disease status of Columbia spotted frogs in Wyoming needs to be determined. These animals share habitat with the boreal toad, which is susceptible to chytrid fungus infections. Populations of the Columbia spotted frogs in Wyoming should be monitored to determine if they are declining.

References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

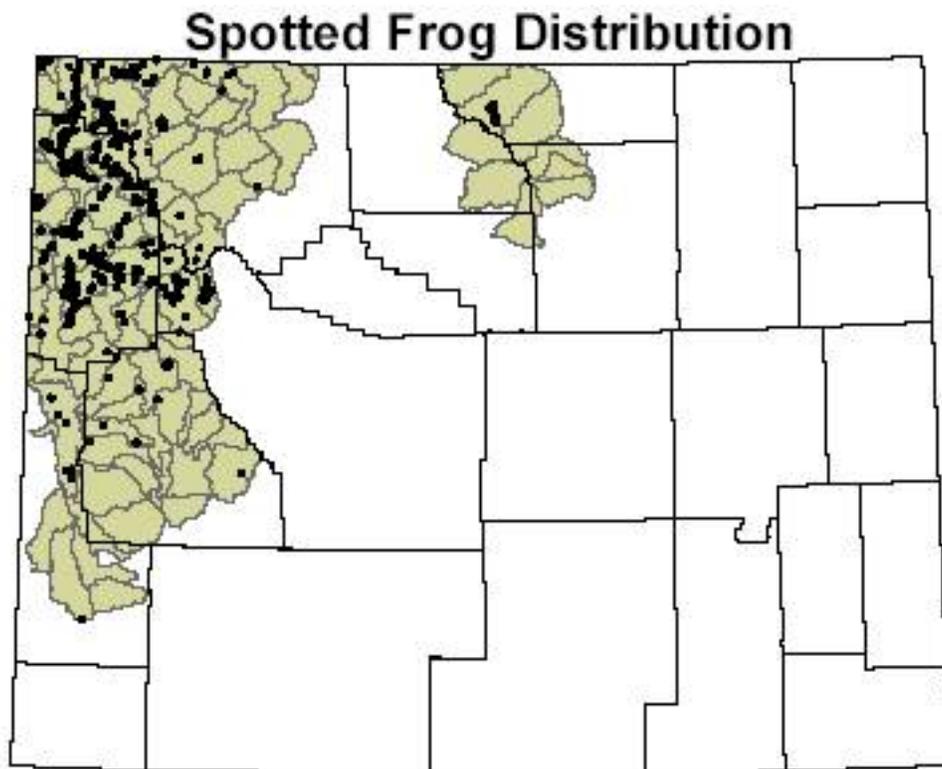
Garber, C.S. 1995. A survey for U.S. Forest Service listed "Sensitive" amphibians including the spotted frog (*Rana pretiosa*), leopard frog (*Rana pipiens*), tiger salamander (*Ambystoma tigrinum*) and the boreal toad (*Bufo boreas*) on the north half of the Shoshone National Forest. Unpublished report. Wyoming Natural Diversity Database, Laramie, WY, for U.S. Forest Service, Shoshone National Forest, Cody, WY.

Leonard, W.P., N.P. Leonard, R. M. Storm and P.E. Petzel. 1996. *Rana prestiosa* (Spotted Frog) Behavior and Reproduction. *Herp. Review* 27(4):195

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available at <http://www.natureserve.org/explorer>. (Accessed: April 2, 2004).

Stebbins, Robert C. 1985. A Field Guide to Western Reptiles and Amphibians. Houghton Mifflin Company, Boston, New York.

Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.



Abundance: Common

Introduction: A small anuran, *S. intermontana* rarely exceeds two and one half inches in length. Its back usually has gray streaks and an hourglass shaped mark. Spadefoot toads have vertical pupils, which indicate their nocturnal nature. As is the case with most anurans, they are insectivorous. There are only two species in Wyoming. The Plains spadefoot has a bony boss between its eyes, while the great basin spadefoot has a fleshy bump. As an adaptation to arid conditions, these animals burrow into the ground and wait until snowmelt or rains moisten their environment sufficiently. The Great Basin spadefoot survives the winter in a burrow that it digs itself. This species has been found as much as 15 feet below ground. The Great Basin spadefoot breeds between May and July, usually in temporary water formed after heavy rains. The female deposits about 300 to 500 eggs in small packets of 20 to 40 eggs each. The eggs hatch in about two to three days in optimal conditions. Metamorphosis occurs in a few to several weeks.

Habitat: Great Basin spadefoots prefer sagebrush communities below 6,000 feet in elevation, although they have been found at elevations of 9,200 feet. Spadefoots require loose soil to burrow. In Wyoming, this species is most abundant west of the Continental Divide in the Wyoming Basin and the Green River Valley, but in the center of the state, it crosses the Divide into Fremont and Natrona counties. Elsewhere, the great basin spadefoot ranges from southern British Columbia south through the Great Basin to northern Arizona and New Mexico.

Problems: *S. intermontana* occupies a tenuous niche giving it stringent habitat requirements. There different types of habitat are required for their survival: over wintering burrow sites, temporary breeding ponds and foraging areas. They also require safe passages between these areas. The development of natural resources in Wyoming has necessitated a massive network of roadways that could potentially hinder movements of these animals between required habitats. Development can compact soils making burrowing difficult or impossible. Temporary ponds and associated aquatic microhabitat may be altered by anthropogenic activities. Although habitat changes and other factors may be adversely affecting this species, the lack of data precludes identification of specific problems and development of management recommendations. Likewise, baseline data on population status, distribution and habitat data are lacking for this species.

Conservation Actions:

- Survey and monitor population distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

Duellman, W. E. and L. Treub. 1986. *Biology of Amphibians*. New York McGraw Hill Book Company. Ministry of Environment Lands and Parks. 1991 Great Basin Spadefoot Toad. Wildlife Branch, Ministry of Environment Lands and Parks, Victoria, British Columbia.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 1, 2004).

Stebbins, R. C. 1985. *A Field Guide to Western Reptiles and Amphibians*. Houghton Mifflin Company, Boston, New York.

Wyoming Game and Fish Department. 2004. *Atlas of birds, mammals, reptiles and amphibians in Wyoming*. Wyoming Game and Fish Department, Cheyenne. 206pp.



Great Plains Toad (*Bufo cognatus*)

Status: NSS4; NatureServe: G5 S3

Abundance: Uncommon

Introduction: The Great plains toad is medium sized toad, reaching four and one half inches in adult length. It is distinguished from other toads in Wyoming by its cranial crests, which join together at the tip of its snout in a V shape, and its color pattern. Great Plains toads dig their own burrows and spend the winter in them. The diet of the adult Great Plains toad consists of moths, caterpillars, cutworms, flies, beetles and other small insects. They breed in ponds created by heavy spring or early summer rains. Stock tanks and temporary ponds are believed to be preferred breeding habitats, although slow moving streams and backwaters may also be used. Great Plains toads breed from March to September. The female lays eggs in long gelatinous strings on the pond bottom, which are not attached to vegetation. Eggs hatch in two to three days and tadpoles begin metamorphosis at about 45 days.

Habitat: The Great Plains toad lives in the grasslands, sand hills and agricultural areas below 6,000 feet in elevation. It ranges from Canada to Texas and Mexico, and west through New Mexico to Arizona, Utah, Nevada and California. In Wyoming, it has not been found west of the Continental Divide. This species probably inhabits most of the northeastern counties and has been found near Gillette and Newcastle.

Problems: A variety of actions have the potential to impact populations of Great Plains toads by fragmenting habitats, altering vernal ponds, eliminating migration corridors, and altering foraging grounds. Natural habitat changes and other factors may also adversely affect this species, but lack of data precludes identification of specific problems and development of management recommendations. Population status, distribution and habitat data are lacking for this species.

Conservation Actions:

- Survey and monitor populations;
- Distribution status and habitat trends;
- Research critical life history and habitat information needs; and
- Develop management recommendations based on resulting data.

References and Additional Reading:

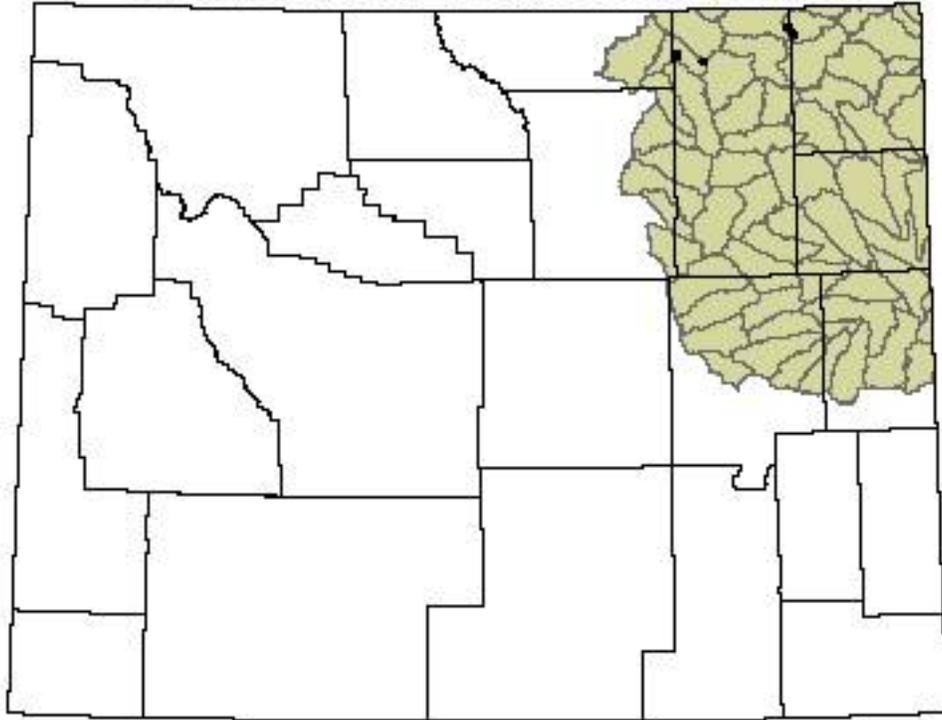
Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

Stebbins, R. C. 1985. A Field Guide to Western Reptiles and Amphibians. Houghton Mifflin Company, Boston, New York. 338 pp.

Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.

Great Plains Toad Distribution



Northern Leopard Frog (*Rana pipiens*)

Status: NSS4; NatureServe G5 S3

Abundance: Common

Introduction: The northern leopard frog is one of the most common and widespread anurans in the United States. However, populations are known to be declining through out its range. Leopard frogs can be brown or green, but always have “leopard” spots. It is a medium sized frog, commonly obtaining four and one half inches. Its spots distinguish it from other frogs in Wyoming, with the exception of the spotted frog. Leopard frogs lack the bumpy skin of the spotted frog. In midsummer, the northern leopard frog actively forages among sedges, cattails and tall grasses, where it eats a wide variety of foods including invertebrates, birds, snakes, fish and even tadpoles of its own kind. Resting near pond and lake margins, it will quickly leap into the water if alarmed. This frog breeds from mid-March through July, emerging from aestivation when daytime high temperatures reach 59 F. Females lay round clusters of eggs in shallow, non-flowing areas of permanent waters or seasonally flooded areas near permanent pools. These frogs are commonly found around beaver ponds in Wyoming. Eggs hatch in 4 to 15 days, and metamorphosis takes place in 14 to 60 days. Northern leopard frogs winter in ponds, buried in the mud. In many cases, they use a shallow pond for breeding and a deeper one to aestivate.

Habitat: The northern leopard frog can be found in or near permanent water in the plains, foothills and montane zones. They range to 11,000 feet in the mountains. Their preferred habitats are swampy cattail marshes on the plains, and beaver ponds in the foothills and montane zones. In Wyoming, this species is common throughout the state except in Teton County, Park County and Yellowstone National Park. Elsewhere, the northern leopard frog ranges across the northern United States from New England to Washington and Oregon, and in the Rocky Mountains south into New Mexico. It’s also found in Utah, northern Arizona and Nevada.

Problems: While leopard frogs were once very common, their populations are currently undergoing a dramatic decline. While no single factor has been flagged as the overwhelming cause for the reduction in leopard frog populations there are several contributing factors: disease (red-leg, chytrid), introduced species (bullfrogs, fish, crayfish), chemicals (atrazine, rotenone etc.) and habitat loss/alteration/fragmentation. Habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations. Population status, distribution and habitat data are lacking for this species.

Conservation Actions:

- Survey and monitor population distribution status and habitat trends.
- Research critical life history and habitat information needs.
- Develop management recommendations based on resulting data.

References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

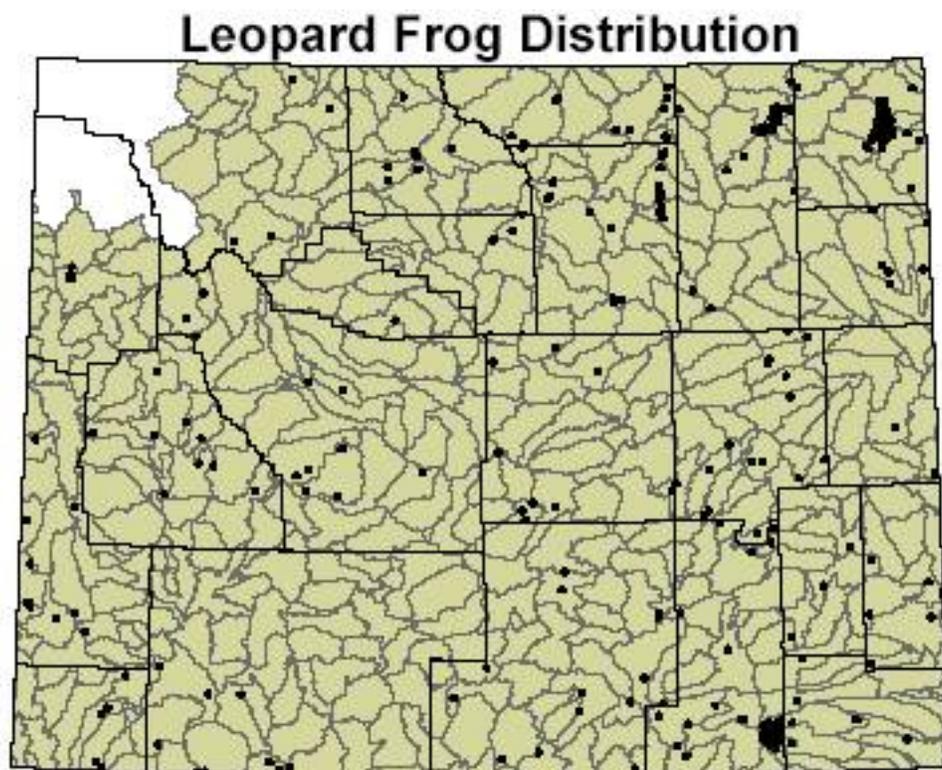
Hayes, T., K. Haston, M. Tsui, A. Hoang, C. Haeffele and A. Vonk. 2003. Atrazine-induced hermaphroditism at 0.1 ppb in American Leopard Frogs (*Rana pipiens*): laboratory and field evidence. *Environmental Health Perspectives* Vol 111 (4): pp. 568 –575.

McAllister, K. R., W. P. Loenard, D. W. Hays, and R.C. Friesz. 1999. Washington State Status Report for the Northern Leopard Frog. Washington Department of Fish and Wildlife, Wildlife Management Program, Olympia, Washington.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 2, 2004).

Smith, B.E. 2003. Conservation Assessment for the Northern Leopard Frog in the Black Hills National Forest, South Dakota and Wyoming.

Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.



Plains Spadefoot (*Spea bombifrons*)

Status: NSS4; NatureServe G5 S4

Abundance: Common

Introduction: A small anuran, the Plains spadefoot generally doesn't exceed 2.5 inches in length. Spadefoots have distinctive cat-like vertical pupils. Plains spadefoots have a bony boss between their eyes, which distinguishes them from the Great Basin spadefoot. The name spadefoot comes from the single tubercle on their hind foot, which is used to dig. As an adaptation to their arid habitation, they spend most of their lives burrowed deep underground, only coming up when rains or melting snows bring sufficient moisture. The Plains spadefoot usually waits until heavy rains or irrigation runoff fills roadside ponds, stock tanks and other temporary ponds to begin breeding, although infrequently it will use permanent bodies of water. Breeding activity occurs from May through July. Eggs are deposited in elliptical masses of 250 or more and are attached to submerged vegetation. The eggs hatch in two to three days, and the larvae usually complete transformation in 36 to 40 days. Active at night and sometimes during daylight after heavy rains, the plains spadefoot's diet consists of a variety of invertebrates, such as spiders, moths, ants and beetles. Small larvae eat plankton and detritus, but as they grow larger they may scavenge or cannibalize.

Habitat: The plains spadefoot prefers grasslands and sagebrush communities in the plains zone below 6,000 feet in elevation. In winter, it burrows deeply to spend its dormant period below the frost line. In Wyoming, it can be found in the Big Horn Basin and in all the eastern and central counties. Elsewhere, it ranges from southern Alberta and Saskatchewan into the plains states, and through western Texas and eastern New Mexico into northern Mexico.

Problems: *S. bombifrons* occupies a tenuous niche and has stringent habitat requirements. Three different types of habitat are required for their survival: over-wintering burrowing sites, temporary breeding ponds and foraging areas. They also need to be able to travel between these areas. The development of natural resources in Wyoming has created a network of roadways that could hinder movements of these animals between required habitats. Development can compact soils making burrowing difficult or impossible.

Conservation Actions:

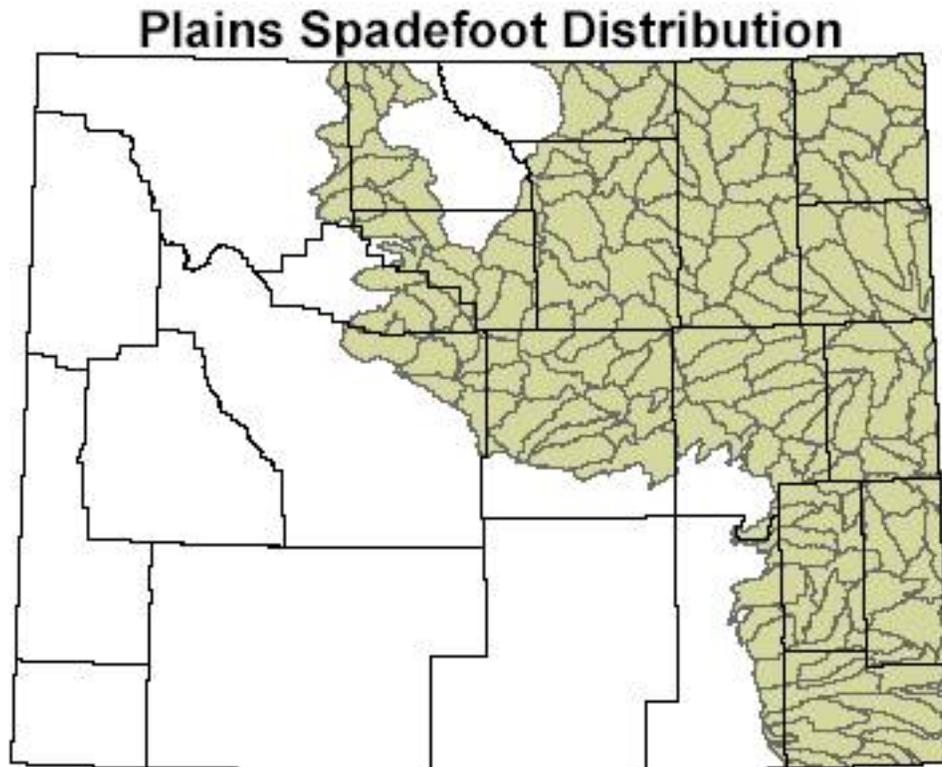
- Basic life history, distribution and abundance information is lacking for this species and needs to be thoroughly studied;
- Critical habitat needs for this species need to be studied;
- A management strategy needs to be developed that preserves critical habitat for plains spadefoots;
- Research is needed into a means to limit habitat fragmentation associated with road development.

References and Additional Reading:

- Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.
- Duellman, W. E. and L. Treub. 1986. Biology of Amphibians. New York McGraw Hill Book Company.

Stebbins, R. C. 1985. A Field Guide to Western Reptiles and Amphibians. Houghton Mifflin Company, Boston, New York.

Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.



Tiger Salamander (*Ambystoma tigrinum*)**Status: NSS4; NatureServe G5 S4****Abundance:** Common

Introduction: Tiger salamanders are large, robust salamanders in the mole salamander family. Adults may reach a length of six and one half inches. It is the only salamander in Wyoming. Adults have distinctive light yellow stripes on a black or olive background. From March to June, adults migrate to temporary or permanent ponds with shallow water to breed. Eggs adhere to submerged vegetation singly or in clusters of up to 20. Larvae are abundant in ponds from late May to August. Larvae lack “tiger” stripes and are generally dark gray or dark olive green. The larval stage has gills on its head, which appear feathery when it is underwater. Larval salamanders are sometimes referred to as waterdogs or mudpuppies. Transformation into adults may occur as soon two months or as long as two years. Larvae feed on aquatic invertebrates when small, but become predacious and sometimes cannibalistic when larger. Adults eat insects, earthworms and other small invertebrates. Tiger salamanders infrequently remain in a paedomorphic (larval) form for many years. These are sometimes called an axolotls. They can be quite large larvae, sometimes reaching lengths of 15 inches.

Habitat: Requiring a moist environment, tiger salamanders can be found in rodent burrows, cellars, window wells and manure heaps, where they can escape desiccation. The adult form is primarily terrestrial except during breeding season in the spring and summer. Larvae may be found in intermittent streams, ponds, lakes and stock troughs. The tiger salamander is widespread in the United States and Canada, ranging from British Columbia and Alberta to northern Florida, excepting the New England states. In Wyoming, it’s found in all counties from lowlands to about 10,000 feet in elevation. Although tiger salamanders have been known to utilize upland habitats in other parts of its range, Wyoming’s arid climate generally restricts this species to areas with more permanent moisture.

Problems:

- Mountain lakes formerly inhabited by tiger salamanders can have reduced populations of the salamander after the stocking of trout, which can consume larval populations;
- Under certain conditions, larval populations may be vulnerable to bacterial infections associated with livestock grazing;
- Populations in the Great Plains may have declined where cultivation is extensive;
- Diseases such as *Ambystoma tigrinum* virus and *Regina ranavirus* have been implicated in massive die-off events. There are also reports of *Batrachochytrium dendrobatides* infections of tiger salamanders, although it is possible that they are sub-lethal;
- Natural resource development, especially coal bed methane mining, has the potential to change the landscape in a manner that could negatively affect tiger salamanders;
- Salamanders make large coordinated movements to breeding sites, which put them in danger of road mortalities. Interruption of normal movement paths can severely impact Tiger Salamander populations.

Conservation Actions:

- A management plan needs to be developed to protect the vernal pools, wetlands and other habitats crucial to Wyoming’s amphibians;

- Distributional and abundance information on this species in Wyoming needs to be revised;
- The disease status of the Tiger Salamander in Wyoming needs to be studied.

References and Additional Reading:

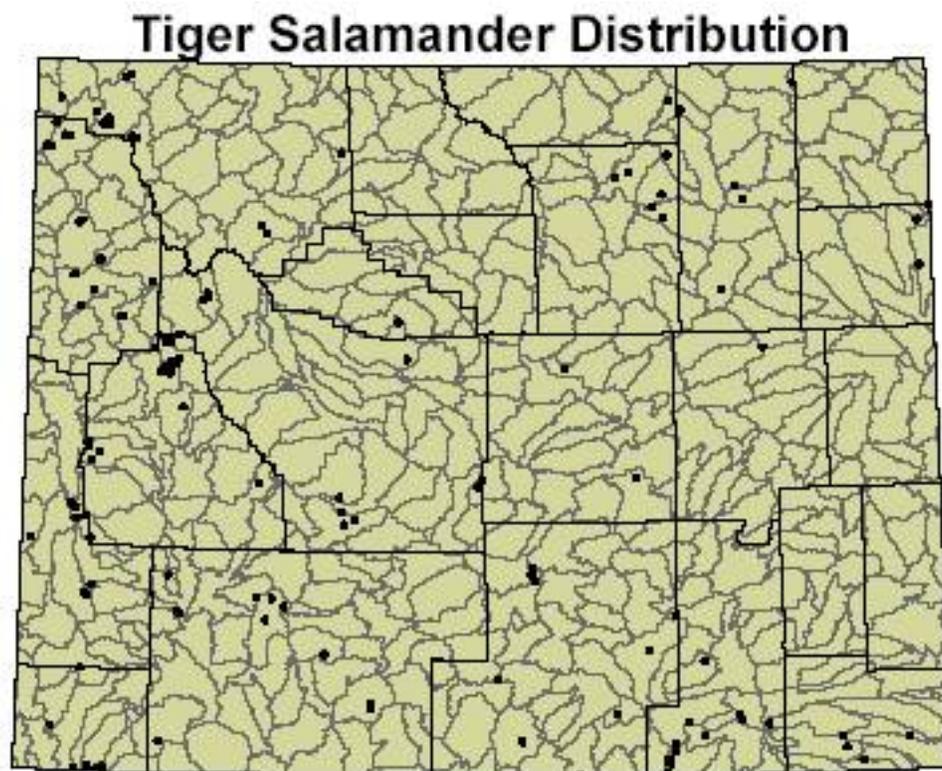
Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

Daszak, P., L. Berger, A. A. Cunningham, A. D. Hyatt, D. E. Green and R. Speare. 1999. Emerging infectious diseases and amphibian population declines. *Emerging Infectious Diseases* Vol. 4(6): pp. 735 – 748.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 2, 2004).

Stebbins, R. C. 1985. *A Field Guide to Western Reptiles and Amphibians*. Houghton Mifflin Company, Boston, New York. 338 pp.

Wyoming Game and Fish Department. 2004. *Atlas of birds, mammals, reptiles and amphibians in Wyoming*. Wyoming Game and Fish Department, Cheyenne. 206pp.



Wood Frog (*Rana sylvatica*)

Status: NSS3; NatureServe G5 S1

Abundance: Rare

Introduction: Wood frogs are small frogs, which only reach a maximum size of slightly larger than three inches. They have a distinctive black mask-like mark over their eyes and a white strip on the “lip” of their upper jaw. Wood frogs are freeze tolerant species and are the northernmost distributed anuran in North America. Wood frogs feed on insects, worms and spiders. At higher elevations (about 9,800 feet in the Medicine Bow Mountains) they breed after the ice melts from ponds and small lakes, around mid-June to early July. Breeding may occur earlier in lower elevations. Each female lays several thousand eggs and sites generally have clusters of eggs from multiple females. The eggs hatch in four to twenty days, and metamorphosis is complete in 70 to 85 days. Sometimes, however, larvae may overwinter and transform the next spring.

This species can be found from Alaska to central Canada, in the central Rocky Mountains, in New England and in the midwestern and Atlantic coast states south to northern Georgia. In Wyoming, the Wood Frog occurs in the Medicine Bow Mountains from the Colorado-Wyoming border north to Long Lake in Carbon County. It is also found in the Big Horn Mountains. Wood Frogs are thought to be declining through the United States and should be carefully monitored. In Wyoming, the northern population occurs in only two small drainages and thus is vulnerable to extirpation. The southern population may also be vulnerable.

Habitat: Wood frogs prefer beaver ponds, slowly moving streams, small lakes, wet meadows and willow thickets in the montane zone, usually around 9,000 feet in elevation. Their ability to reproduce in cold waters allows them to range further north than any other frog in North America.

Problems:

Existing data on this species’ population status, distribution and habitat data are insufficient. Habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

- Survey and monitor population distribution status and habitat trends.
- Research critical life history and habitat information needs.
- Develop management recommendations based on resulting data.

References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

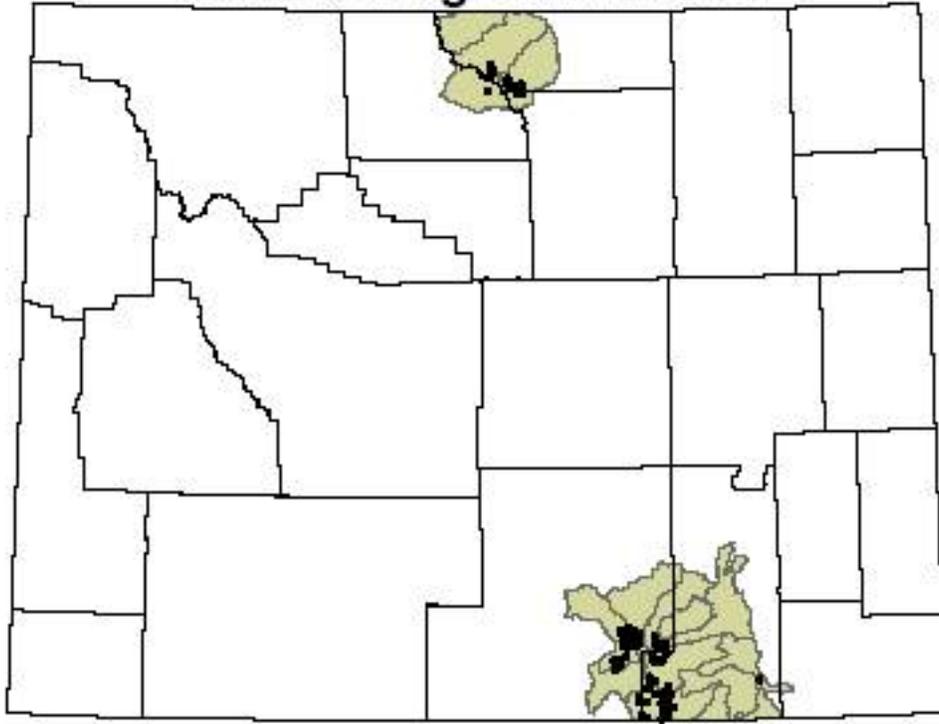
NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application].

Version 1.8. NatureServe, Arlington, Virginia. Available

<http://www.natureserve.org/explorer>. (Accessed: April 2, 2004).

Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.

Wood Frog Distribution



Woodhouse's Toad (*Bufo woodhousii*)

Status: NSS4; NatureServe G5 S4

Abundance: Common

Introduction: A large toad, Woodhouse's Toad may reach a length of five inches. These toads generally have a white mid-dorsal stripe and prominent cranial crests. The frontal cranial crests are parallel (they are V-shaped in the Great Basin Toad). This toad rests in shallow burrows during the day, feeding at dusk and after dark on a variety of insects, with a preference for ants and beetles. In Wyoming, breeding begins in early May and continues until July. Eggs are often laid after heavy rains. Up to 25,000 eggs are deposited in long strings, unattached to vegetation, in floodplain ponds, marshes, lakes, reservoirs and flooded areas. The toads may migrate several hundred meters between breeding pools and terrestrial habitats. On the Powder River, tadpoles of this species are often found in puddles, backwaters and side channels. The adults are generally near the water's edge and often jump into the water when frightened. If stressed too greatly, this toad will inflate itself.

Habitat: Woodhouse's Toads prefer habitat near permanent water or irrigation runoff water in the plains and foothills zones. This species has been found in the eastern and northern counties of Wyoming, east of the Continental Divide, usually below 6,000 feet in elevation, although in other states it has been reported to 8,600 ft. Woodhouse's Toads range from Montana to Mexico and from Iowa to Nevada but appears to be absent from the higher elevations of the Rocky Mountains.

Problems: Population status, distribution and habitat data are lacking for this species. Habitat changes and other factors may be adversely affecting this species, but lack of data precludes identification of specific problems and development of management recommendations.

Conservation Actions:

- Survey and monitor population distribution status and habitat trends.
- Research critical life history and habitat information needs.
- Develop management recommendations based on resulting data.

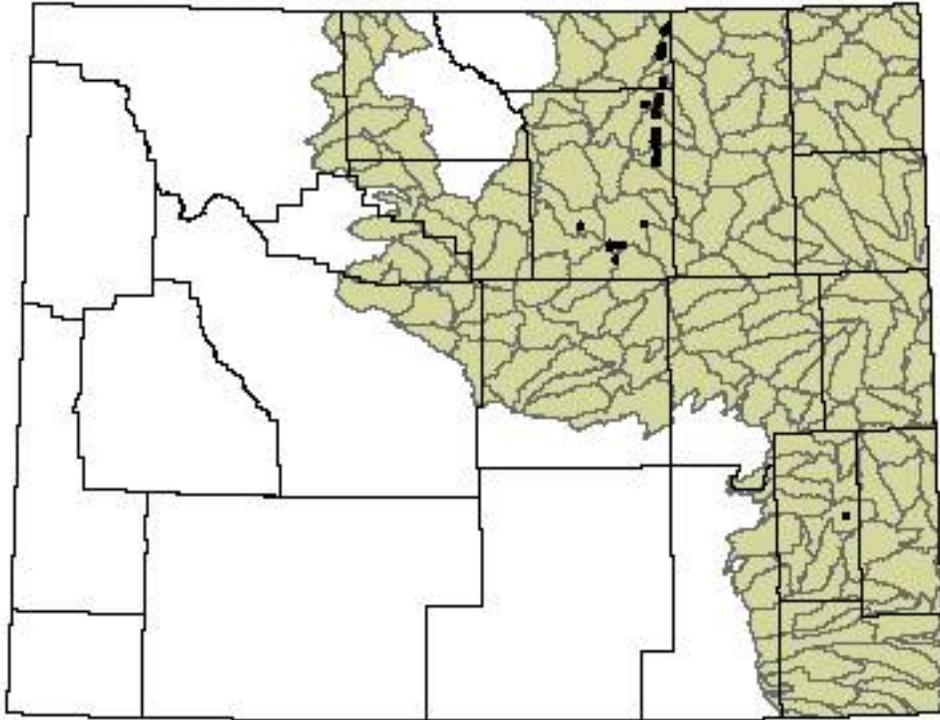
References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 1, 2004).

Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.

Woodhouse Toad Distribution



Wyoming Toad (*Bufo baxteri*)

Status: NSS1; NatureServe G1 S1

Abundance: Rare

Introduction: Wyoming toads reach a maximum length of only three inches. They have no post-orbital cranial crests and a bony boss of fused cranial crests on their snouts. In some individuals the crests are not totally fused. As with most toads, the crests are lacking on young animals. Wyoming toads are primarily nocturnal and are adept burrowers in soft soils. Adults feed on ants, beetles and other small insects. Historically, natural breeding congregations were small, about six males in a pond with a few females. Females deposited their eggs in ponds and small lakes from mid-May to early June. The larvae usually transform by early August. Wyoming toads are extremely rare. Wyoming toads were listed as endangered in 1984 under the federal Endangered Species Act. They were abundant in the Laramie River Basin in the early 1950s, but populations crashed suddenly around 1975. There is now only a single wild population, encompassing three lakes. Possible causes of decline are listed below, but evidence is scant. The remaining population is infected with the *Batrachochytrium dendrobatidis* fungus. A recovery team was formed to address the problems of this highly endangered amphibian. A captive breeding program was initiated and is ongoing. Most recently, a Safe Harbor Agreement has been proposed, which will allow captive bred animals to be released at disease free sites.

Habitat: The Wyoming toad lives in floodplains, ponds and small seepage lakes in the mixed grass prairie of the Laramie River Basin.

Problems:

- Habitat modification associated with a variety of human land uses;
- Pesticide use (herbicides for weed control, insecticides for mosquito control);
- Increased avian predator populations;
- Bacterial and fungal (chytrid) infections; and
- Limited genetic stock.

Conservation Actions:

- Much of the basic biology of the Wyoming Toad remains unstudied. This information is crucial to the formation of a management plan for this species;
- Due to the dire circumstances of this animal, research into more effective captive propagation and reintroduction should be pursued;
- A thorough study of the decline and the possible contributing factors should be undertaken. The data from such a study would be useful for application to other species in similar circumstances as well as valuable in steering recovery efforts;
- The basic biology and transmission of *Batrachochytrium dendrobatidis* (chytrid) needs to be studied;
- Studies need to be conducted to delineate critical habitat and address management requirements;
- When population baseline data are collected, a monitoring strategy needs to be formulated and implemented.

References and Additional Reading:

Baxter, G.T., and M. D. Stone. 1980. Amphibians and reptiles of Wyoming. Wyoming Game and Fish Department, Cheyenne. 137pp.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

Stebbins, R. C. 1985. A Field Guide to Western Reptiles and Amphibians. Houghton Mifflin Company, Boston, New York. 338 pp.

U.S. Fish and Wildlife Service. 2002. Wyoming Toad Recovery Plan, Colorado. Region 6, Lakewood, Colorado. 56 pp.

Wyoming Game and Fish Department. 2004. Atlas of birds, mammals, reptiles and amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne. 206pp.



Arctic Grayling (*Thymallus arcticus*)

Status: NSS4; NatureServe G5 S2

Abundance: Rare

Introduction: Grayling are distinguished from other salmonids by an extremely large dorsal fin. Grayling are a gray/bluish color. The dorsal fin of breeding males is strikingly colored with blue or violet spots. Grayling feed primarily on insects and the occasional small fish. Grayling are spring spawners, migrating into smaller tributary streams to spawn over gravel beds.

Habitat: Grayling are native only to extreme northwestern Wyoming, but have been introduced to a number of other locations and now popular grayling fisheries can be found at Meadow Lake (Pinedale) and Willow Lake (Big Horn Mountains). Grayling prefer clear, large rivers, creeks and mountain lakes. This fish ranges throughout the northern regions of North America and Eurasia. In North America, the grayling is native across northern Canada, extending south into Michigan, Montana and northwestern Wyoming in the Rocky Mountains.

Problems:

Arctic grayling are considered a “candidate” species under the Endangered Species Act as administered by the U.S. Fish and Wildlife Service. This is primarily due to their much reduced range in Montana. In Wyoming, grayling have been introduced outside their native range to create a unique fishing opportunity. They are still present in their native range within Yellowstone National Park, Wyoming.

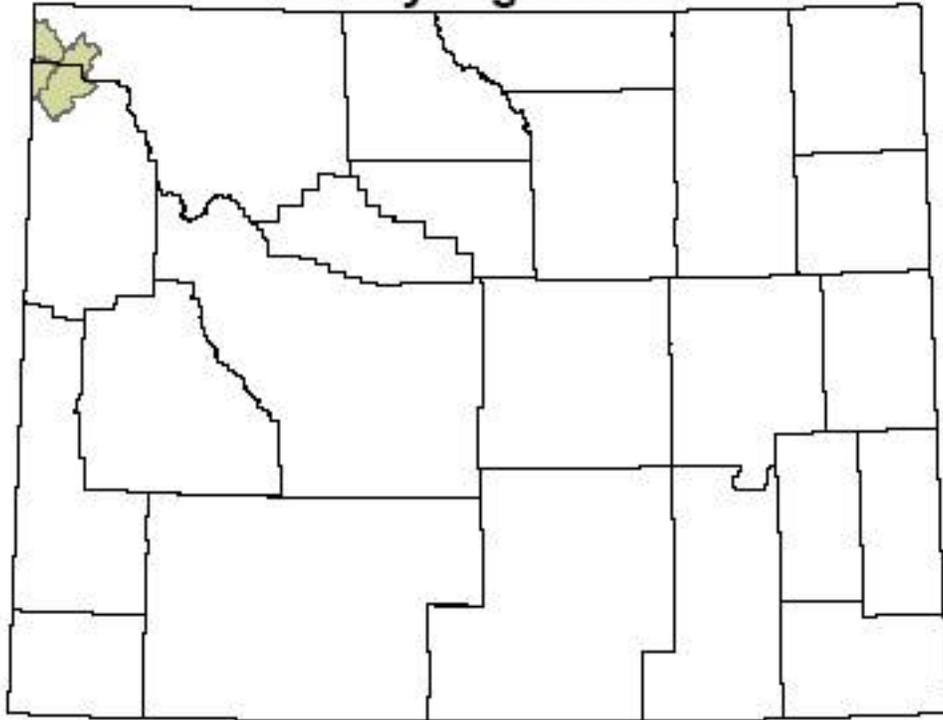
Conservation Actions:

- Although there is concern for the sustainability of native grayling populations in the northern Rocky Mountains; within Wyoming, management actions are focused on providing a healthy, sportfishery. Currently, these grayling populations appear to be in good shape.

References and Additional Reading:

- Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.
- Brown, C.J.D. 1938. Observations on the life history and breeding habits of the Montana grayling. Copeia. 1938 (3):132-136.
- Miller, R.B. 1946. Notes on the Arctic grayling *Thymallus signifer* Richardson from Great Bear Lake. Copeia. 1946 (4):227-236.
- Scott, W.B., and E.J. Crossman. 1973. Freshwater fishes of Canada. Bull. 184 Fish. Res. Bd. Canada. 966pp.

Arctic Grayling Distribution



Bigmouth Shiner (*Notropis dorsalis*)

Status: NSS4; NatureServe G5 S5

Abundance: Uncommon

Introduction: The bigmouth shiner has a slender body with a long, flattened head. The eyes are large and displaced slightly upward. The mouth is large and subterminal, lacking a barbel. Adults may reach 3 inches in length. A hardy fish, the bigmouth shiner feeds on aquatic and terrestrial insects and other aquatic invertebrates. In Wyoming, it spawns in July and August. It's believed to spawn in open water, with the pelagic eggs drifting downstream while hatching.

Habitat: The bigmouth shiner lives in small, clear streams with sand or small gravel substrate. It's often associated with the sand shiner. The bigmouth shiner may also occur in lakes. It can be found from Wyoming and Colorado east to New York. In Wyoming, bigmouth shiners are limited to the North Platte River drainage but are widespread and abundant where they occur.

Problems:

There are no immediate concerns for the bigmouth shiner in Wyoming. They are considered to be widespread, abundant, and globally secure. The population trend of the bigmouth shiner in Wyoming is unclear but it is believed to be stable. Historical data are limited to presence and absence accounts and current measures of abundance are only rough estimates.

Conservation Actions:

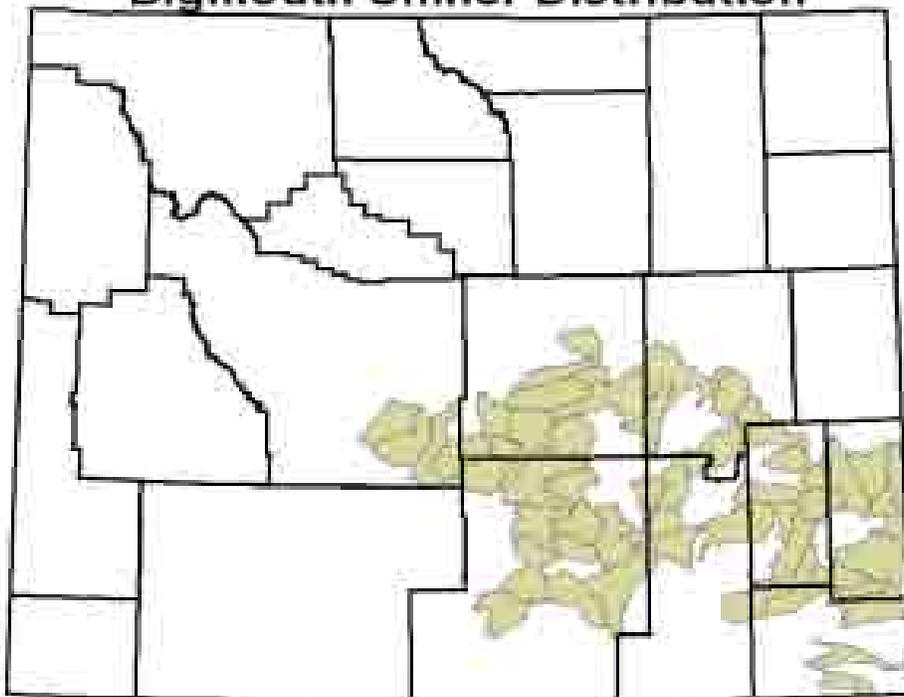
The following research is needed:

- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- Monitoring protocols and sites should be identified and routinely sampled.
- A better understanding of movement, dispersal, and colonization patterns is needed.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.

References and Additional Reading:

- Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.
- Bailey, R.M., and H.M. Harrison, Jr. 1945. The fishes of Clear Lake, Iowa. Iowa State Coll. J. Sci., 20 (1):57-77.
- Moore, G.A. 1944. Notes on the early life history of *Notropis girardi*. Copeia. 1944 (4):209-214.
- Weitzel, D. L., 2002. Conservation and Status Assessment for the Common Shiner (*Luxilus cornutus*), Bigmouth Shiner (*Notropis dorsalis*), Central Stoneroller (*Campostoma anomalum*) and Red Shiner (*Cyprinella lutrensis*): Common native minnows of the Platte and Niobrara River drainages, Wyoming.

Bigmouth Shiner Distribution



Black Bullhead (*Ameiurus melas*)**Status: NSS3; NatureServe G5 S5****Abundance:** Unknown

Introduction: Body is stout; caudal fin is only slightly notched; and body is scaleless. Black bullhead are very hardy and are sometimes used to provide a source of recreational fishing in Wyoming's warm and turbid waters that tend to be unsuitable for other fish. They prefer to feed on aquatic invertebrates and some small fish, but it's been said that they will eat almost anything digestible, including carrion. Eggs are laid in a nest or depression, or are sometimes attached to aquatic plants. Either the male or female adult bullhead will guard the nest, and once hatched, the fry continue to be escorted by the adult. Young fish will often remain in small schools for some time after the adult escort is discontinued. In Wyoming, maximum size is about one-half pound.

Habitat: Although it prefers small muddy lakes, the black bullhead can also be found in pools in rivers and small streams. Wyoming's relatively cool waters provide only marginal habitat for this fish. In Wyoming, black bullheads are found most often in the north and northeastern counties of the state, east of the Continental Divide. This catfish ranges from New York to the Rocky Mountains and from Manitoba to Tennessee. It's also been introduced to areas in the southern and western United States. Whether black bullhead are actually native to Wyoming is currently under discussion.

Problems:

There are no immediate concerns for the black bullhead in Wyoming. Populations appear to be stable wherever suitable habitat exists. Their NSS ranking of "3" is based on the assumption of being native in Wyoming, and potential [anthropogenic](#) threats to their limited habitats.

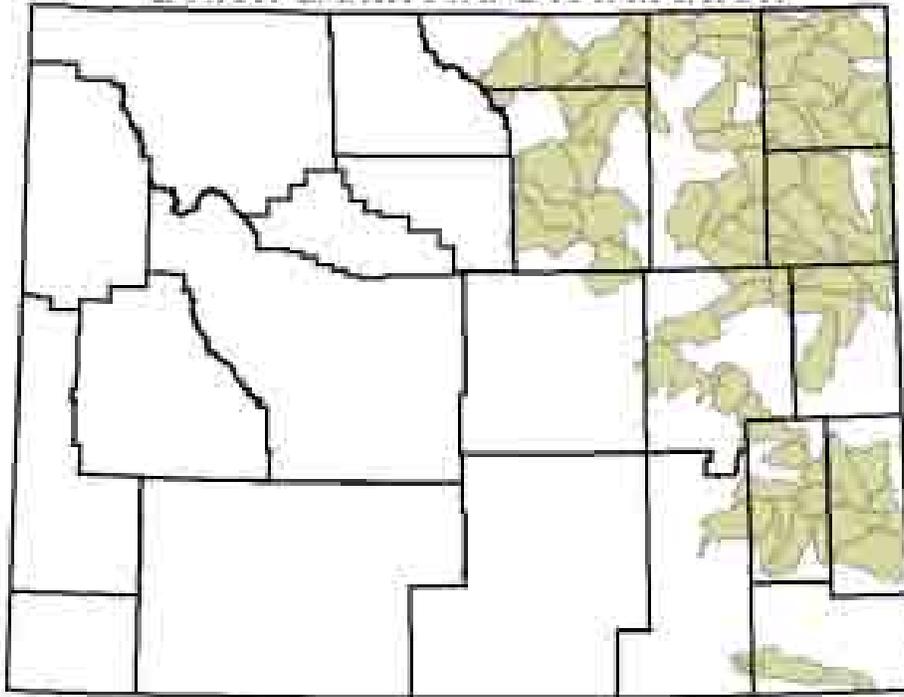
Conservation Actions:

- Monitoring protocols and sites should be identified and routinely sampled.
- Determination of their status as native needs to be clarified.

References and Additional Reading:

Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

Black Bullhead Distribution



Bluehead Sucker (*Catostomus discobolus*)

Status: NSS1; NatureServe G4 S3

Abundance: Rare

Introduction: Bluehead suckers have an elongated body with a narrow caudal peduncle. The mouth has cartilaginous edges for scraping algae off the rocks. Adults may attain lengths of 18 inches, more typical are lengths of 6 to 10 inches. The bluehead sucker feeds mostly on algae, but its diet may also include small bottom-dwelling invertebrates. It's been observed spawning in June.

Habitat: Bluehead suckers are usually found in the main current of streams, although its streamlined body form and narrow caudal peduncle indicate adaptation to living in the strong currents of larger rivers. Bluehead suckers prefer turbid to muddy streams often with high alkalinity and are rarely found in clear water.

Problems:

Bluehead suckers are considered to be of special concern in Idaho, Utah, Wyoming, Colorado, Arizona, and New Mexico. Bluehead suckers are rare and of special concern in Wyoming; the distribution of the bluehead sucker has dramatically declined on site, stream, subdrainage, and drainage scales. Habitat alterations and the introduction of nonnative species are believed responsible for the decline in this species. Habitat alterations include:

- Some water management practices that dramatically alter water quantity/quality thus reducing habitat suitability;
- Water management practices dewater stretches of streams, leading to habitat fragmentation;
- Manipulation of flood regimes that cause the degradation or loss of spawning habitats; and

The introduction of white suckers to the Green River and Little Snake River drainages may pose the greatest threat to bluehead suckers in Wyoming. White suckers hybridize with bluehead suckers and compete directly for habitat and food with bluehead suckers.

Conservation Actions:

The following research is needed:

- Hybridization issues must be better understood by basin/subdrainage.
- Managers should consider developing refugia in the form of pond habitats.
- A better understanding of the basic biology, life history and ecology is needed.
- Monitoring protocols and sites should be identified and routinely sampled.
- Methods and strategies detailed in the Multi-agency Conservation Agreement and Strategy need to be implemented and evaluated.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.
- Evaluate the potential for restoring within suitable portions of historic range that are currently uninhabited or where competing or hybridizing species can be removed.

References and Additional Reading:

Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department. Cheyenne. 290pp.

Weitzel, D. L., 2002. Conservation and Status Assessments for the Bluehead Sucker (*Catostomus discobolus*), Flannelmouth Sucker (*Catostomus latipinnis*), Roundtail Chub (*Gila robusta*), and Leatherside Chub (*Gila copei*): Rare Fishes West of the Continental Divide, Wyoming. Wyoming Game and Fish Department, Cheyenne. 51pp.



Bonneville Cutthroat Trout (*Oncorhynchus clarki utah*)

**Status: NSS2;
NatureServe G4T4 S1**

Abundance: Common

Introduction: The Bonneville cutthroat trout is also known as the Bear River cutthroat trout for its native drainage in Wyoming. It is distinguished from the other cutthroat trout by a more uniform distribution of spots. Habitat modification and range fragmentation, the introductions of non-native species, and fishing have all contributed to the decline of the Bonneville cutthroat. In comparison to other cutthroat trout, the Bonneville cutthroat is less easily caught by anglers. It does not readily hybridize with non-native trout; it tends to tolerate and survive in degraded habitats with warmer water temperatures better than other cutthroat trout. This fish had been considered extinct until populations were found in the latter 20th century in western Wyoming, Utah and Nevada. Rainbow and other cutthroat trout are not stocked in the Smiths Fork and Thomas Fork of the Bear River because they can hybridize with Bonneville cutthroat trout and reduce the high genetic purity seen in populations of Bonneville cutthroat trout in Wyoming.

Habitat: Cutthroat trout prefer gravel-bottomed creeks and small rivers as well as lakes. The Bonneville cutthroat trout is well known for its ability to survive in harsh and often degraded (by man) habitats. In Wyoming, the Bonneville cutthroat is found in the Smith Fork and Thomas Fork drainages of the Bear River system. It is also native to some drainages in Idaho, Utah and Nevada with the bulk of its historic range within Utah.

Problems:

Bonneville cutthroat trout are currently designated a special status species by the states of Idaho Nevada, Utah and Wyoming. To prevent hybridization it is imperative to continue long standing moratoriums on stocking of non-native trout in the Bear River tributaries of the Smiths Fork and Thomas Fork. Recent studies have shown a great susceptibility to irrigation diversion dams that cause range fragmentation and loss of cutthroat trout by entrainment in irrigation ditches. Watershed function has been degraded in many headwater streams by a variety of anthropogenic activities and fire suppression resulting in the loss of aspen and beaver.

Conservation Actions:

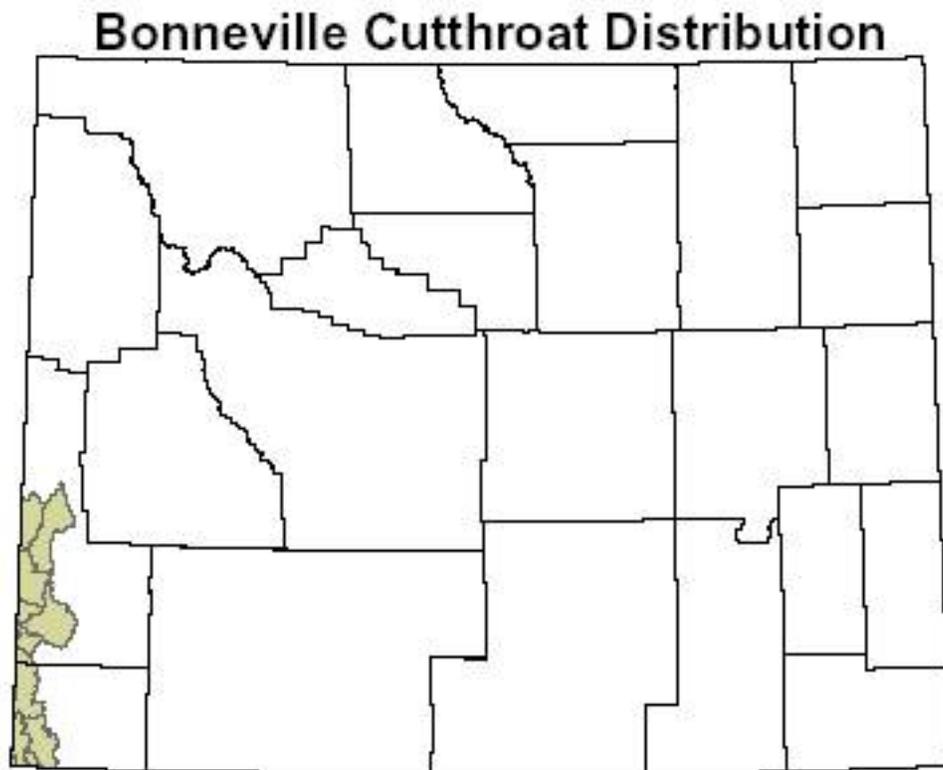
- More permanent fish passage barriers need to be developed and installed as current barriers age and require replacement.
- Determine if genetic integrity of native stocks has been altered by introduced stocks. Prevent further introgression.
- New methods to restore habitat at a watershed level need to be developed and then implemented range-wide especially replacement of declining aspen communities in headwaters of most sub basins.
- Methods and strategies detailed in the Multi-agency Conservation Agreement and Strategy need to be implemented and evaluated.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.

- Evaluate the potential for restoring within suitable portions of historic range that are currently uninhabited or where competing or hybridizing species can be removed.

References and Additional Reading:

Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

Binns, A. 1981. Bonneville cutthroat trout, *Salmo clarki utah*, in Wyoming. Fish Tech. Bull. No. 5. Wyoming Game and Fish Department, Cheyenne. 107pp.



Burbot (*Lota lota*)**Status: NSS2; NatureServe G5 S3S4****Abundance:** Unknown

Introduction: The burbot is the only freshwater codfish. The body is extremely elongate (almost snake-like) with a single median barbell. Burbot, especially larger adults, feed on other fish, even of their own species. Immature burbot, as well as some adults, eat damselflies and other invertebrates. One study of Canada burbot noted that they eat fish in the summer and invertebrates in the winter. Feeding most often occurs at night. The fish spawn during winter. Fry are so small that conventional hatchery screens won't retain them, and attempts to artificially propagate burbot were discontinued. Burbot are also known as *ling*.

Habitat: The burbot lives in cold, deep lakes and large rivers. Immature fish prefer rubble substrate, while adults remain in deep water to prey on other fish. In Wyoming, the burbot is native to the Big Horn and Tongue river systems. It's found in larger lakes in the Lander and Dubois area, including Boysen Reservoir and Ocean Lake. It also occurs south to Missouri and Kansas and east to New England, as well as throughout Canada.

Problems: Burbot populations in the Wind/Big Horn drainage are considered to have declined over the last two decades. However, established populations have also been discovered outside their native range in the Green River drainage. Water development facilities and increased sediment loading associated with a variety of land uses are thought to be the major cause of population declines.

Conservation Actions:

The following research is needed:

- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- Monitoring protocols and sites should be identified and routinely sampled.
- A better understanding of movement, dispersal, and colonization patterns is needed.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.

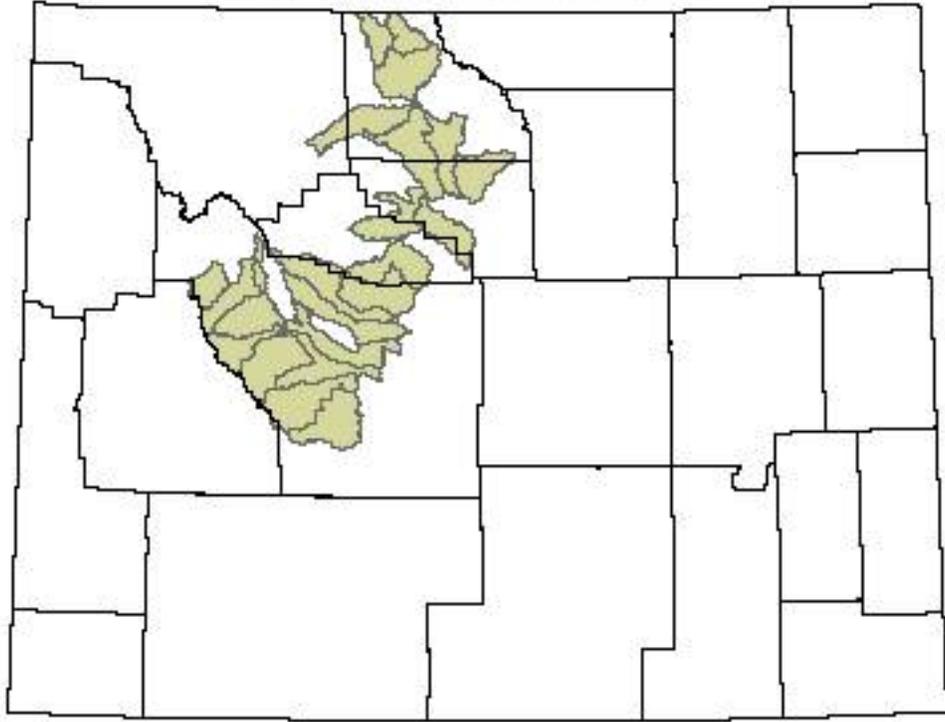
References and Additional Reading:

Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

Miller, D.D. 1970. A life history study of the burbot in Ocean Lake and Torrey Creek, Wyoming. M.S. thesis (unpublished). Univ. Wyoming. 97pp.

Scott, W. B., and E.J. Crossman. 1973. Freshwater fishes of Canada. Bull. 184 Fish. Res. Bd. Canada. 966pp.

Burbot Distribution



Central Stoneroller (*Campostoma anomalum*)

Status: NSS4; NatureServe G5 S4

Abundance: Common

Introduction: The central stoneroller has a stout body form with a blunt snout. It has an inferior mouth with cartilaginous biting edges and no barbels. Adults may reach lengths of 6 inches. The central stoneroller's unique mouth scrapes algae and possibly some aquatic insect larvae from the substrate. A study of central stonerollers in New York showed that this minnow spawns from April to early June in water temperatures of 58 to 75 degrees F. Males dig small pits in shallow water. The fertilized eggs are covered by gravel during subsequent nest building.

Habitat: Central stonerollers are commonly found in high gradient headwater streams with swift currents and well-defined gravel, rubble, or bedrock riffles. They are frequently found in riffle/pool complexes in clear to slightly turbid water and may be associated with vegetation. They are occasionally found in medium to large sized rivers and rarely occur in lakes. They are tolerant of low dissolved oxygen levels. In Wyoming, Central stonerollers are widespread and occur throughout the entire North Platte River drainage. They also commonly occur in Lodgepole and Crow creeks of the South Platte River drainage and in the Niobrara River.

Problems:

There are no immediate concerns for the central stoneroller in Wyoming. Range-wide they are considered widespread, abundant, and globally secure. In Wyoming, distribution appears to be increasing on site, stream, and subdrainage scales.

Conservation Actions:

The following research is needed:

- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.
- Monitoring protocols and sites should be identified and routinely sampled.

References and Additional Reading:

- Baxter, G.T. 1955. A study of the fish population in Lodgepole Creek, Laramie County, Wyoming. *J. Colo.-Wyo. Acad. Sci.* IV (7):61.
- Baxter, G.T., and M.D. Stone. 1995. *Fishes of Wyoming*. Wyoming Game and Fish Department, Cheyenne. 290pp.
- Miller, R.J. 1962. Reproductive behavior of the stoneroller minnow, *Campostoma anomalum pullum*. *Copeia*. 1962 (2):407-417.

Weitzel, D. L., 2002. Conservation and Status Assessment for the Common Shiner (*Luxilus cornutus*), Bigmouth Shiner (*Notropis dorsalis*), Central Stoneroller (*Campostoma anomalum*) and Red Shiner (*Cyprinella lutrensis*): Common native minnows of the Platte and Niobrara River drainages, Wyoming.



Channel Catfish (*Ictalurus punctatus*)

Status: NSS4; NatureServe G5 S5

Abundance: Common

Introduction: Channel catfish have a slender body with a deeply forked caudal tail. Their lateral barbels are long, extending beyond the gill opening. As with the other catfish, their bodies are scaleless. The channel catfish is an important game fish in Wyoming and across the United States. Adults are omnivorous, with a diet that includes algae, plants, terrestrial insects, dead fish and even garbage. Large catfish living in streams are quite predacious, feeding at night in shallow water and resting in pools or under submerged rocks or logs in the daytime. Young catfish can be found in shallow riffles and turbulent areas near sand bars. This fish will spawn in lakes or streams, laying its eggs in dark places that are protected from intruders, perhaps in a burrow or beneath a submerged boulder. In man-made habitats, they will spawn in wooden boxes with black interiors, submerged cream cans, or specially made earthenware crocks. The male sometimes eats the eggs. It's believed that females spawn once a year with only one male.

Habitat: The channel catfish prefers large rivers and will tolerate turbid waters. Its range encompasses Montana and Canada's prairie provinces east through the Lake States, and south to Florida and northern Mexico. An introduced species in the western U.S, the channel catfish is native to the Missouri River drainage in Wyoming. It occurs in several drainages east of the Continental Divide at lower elevations and has been introduced to the Little Snake and Green river drainages west of the Divide.

Problems:

There are no immediate concerns for channel catfish in Wyoming. Populations appear to be stable wherever suitable habitat exists. It's range in Wyoming has been extended primarily via planned introductions as a sportfish.

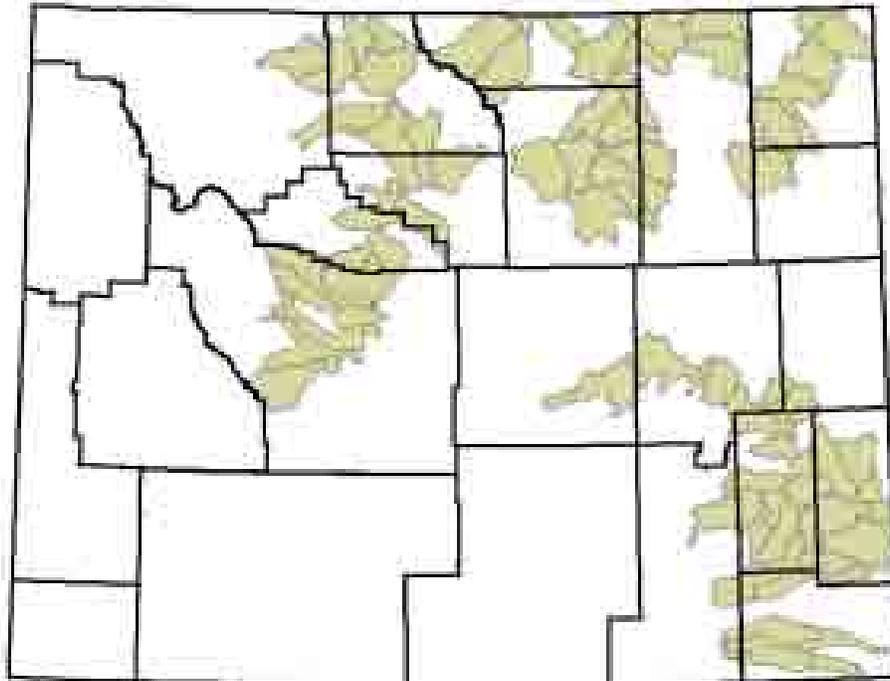
Conservation Actions:

- Determine if genetic integrity of native stocks has been altered by introduced stocks. Prevent further introgression.
- Continue monitoring in conjunction with routine sampling efforts in reservoir habitats.

References and Additional Reading:

- Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.
- Brown, L. 1942. Propagation of the spotted channel catfish (*Ictalurus lacustris punctatus*). Trans. Kansas Acad. Sci., 45:311-314.
- Davis, J. 1959. Management of channel catfish in Kansas. Univ. Kansas Mus. of Nat. Hist., Misc. Publ., 21:1-56.

Channel Catfish Distribution



Colorado River Cutthroat Trout (*Oncorhynchus clarki pleuriticus*) **Status:NSS2;**
NatureServe G4T3 S1

Abundance: Uncommon

Introduction: The only trout native to the Green and Little Snake river drainages in Wyoming, the Colorado River cutthroat is spectacularly colored when it begins spawning on the declining side of high flows in the late spring and continuing through early July at higher elevations. They feed mostly on aquatic and terrestrial invertebrates. Genetically pure populations of this trout are relegated to isolated headwaters though slightly hybridized populations are found also found. They will hybridize with other subspecies of cutthroats and with rainbow trout. This subspecies is considered easy to catch, thus it is protected by restrictive regulations to prevent excessive harvest.

Habitat: In Wyoming, the Colorado River cutthroat can be found in the Green River, Black's Fork and Little Snake River enclaves. Some of the healthiest and purest populations of this subspecies occur in small stream tributaries of the Little Snake River in Carbon County and in the Wyoming Range of Sublette County. This fish prefers cold, clear water, a relatively steep gradient and a rubble-boulder substrate. It is native to portions of Utah, Wyoming and Colorado.

Problems:

Nonnative brook trout quickly out-compete and totally replace Colorado River cutthroat trout in most stream systems in Wyoming. Rainbow and other cutthroat trout readily hybridize with Colorado River cutthroat trout; long standing moratoriums that prevent stocking these in the same streams harboring Colorado River cutthroat trout must be continued. Man-made barriers that were built to preclude mixing of non-native trout with conservation populations of Colorado River cutthroat trout need to be maintained and repaired to keep them functional. Restoration actions to reconnect populations in isolated head waters into a large interconnected population are crucial conservation measures but very expensive, require persistence, extensive effort and a good public education program. Watershed function has been degraded in many headwater stream habitats by a variety of anthropogenic activities and fire suppression resulting in the decline or loss of aspen and beaver.

Conservation Actions:

- More permanent fish passage barriers need to be developed and installed as current barriers age and require replacement.
- Determine if genetic integrity of native stocks has been altered by introduced stocks. Prevent further introgression.
- New methods to restore habitat at a watershed level need to be developed and then implemented range-wide especially replacement of declining aspen communities in headwaters of most sub basins.
- Methods and strategies detailed in the Multi-agency Conservation Agreement and Strategy need to be implemented and evaluated.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.
- Evaluate the potential for restoring within suitable portions of historic range that are currently uninhabited or where competing or hybridizing species can be removed.

References and Additional Reading:

- Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.
- Behnke, R.J. 1979. Monograph of the native trouts of the genus *Salmo* of western North America. U.S. Fish and Wildlife Service, Denver. 215pp.
- Binns, A. 1977. Present status of indigenous populations of cutthroat trout, *Salmo clarki*, in Southwestern Wyoming. Fish Tech. Bull. No. 2. Wyoming Game and Fish Department, Cheyenne. 58pp.
- Jespersion, D.M. 1981. A study of the effects of water diversion on the cutthroat trout, *Salmo clarki pleuriticus*, in the drainage of the North Fork of the Little Snake River in Wyoming. M.S. thesis. Univ. Wyoming. 99pp.
- Quinlan, R.E. 1980. A study of the biology of the Colorado River cutthroat trout (*Salmo clarki pleuriticus*) population in the North Fork of the Little Snake River drainage in Wyoming. M.S. thesis. Univ. Wyoming. 49pp.
- Wyoming Game and Fish Department. 1987. Comprehensive management and enhancement plan for Colorado River cutthroat trout in Wyoming. Wyoming Game and Fish Department, Cheyenne.



Common Shiner (*Luxilus cornutus*)

Status: NSS3; NatureServe G5 S3S4

Abundance: Common

Introduction: The common shiner is a silvery, deep bodied minnow with a terminal mouth. No barbel is present. The adult size is 3 to 5 inches and the maximum length is 7 inches. The common shiner spawns in early summer when water temperatures reach about 65 degrees F. The fish makes a shallow nest in the gravel to lay its eggs in, or it may use the nest of creek chubs or hornyhead chubs. Adults and juveniles feed on aquatic and terrestrial insects along with lesser quantities of fish, small crustaceans and plant material.

Habitat: The common shiner can be found in clear streams with gravel bottoms but may also occur in small lakes. Adults are generalists and can be found in a variety of habitats but they often occur in clear tributaries to mainstem rivers. These streams may be reduced to isolated pools by mid-summer. In Wyoming, it occurs in tributaries of the North and South Platte rivers.

Problems:

It is considered to be widespread, abundant, and globally secure, but it is of special concern in Nebraska and Wyoming and is threatened in Colorado. In Wyoming the population trend of the common shiner is believed to be declining on subdrainage, stream, and site scales. Reasons for these declines have yet to be specifically identified.

Conservation Actions:

- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- Monitoring protocols and sites should be identified and routinely sampled.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.

References and Additional Reading:

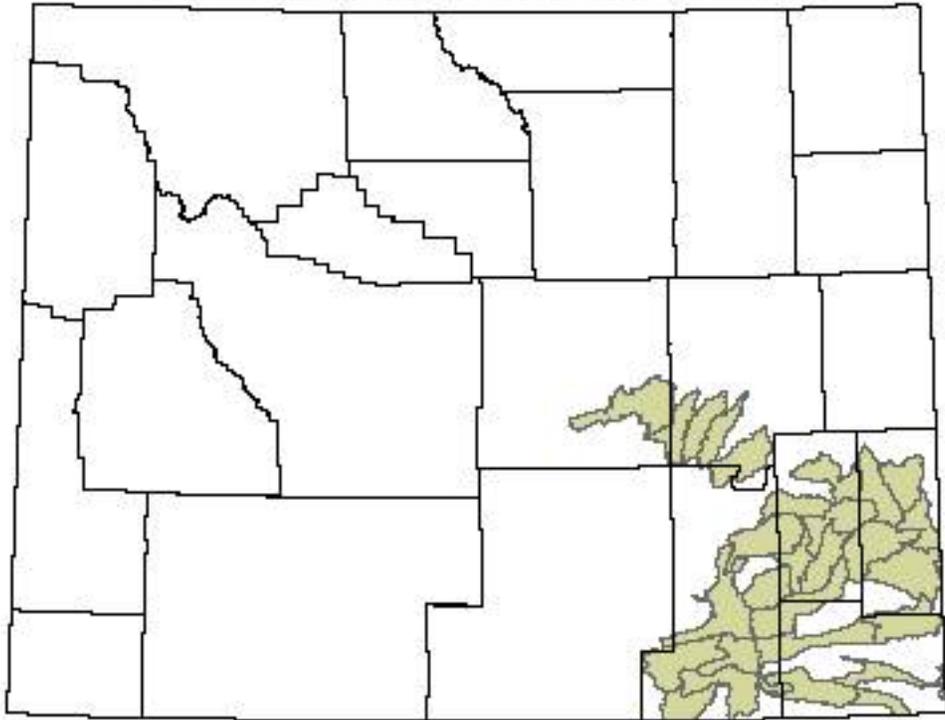
Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

Forbes, S.A., and R.E. Richardson. 1920. The fishes of Illinois. Nat. Hist. Surv. Ill., 3:1-358.

Raney, E.C. 1940. The breeding habits of the common shiner, *Notropis cornutus* (Mitchill). Zoologica 25:1-14.

Weitzel, D. L., 2002. Conservation and Status Assessment for the Common Shiner (*Luxilus cornutus*), Bigmouth Shiner (*Notropis dorsalis*), Central Stoneroller (*Campostoma anomalum*) and Red Shiner (*Cyprinella lutrensis*): Common native minnows of the Platte and Niobrara River drainages, Wyoming.

Common Shiner Distribution



Finescale Dace (*Phoxinus neogaeus*)

Status: NSS1; NatureServe G5 S2

Abundance: Rare

Introduction: Body is elongate, fins rounded and head short. The mouth is large and lacking a barbel. The finescale dace feeds on algae, mollusks and aquatic insects. In Minnesota, where this fish has been studied, spawning occurs in early spring. It's believed that the eggs are deposited in mud or sand under the cover of submerged objects. Adult size is about 3 inches

Habitat: The finescale dace ranges widely but populations existing in Nebraska and Wyoming are considered to be glacial relics. Finescale dace commonly occur in the Niobrara River, and also occur at several sites in Crook County where they are native to the North Fork Cow Creek in the Cheyenne River drainage. Finescale dace typically occur in cool, boggy lakes and sluggish, acidic streams. They are commonly found in lakes and ponds and are often associated with beaver ponds. They are tolerant of low oxygen levels and commonly occur in lakes that are prone to winterkill.

Problems:

They are considered to be widespread, abundant, and globally secure but are considered threatened in South Dakota and of special concern in North Dakota, Nebraska, and Wyoming. Reasons for these declines have yet to be specifically identified. Although finescale dace appear stable when viewed on a drainage or subdrainage scale, distribution is believed declining on site and stream scales. Relic populations have the potential for decreased fitness. Finescale dace habitat is bounded by private land so assessment and management activities are predicated upon good relations with private landowner.

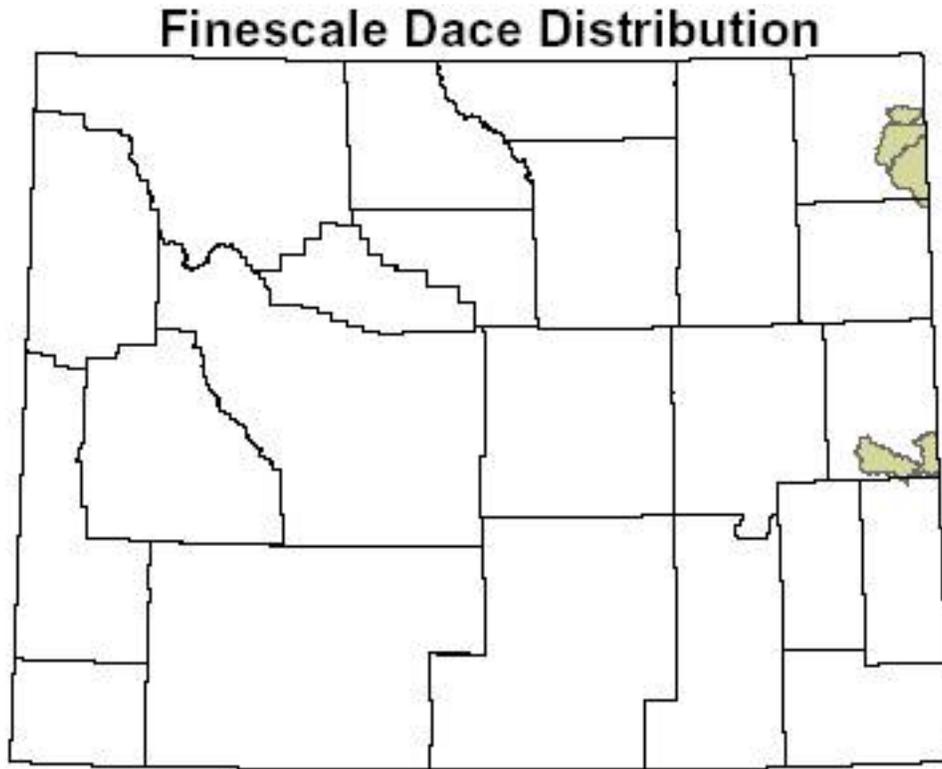
Conservation Actions:

- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- Monitoring protocols and sites should be identified and routinely sampled.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.

References and Additional Reading:

- Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department. Cheyenne. 290pp.
- Page, L.M., and B.M. Burr. 1991. Freshwater fishes. Houghton Mifflin Company, New York. 432pp.
- Stasiak, R.H. 1977. Morphology and variation in the finescale dace, *Chrosomus neogaeus*. Copeia. 1977:771-774.

Weitzel, D. L., 2002. Conservation and Status Assessments for the Finescale Dace (*Phoxinus neogaeus*), Pearl Dace (*Margariscus margarita*), and Plains Topminnow (*Fundulus sciadicus*): Rare Native Fish Species of the Niobrara and Platte River Basins, Wyoming.



Flannelmouth Sucker (*Catostomus latipinnis*) Status: NSS1; NatureServe G3G4 S3

Abundance: Uncommon

Introduction: Flannelmouth suckers are slender bodied. With its very narrow caudal peduncle and deeply forked caudal fin it is well adapted for swimming long distances in large, rivers with a stout current. Average adult size is 22 inches but are found as long as 28 inches. Recent age analysis has shown some flannelmouth suckers live as long as 30 years. Mainly herbivorous, it has been known to eat aquatic insects, detritus and the occasional trout egg.

Habitat: Although preferring large rivers with deep riffles and runs, they can also be found in smaller streams and sometimes in lakes. Native to the Colorado River drainage basin, in Wyoming it's found in the Green and Little Snake river drainages. In the spring they leave the large rivers and ascend small tributary streams to spawn; migrations of over 140 miles have been documented.

Problems:

The flannelmouth sucker has declined in abundance across its native range. It considered of special concern in Utah, Colorado and Wyoming. It is rare in Arizona and New Mexico. In Wyoming, flannelmouth suckers have shown dramatic declines on stream, subdrainage, and drainage scales. Habitat alterations and the introduction of nonnative species are believed to be responsible for the decline in this species. Habitat alterations include:

- Some water management practices dramatically alter water quantity/quality thus reducing habitat suitability;
- Water management practices dewater stretches of streams, leading to habitat fragmentation;
- Manipulation of flood regimes that cause the degradation or loss of spawning habitats; and

Nonnative species have contributed to the decline of this fish either through direct predation or competition for food and spawning sites and hybridization. White suckers hybridize with flannelmouth suckers posing one of the greatest threats to this species suckers in Wyoming.

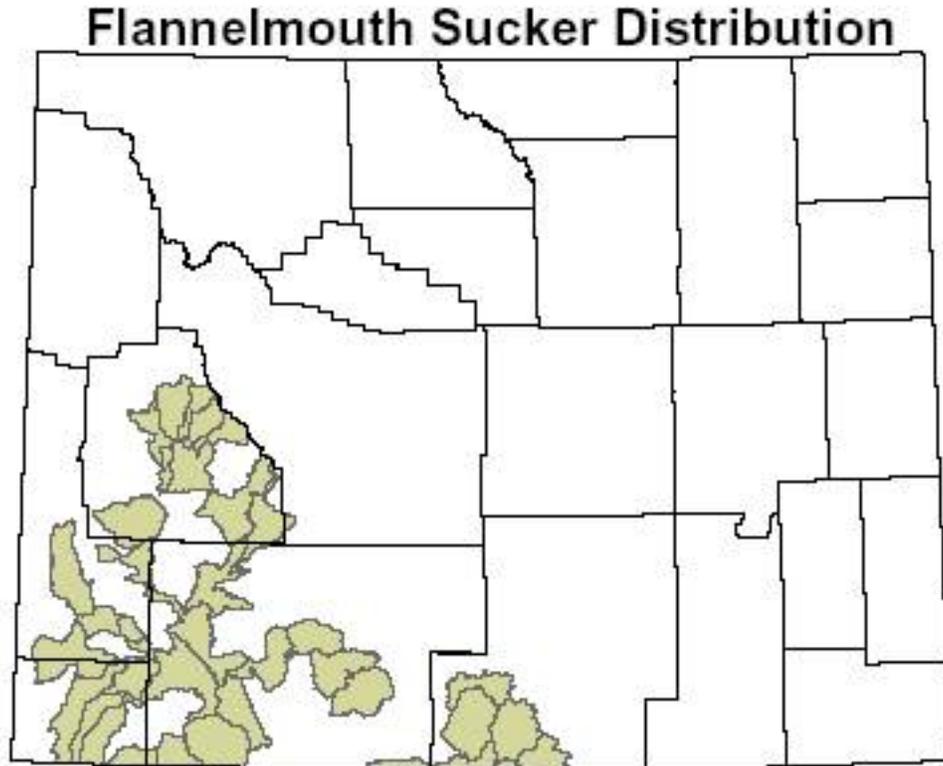
Conservation Actions:

- Hybridization issues must be better understood by basin/subdrainage.
- A better understanding of the basic biology, life history and ecology is needed.
- Monitoring protocols and sites should be identified and routinely sampled.
- Methods and strategies detailed in the Multi-agency Conservation Agreement and Strategy need to be implemented and evaluated.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.
- Evaluate the potential for restoring within suitable portions of historic range that are currently uninhabited or where competing or hybridizing species can be removed.

References and Additional Reading:

Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

Weitzel, D. L., 2002. Conservation and Status Assessments for the Bluehead Sucker (*Catostomus discobolus*), Flannemouth Sucker (*Catostomus latipinnis*), Roundtail Chub (*Gila robusta*), and Leatherside Chub (*Gila copei*): Rare Fishes West of the Continental Divide, Wyoming. Wyoming Game and Fish Department, Cheyenne. 51pp.



Flathead chub (*Platygobio gracilis*)

Status: NSS3; NatureServe G5 S5

Abundance: Uncommon

Introduction: The body of the flathead chub is an elongated, streamlined minnow with a broad, flattened head. Its mouth is subterminal with a conspicuous barbel. The caudal fin is deeply forked and pectorals fins are falcate. Adults range in size to a maximum of 10 inches. They are omnivorous, feeding mainly on aquatic and terrestrial invertebrates and vegetation. Small fish have also been reported as part of its diet. This chub spawns in late summer when the rivers are low, warm, and the bottoms stable.

Habitat: The large barbel and special sensory organs are adaptations for living and feeding in turbid waters. Its large fins and streamlined shape also allow it to live successfully in swift current.

Problems:

The flathead chub is considered to be widespread, abundant, and globally secure. Flathead chubs have declined throughout their native range and are considered of special concern in North Dakota, Colorado, Kansas, Iowa, Illinois, and Missouri. In Wyoming flathead chub distribution is declining on site, stream, subdrainage and drainage scales. The cause of these declines has yet to be precisely identified.

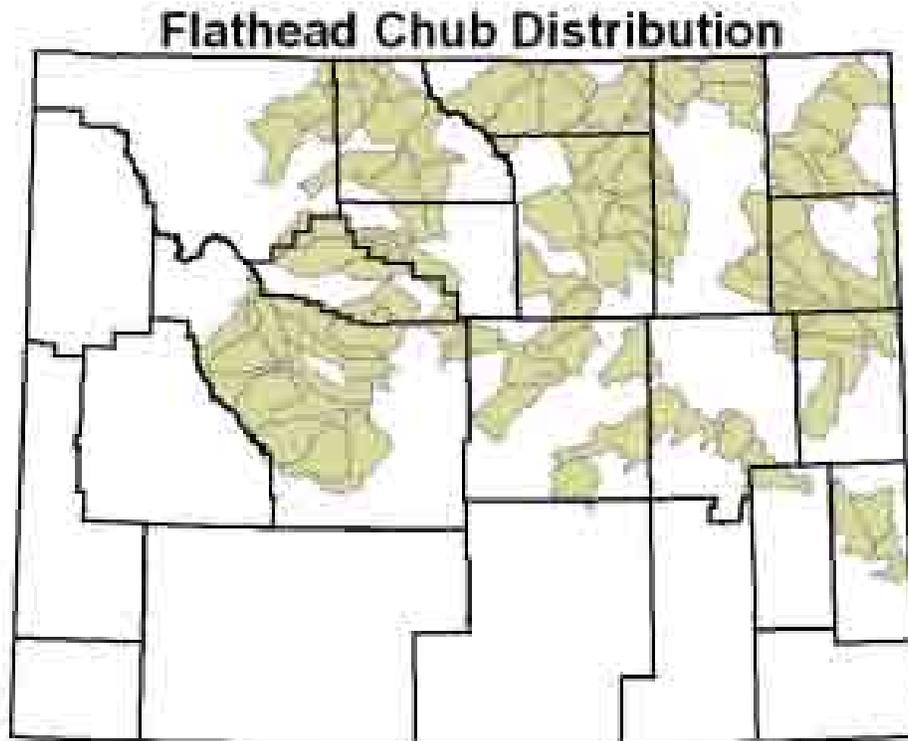
Conservation Actions:

- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- A better understanding of the basic biology, life history and ecology is needed.
- Monitoring protocols and sites should be identified and routinely sampled.
- A better understanding of movement, dispersal, and colonization patterns is needed.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.

References and Additional Reading:

- Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.
- Cross, R.B. 1967. Handbook of fishes of Kansas. Univ. Kansas Mus. of Nat. Hist. Misc. Publ. 45:1-357.
- McPhail, J.D., and C.C. Lindsey. 1970. Freshwater fishes of northwestern Canada and Alaska. Fish. Res. Board Canada Bull. 173. 381pp.
- Moore, G.A. 1950. The cutaneous sense organs of barbeled minnows adapted to life in the muddy waters of the Great Plains Region. Trans. Amer. Micros. Soc. 69:69-95.

Weitzel, D. L., 2002. Conservation and Status Assessment for the Lake Chub (*Couesius plumbeus*), Flathead Chub (*Platygobio gracilis*), Plains Minnow (*Hybognathus placitus*), and Brassy Minnow (*Hybognathus hankinsoni*) in Wyoming.



Goldeye (*Hiodon alosoides*)

Status: NSS2; NatureServe G5 S2

Abundance: Uncommon

Introduction: The goldeye is similar in appearance to the mooneye except for its characteristic yellow eyes. Adults up to 16 inches are found but 10 inches is more typical. Goldeye are known to eat snails, cladocerans, insect larvae, earthworms, fish, mice and frogs. They tend to be surface feeders that feed mostly at twilight or after dark. Spawning occurs in late spring, and the eggs float in open water.

Habitat: In Wyoming, the goldeye can be found in the Powder, Little Powder and Little Missouri rivers and in Clear and Crazy Woman creeks. It prefers large rivers and their associated backwaters and marshes, or the shallow waters of large lakes and reservoirs. Its large eye allows the fish to live in very turbid waters. Young goldeye have never been found in Wyoming, it's thought that populations in the northeastern part of the state are maintained by the migration of adult fish seeking spawning grounds.

Problems: The goldeye is considered to be widespread, abundant, and secure across its range. In Wyoming the goldeye was once quite common in the North Platte, Big Horn, Little Missouri and Powder rivers. It is now found in the latter two. Habitat conditions are declining. Dewatering and habitat degradation are the most serious threats to the goldeye. Ironically changes in water and land management that would increase water clarity could result in greater predation and jeopardy to the goldeye. Conversely, water uses that can cause intermittency in tributary streams are a problem.

Conservation Actions:

- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- Investigate spawning habitats and early life history habitat requirements in their undisturbed range of the Powder River. It is unknown if water quality changes associated with coal bed methane development will affect spawning, incubation or survival of shovelnose sturgeon eggs or larvae.
- A better understanding of the basic biology, life history and ecology is needed.
- Monitoring protocols and sites should be identified and routinely sampled.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.

References and Additional Reading:

Battle, H.I., and W.M. Sprules. 1960. A description of the semi-buoyant eggs and early developmental stages of the goldeye, *Hiodon alosoides* (Rafinesque). J. Fish. Res. Bd. Canada, 17:245-265.

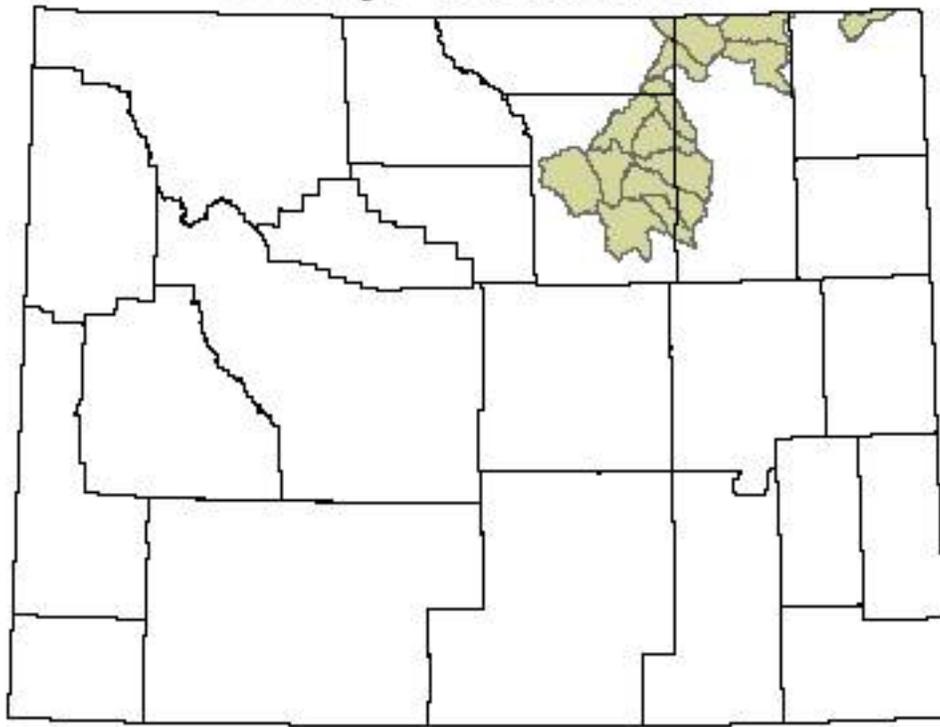
Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

Hill, W.J. 1966. Observations on the life history and movement of the goldeye, *Hiodon alosoides*, in Montana. Proc. Montana Acad. Sci. 26:45-53.

Scott, W. B., and E.J. Crossman. 1973. Freshwater fishes of Canada. Bull. 184 Fish. Res. Bd. Canada. 966pp.

Weitzel, D. L., 2002. Conservation and Status Assessments for the Sturgeon Chub (*Macrhybopsis gelida*), Western Silvery Minnow (*Hybognathus argyritis*), and Goldeye (*Hiodon alosoides*): Rare Fish Species of the Upper Missouri River Drainage, Wyoming. Wyoming Game and Fish Department, Cheyenne. 38pp.

Goldeye Distribution



Hornyhead Chub (*Nocomis biguttatus*)**Status: NSS1; NatureServe G5 S1****Abundance:** Rare

Introduction: Body is robust, with a large head and blunt snout. They have a large mouth with single barbel. Breeding males have conspicuous nuptial tubercles on their head and body. The hornyhead chub prefers a diet of insects, crustaceans and mollusks, as well as algae and other plant material. When spawning, it constructs a conspicuous gravel nest, with circular areas one to three feet in diameter, tapering from upstream to downstream. Spawning nests are often composed of gravel larger than the male chubs' head. Females enter the nest, which is guarded by the male, when spawning.

Habitat: This fish is found in medium-size to large clear, gravel-bottomed streams. It is relatively uncommon in Wyoming, but has been found in the Laramie River downstream from Wheatland Reservoir 2 as well as in the North Laramie River. Outside of Wyoming, the hornyhead chub occurs from New York to the Rocky Mountains and south to Arkansas.

Problems:

Dewatering and habitat degradation, associated with human water usage and management have impacted the hornyhead chub.

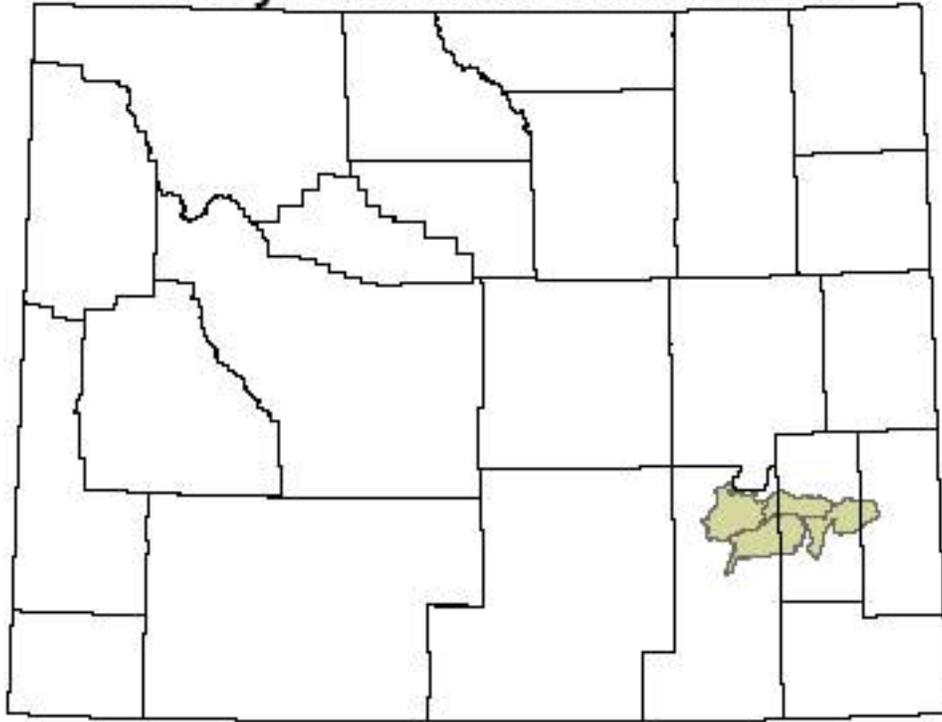
Conservation Actions:

- Studies are needed to better understand the population genetic structure.
- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- A better understanding of the basic biology, life history and ecology is needed.
- Monitoring protocols and sites should be identified and routinely sampled.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.

References and Additional Reading:

- Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.
- Davis, B.J., and R.J. Miller. 1967. Brain patterns in minnows of the genus *Hybopsis* in relation to feeding habits and habitat. *Copeia* 1967 (1):1-39.
- Lachner, E.A. 1950. The comparative food habits of the cyprinid fishes *Nocomis biguttatus* and *Nocomis micropogon* in western New York. *Journal of the Washington Academy of Science* 40(7):229-236.
- Weitzel, D. L., 2002. Conservation and Status Assessments for the Hornyhead Chub (*Nocomis biguttatus*), Suckermouth Minnow (*Phenacobius mirabilis*), and Orangethroat Darter (*Etheostoma spectabile*): Rare Stream Fish Species of the Platte River Drainages, Wyoming. Wyoming Game and Fish Department, Cheyenne. 40pp.

Hornyhead Chub Distribution



Iowa Darter (*Etheostoma exile*)

Status: NSS4; NatureServe G5 S3S4

Abundance: Common

Introduction: The body and head of the Iowa darter are moderate in size, it sports large eyes, and a moderate terminal mouth. Adults reach a maximum length of about 2.5 inches. The Iowa darter actively feeds off the bottom during day and night; its diet consists of small aquatic invertebrates. From late April to July, it spawns beneath undercut banks or submerged objects. The eggs are deposited along fibrous mud banks or on the undersurface of submerged objects or buried in sand.

Habitat: Iowa darters are typically found in small lakes, ponds, and cool, slow moving streams. Iowa darters prefer clear to slightly turbid water. They are intolerant of high turbidity but survive in low oxygen levels. In Wyoming, this fish is found in the North Platte, South Platte and Niobrara river drainages. The johnny darter has replaced most of the Iowa darter populations in the upper North Platte River in Carbon County and the Rock and Medicine Bow Rivers. The Iowa darter, however, is common in Sand Creek, the Laramie River and drainage lakes in the Laramie Basin.

Problems:

There is no immediate concern for the Iowa darter in Wyoming, although their range has apparently been reduced somewhat by the expansion of the Johnny darter.

Conservation Actions:

- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- A better understanding of the basic biology, life history and ecology is needed.
- Monitoring protocols and sites should be identified and routinely sampled.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.

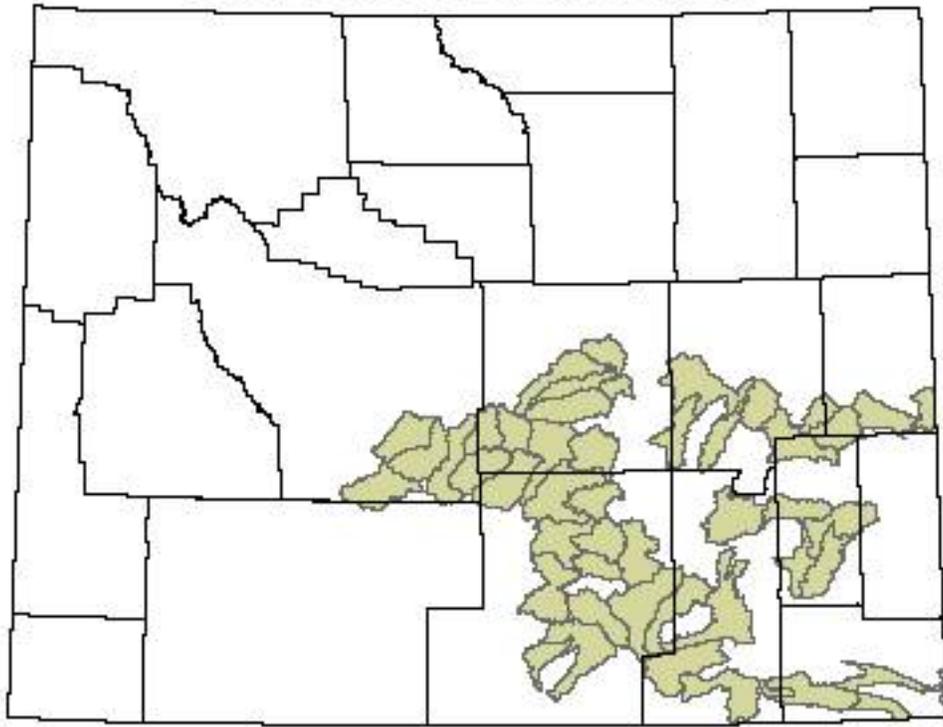
References and Additional Reading:

Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

Winn, H.E. 1958. Comparative reproductive behavior and ecology of fourteen species of darters (Pisces-Percidae). Ecol. Monogr. 28:155-191.

Weitzel, D. L., 2002. Conservation and Assessment for the Iowa Darter (*Etheostoma exile*) and the Johnny Darter (*Etheostoma nigrum*): Wyoming's common darters.

Iowa Darter Distribution



Kendall Warm Springs Dace (*Rhinichthys osculus thermalis*)

**Status: NSS1;
NatureServe G5T1 S1**

Abundance: Abundant within an extremely limited range

Introduction: This is a diminutive subspecies of the speckled dace, typically achieving a length of less than 2 inches. It resides solely in a warm spring tributary to the Green River within the Bridger-Teton National Forest. Kendall Warm Springs dace are found well distributed throughout all but the upper portion of the 984-foot long spring creek. This dace has been seen to spawn from late June through September. At time of spawning it sports spawning tubercles while the body and fins turn a bright purple.

Habitat: The temperature of Kendall Warm Springs has a near constant temperature of 85 degrees F. Habitat consists of moderate to fast riffles, several man-made pools less than 3 feet deep and shallower boggy areas. Adults are seen in the main current and pools while juveniles are seen in vegetated lateral habitats.

Problems:

The Kendall Warm Springs dace is listed as an endangered subspecies. While it fully occupies its known historic range, it is still restricted to less than 1000 feet of springs, seeps, and main channel habitats. Kendall Warm Springs was fenced to prevent livestock impacts. Pollution from cleaning products has been eliminated and restrictions on bathing activities by humans have done well to protect the habitat of this dace. Its use as a bait minnow is also prohibited.

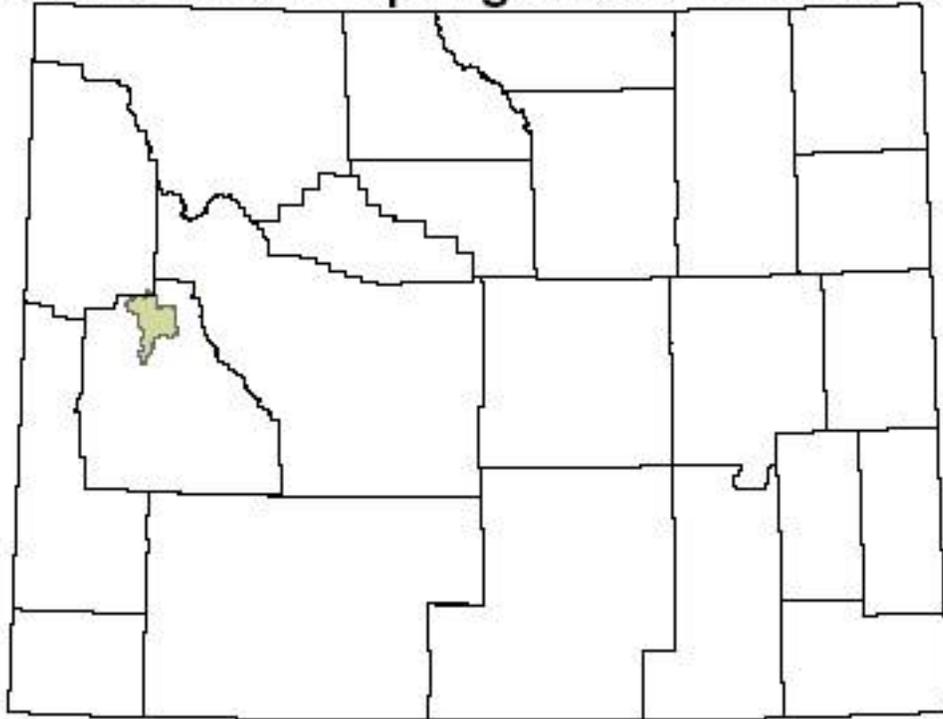
Conservation Actions:

- This fish has been well studied.
- The restrictions on human and livestock must be continued.

References and Additional Reading:

- Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.
- Binns, N.A. 1977. Habitat Structure of Kendall Warm Springs, with reference to the Endangered Kendall Warm Springs Dace, *Rhinichthys osculus thermalis*. Fisheries Technical Bulletin No. 4. Wyoming Game and Fish Department, Cheyenne. 45pp.
- Kaya, C.M., P.F. Brussard, D.G. Cameron, W.R. Gould, and E.R. Vyse. 1989. A comparison of morphometrics, thermal tolerance, and biochemical genetics of the Kendall Warm Springs dace (*Rhinichthys osculus thermalis*) and speckled dace (*R.o. yarrowi*) of the upper Green River drainage in Wyoming. Project Report, U.S. Fish and Wildlife Service, Endangered Species Office. 32pp.

Kendall Warm Springs Dace Distribution



Lake Chub (*Couesius plumbeus*)

Status: NSS3; NatureServe G5 S5

Abundance: Unknown

Introduction: The body is elongated and rounded with a short head. The mouth is terminal with a large, round barbel. Length of adults may be as great as 6 inches but more commonly 4 inches. Without building a nest or guarding its eggs, the lake chub spawns in the spring in creeks and lakes. Almost completely carnivorous, adult fish eat aquatic and terrestrial insects, while younger fish feed on microcrustaceans.

Habitat: Lake chubs are typically found in cool streams and lakes. In Wyoming, it occurs most commonly in the northern part of the state east of the Continental Divide. The habitat preferences of lake chubs are not well known but they are considered a shallow water species. They may be found in a large range of habitats including silted rivers and rocky lake shoals.

Problems:

The population trend of the lake chub is unclear, but they appear to be declining on all scales east of the Continental Divide. The reasons for this decline are unclear. The introduction of gamefish in the Big Horn River may be a factor contributing to the suspected decline of lake chubs in that drainage.

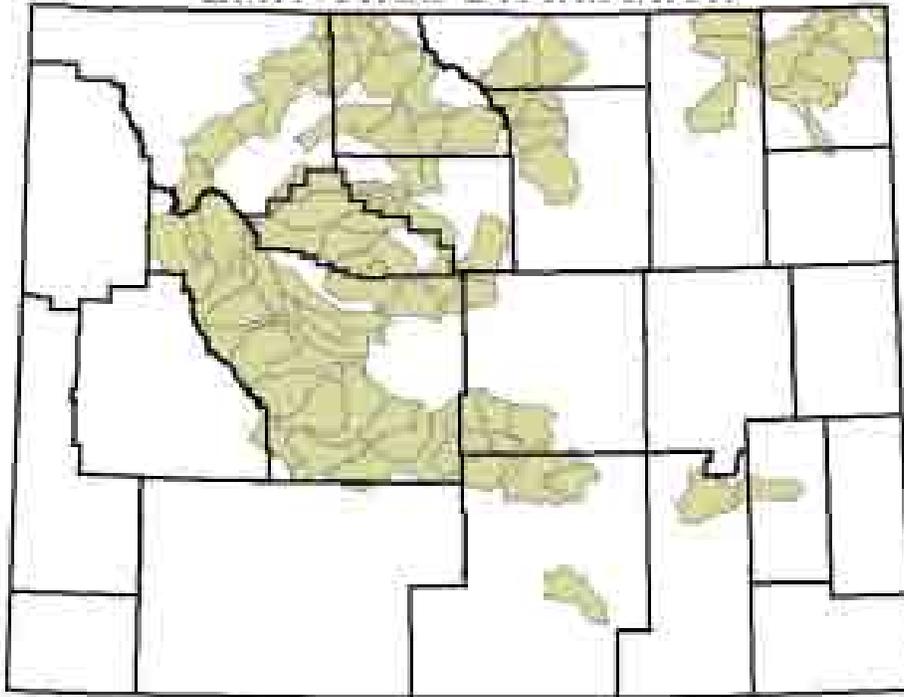
Conservation Actions:

- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- A better understanding of the basic biology, life history and ecology is needed.
- Monitoring protocols and sites should be identified and routinely sampled.
- A better understanding of movement, dispersal, and colonization patterns is needed.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.

References and Additional Reading:

- Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.
- McPhail, J.D., and C.C. Lindsey. 1970. Freshwater fishes of northwestern Canada and Alaska. Fish. Res. Board Canada Bull. 173. 381pp.
- Simpson, J.C. 1941. Food analysis of some important species of Wyoming forage fishes. M.S. thesis (unpublished). Univ. Wyoming.
- Weitzel, D. L., 2002. Conservation and Status Assessment for the Lake Chub (*Couesius plumbeus*), Flathead Chub (*Platygobio gracilis*), Plains Minnow (*Hybognathus placitus*), and Brassy Minnow (*Hybognathus hankinsoni*) in Wyoming.

Lake Chub Distribution



Leatherside Chub (*Gila copei*)**Status: NSS1; NatureServe G3G4 S1****Abundance:** Unknown

Introduction: The leatherside chub has a robust body with a short head and a small mouth, without a barbel. The caudal peduncle is deep. Adults may grow to 6 inches but are typically 4 or less. It readily hybridizes with speckled dace and redbreast shiners. This may be due in part to its prolonged spawning period from April through August. They have been aged to 8 years old – a fairly long-lived minnow.

Habitat: The habitat needs of the leatherside chub are poorly understood though they seem to inhabit deep pools in medium sized streams having cool water temperatures between 60° and 75°F. They are found in streams with dense vegetation or abundant lateral habitat. It occurs in the Bonneville Basin and upper Snake River in Wyoming, as well as in Sulphur Creek and Bear River in Uinta County. The leatherside chub has also been reported in Lincoln County.

Problems:

The leatherside chub has declined in abundance across its native range. It is considered a sensitive species throughout its range and is considered of special concern in Utah, Idaho and Nevada. In Wyoming, leatherside chubs are rare and of special concern. Habitat alterations and the introduction of nonnative species are believed to be responsible for the decline in this species. Habitat alterations include:

- Manipulation of flood regimes that cause the degradation or loss of spawning habitats;
- Cold water discharges from dams that limit spawning and contribute to fish mortality; and
- Depending upon the watershed, land use practices that dewater stretches of streams, increase bank erosion and siltation, increase water salinity, and result in nutrient loading and pollution.

Nonnative species have contributed to the decline of this fish either through direct predation or competition for food and spawning sites.

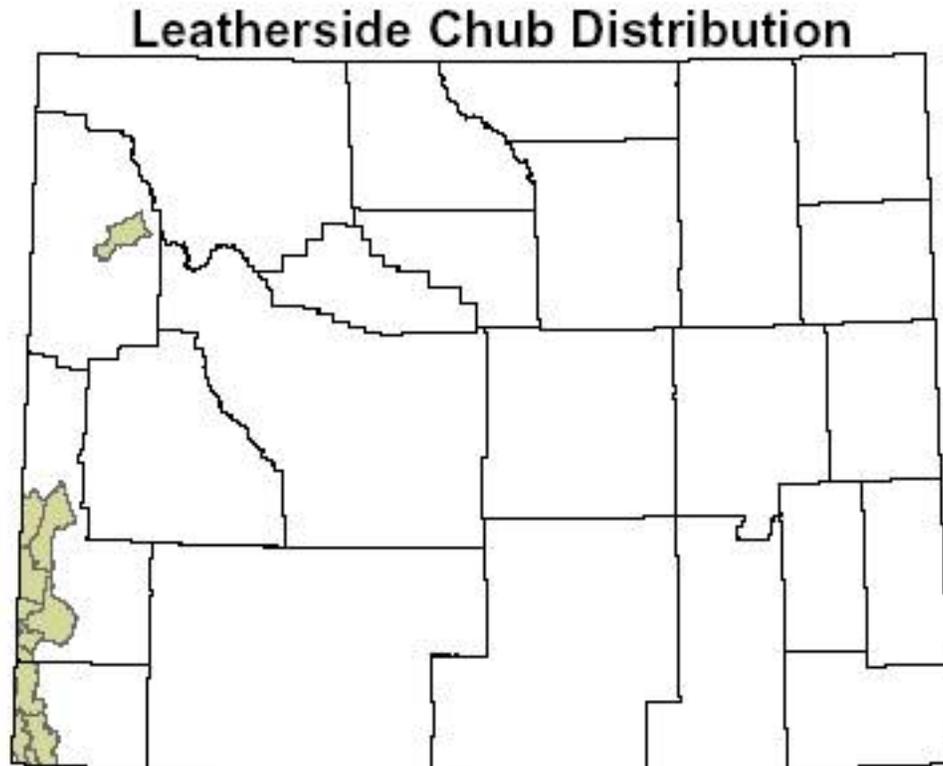
Conservation Actions:

- New methods to restore habitat at a watershed level need to be developed and then implemented range-wide especially replacement of declining aspen communities in headwaters of most sub basins.
- A better understanding of the basic biology, life history and ecology is needed.
- Monitoring protocols and sites should be identified and routinely sampled.
- Methods and strategies detailed in the Multi-agency Conservation Agreement and Strategy need to be implemented and evaluated.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.
- Evaluate the potential for restoring within suitable portions of historic range that are currently uninhabited or where competing or hybridizing species can be removed.

References and Additional Reading:

Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

Weitzel, D. L., 2002. Conservation and Status Assessments for the Bluehead Sucker (*Catostomus discobolus*), Flannelmouth Sucker (*Catostomus latipinnis*), Roundtail Chub (*Gila robusta*), and Leatherside Chub (*Gila copei*): Rare Fishes West of the Continental Divide, Wyoming. Wyoming Game and Fish Department, Cheyenne. 51pp.



Mottled Sculpin (*Cottus bairdi*)**Status: NSS4; NatureServe G5 S5****Abundance:** Common

Introduction: The genus name, loosely translated as bull's head aptly describes the head of the mottled sculpin, as it is large, broad and compressed. The body is slender; the mouth is large. Pectoral fins are very large and the caudal fin is rounded. Adults grow to as long as 6 inches. Mottled sculpin typically hide in gravel, rubble and other cover during daylight hours but actively feed at night. Freshwater shrimp, mayfly and caddis fly nymphs and other bottom dwelling, aquatic insects comprise the majority of their diet but they also eat leeches and plant material. Mottled sculpin spawn from February to June when males establish a nest cavity of rocks or vegetation, the eggs are fertilized and adhered to the roof of a cavity. The males defend the eggs and young fry.

Habitat: Mottled sculpin prefer cold water and are not found in temperatures exceeding 70°F. They prefer clear water but can be found in somewhat turbid water. They are most often associated with headwater streams having sand, gravel, and rubble substrates. Mottled sculpin are found in riffle/pool complexes that have cover consisting of some vegetation. They occur in all drainages west of the continental divide and have been introduced to the Wind River.

Problems:

Existence of the mottled sculpin appears to be stable or expanding; habitat conditions also appear to be stable. There is no immediate concern for the mottled sculpin in Wyoming.

Conservation Actions:

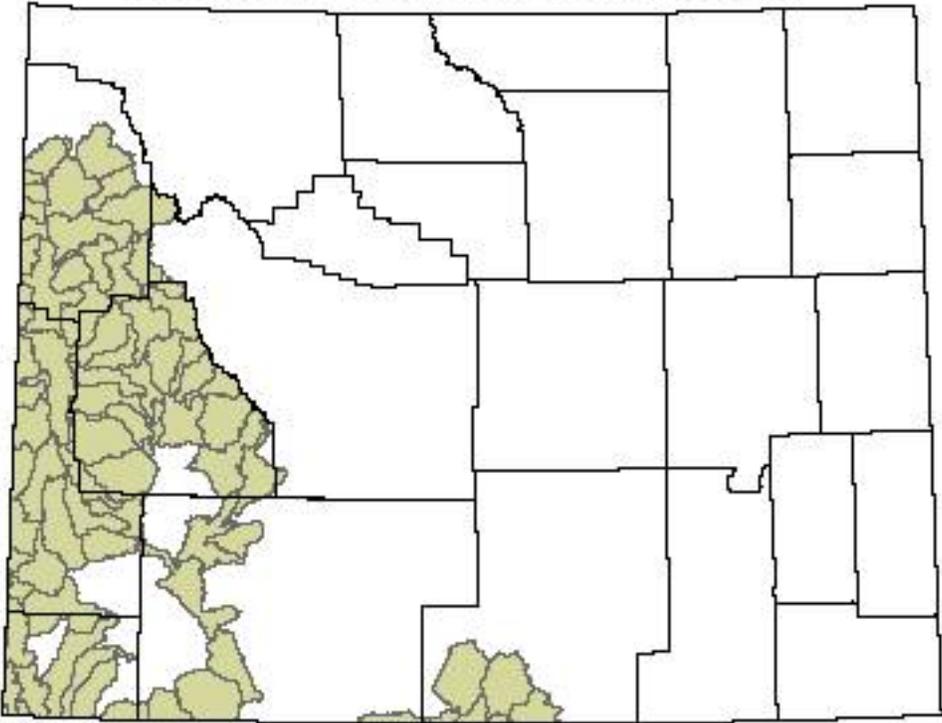
- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- New methods to restore habitat at a watershed level need to be developed and then implemented range-wide especially replacement of declining aspen communities in headwaters of most sub basins.
- Monitoring protocols and sites should be identified and routinely sampled.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.
- Continue reestablishing the entire native fish assemblage in streams rehabilitated to remove non-native trout species as part of cutthroat trout restoration projects.

References and Additional Reading:

Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

Weitzel, D. L., 2002. Conservation and Status Assessment for the mottled sculpin (*Cottus bairdi*) and Paiute sculpin (*Cottus beldingi*): Common sculpin of Wyoming. Wyoming Game and Fish Department, Cheyenne. 54pp.

Mottled Sculpin Distribution



Mountain Sucker (*Catostomus platyrhynchus*)

Status: NSS3; NatureServe G5 S5

Abundance: Common

Introduction: A diminutive sucker it rarely grows in excess of 6 inches. It is slender, has a deep caudal peduncle and a short head. The inferior mouth has distinctive lateral notches and cartilaginous biting ridges. The mountain sucker spawns in late spring and early summer. These fish use the cartilaginous biting edges of their jaws to scrape algae off of rocks, and they sometimes feed on invertebrates as well. This species may be important as a food source for trout.

Habitat: The mountain sucker enjoys a wide range of habitats, including large rivers, lower elevation creeks, and montane lakes and streams. They prefer cold water and are most often associated with mountain streams where they coexist with cutthroat trout. In Wyoming, the mountain sucker is common in all drainages west of the Continental Divide and, east of the Divide, in drainages of the northern and northeastern counties. In the Wind River Mountains, it can be found at elevations up to about 10,000 feet.

Problems:

Wyoming's mountain sucker population is believed to be stable, but there are concerns that its habitat, swift to moderate streams and montane lakes, is either declining or is vulnerable. Some researchers also suggest that this fish's distribution may be declining.

Conservation Actions:

- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- New methods to restore habitat at a watershed level need to be developed and then implemented range-wide especially replacement of declining aspen communities in headwaters of most sub basins.
- Monitoring protocols and sites should be identified and routinely sampled.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.
- Continue reestablishing the entire native fish assemblage in streams rehabilitated to remove non-native trout species as part of cutthroat trout restoration projects.

References and Additional Reading:

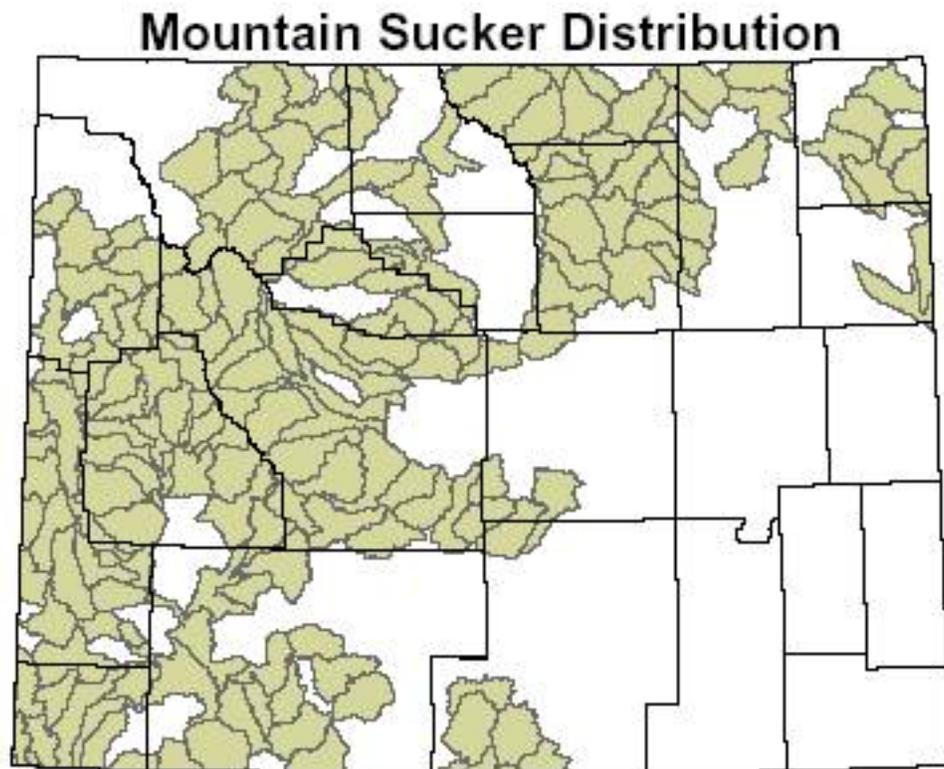
Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

Hauser, W.J. 1969. Life history of the mountain sucker (*Catostomus platyrhynchus*) in Montana. Trans. Amer. Fish. Soc., 98:209-215.

Simpson, J.C. 1941. Food analysis of some important species of Wyoming forage fishes. M.S. thesis (unpublished). Univ. Wyoming.

Smith, G. R. 1966. Distribution and evolution of the North American Catostomid fishes of the subgenus *Pantosteus*, genus *Catostomus*. Misc. Publ. Mus. Zool. Univ. Mich., 129:1-132.

Weitzel, D. L., 2002. Conservation and Status Assessments for Wyoming's Common Suckers: White Sucker, (*Catostomus commersoni*), Mountain Sucker (*Catostomus platyrhynchus*), Longnose Sucker (*Catostomus catostomus*), Utah Sucker (*Catostomus ardens*), Quillback (*Carpoides cyprinus*), River Carpsucker (*Carpoides carpio*), and Shorthead Redhorse (*Maxostoma macrolepidotum*). Wyoming Game and Fish Department, Cheyenne. 54pp.



Mountain Whitefish (*Prosopium williamsoni*)**Status: NSS4; NatureServe G5 S5****Abundance:** Abundant

Introduction: Body is rounded and elongate. Adipose fin is large and the caudal fin is deeply forked. The mountain whitefish spawns in the fall, usually from September to November. It's believed that spawning takes place at night and that the fish does not make a nest. Its diet consists of aquatic insects. Mountain whitefish may, however, feed at the surface when there are large hatches of aquatic insects. Although considered a game species in Wyoming, active monitoring and management is minimal. Populations appear to be stable within their native range.

Habitat: Although sometimes abundant in lakes, the mountain whitefish prefers deep, fast water in large, clear, cold rivers. This species can be found from the Canadian Rockies south to Colorado and Nevada. It's common in Wyoming in the drainages west of the Continental Divide and in the Madison, Yellowstone, Big Horn and Tongue rivers.

Problems:

There are no immediate concerns for mountain whitefish in Wyoming. Populations appear to be stable wherever suitable habitat exists. There may be some competition between mountain whitefish and native trout, but no evidence that this is detrimental to either species has been documented.

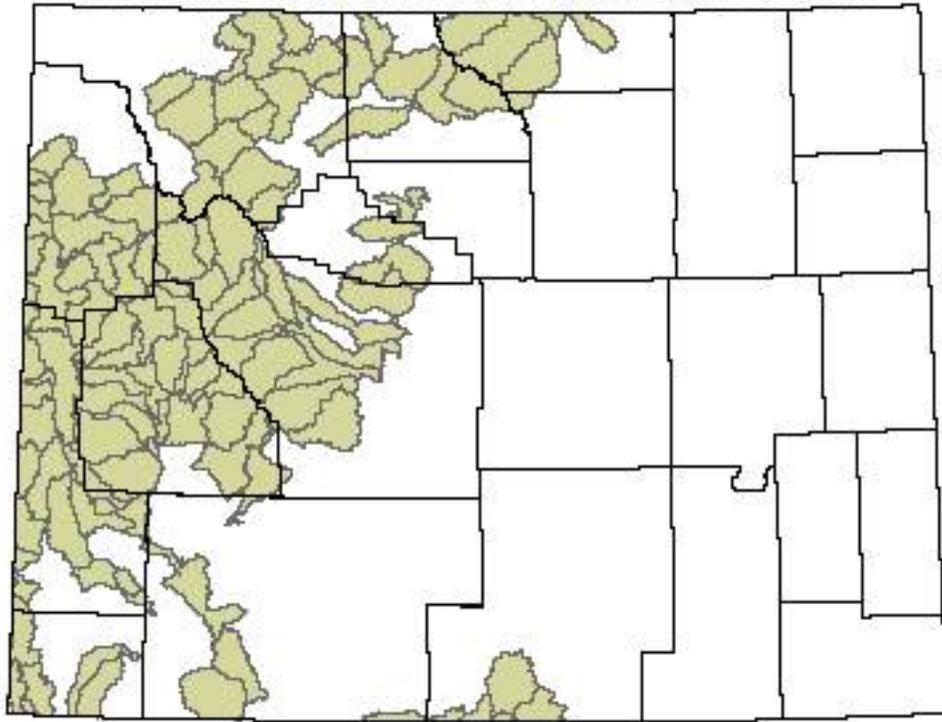
Conservation Actions:

- Monitoring protocols and sites should be identified and routinely sampled.

References and Additional Reading:

- Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.
- Brown, C.J.D., 1952. Spawning habits and early development of the mountain whitefish, *Prosopium williamsoni*, in Montana. *Copeia*. 1952 (2):109-113.
- Hagen, H. 1969. Age, growth and reproduction of the mountain whitefish in Phelps Lake, Wyoming. pp. 399-425, *In*: C.C. Lindsey and C.S. Woods (eds.) *Biology of Coregonid Fishes*. Univ. Manitoba Press, Winnipeg. 560pp.
- Pontius, R.W., and M. Parker. 1975. Food habits of the mountain whitefish, *Prosopium williamsoni* (Girard). *Trans. Amer. Fish. Soc.* 102(4):764-773.

Mountain Whitefish Distribution



Northern Pearl Dace (*Margariscus margarita*)

Status: NSS1; NatureServe G5 S1

Abundance: Rare

Introduction: The body is elongated and rounded. The mouth is moderate in size and some individuals have a barbel. Size is to 6 inches but more typically less than 4 inches. Pearl dace feed on a variety of invertebrates including adult and larval insects and mollusks. Little is known about the life history of pearl dace, though they are known to be spring spawners, which lay eggs over gravel.

Habitat: The pearl dace prefers clear, cool streams with gravel substrate. In Wyoming, pearl dace occur in the Niobrara River but are more restricted in distribution than the finescale dace.

Problems:

Considered to be widespread, abundant, and globally secure, it is threatened in Montana, South Dakota, and Nebraska and is endangered in Iowa. It is of special concern in Montana. In Wyoming the pearl dace is rare and of special concern; they appear stable in Wyoming, but are highly restricted and dangerously close to extirpation. In the Niobrara, the pearl dace distribution can be restricted to as little as 4 miles of 62 possible river miles when drought severely restricts useable habitat. Pearl dace are intolerant of heavy predation and the historic introduction of game fish may currently limit the habitats available to the pearl dace. Pearl dace habitat is bounded by private land so assessment and management activities are predicated upon good relations with private landowners.

Conservation Actions:

- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- Monitoring protocols and sites should be identified and routinely sampled.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.

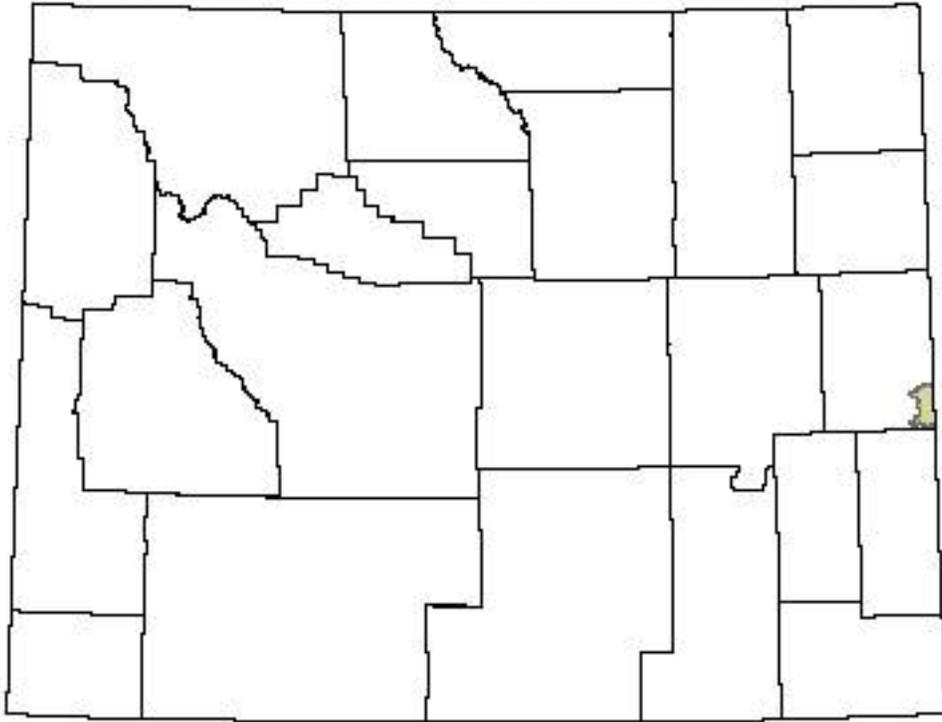
References and Additional Reading:

Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

Langlois, T.H. 1929. Breeding habits of the northern dace. Ecology. 10:161-163.

Weitzel, D. L., 2002. Conservation and Status Assessments for the Finescale Dace (*Phoxinus neogaeus*), Pearl Dace (*Margariscus margarita*), and Plains Topminnow (*Fundulus sciadicus*): Rare Native Fish Species of the Niobrara and Platte River Basins, Wyoming.

Northern Pearl Dace Distribution



Orangethroat Darter (*Etheostoma spectabile*)

Status: NSS2; NatureServe G5 S1

Abundance: Rare

Introduction: The orangethroat darter is a moderately stout darter. Breeding males become brilliantly colored with blue-green bars and red blotches, gill membranes become bright orange and the underside of the head becomes blue-green. Adults are typically 2 inches or less in length. The diet of the orangethroat darter is mostly chironimids, diptera and caddis fly and other insect larvae in both riffle and pool habitats.

Habitat: The orangethroat darter occurs in small streams with sand or gravel bottoms, and is tolerant of intermittent stream flow. It may also be found along the shoreline of small lakes. They are tolerant of turbidity but prefer waters that are clear, warm and alkaline. It's widely distributed but in Wyoming is limited only to the lower reach of Lodgepole Creek in Laramie County.

Problems:

The orangethroat darter is widely distributed and secure in its range though they are considered rare in Nebraska and are of special concern in Iowa. In Wyoming the orangethroat darter is rare and of special concern because of its greatly restricted distribution. Thus it is vulnerable to catastrophic loss and possible loss of genetic variation over time. All suitable and occupied habitat is bounded by private lands making it crucial to develop and maintain good landowner relations so assessment and management actions are possible.

Conservation Actions:

- Studies are needed to better understand the population genetic structure.
- Managers should consider developing refugia in the form of pond habitats.
- Monitoring protocols and sites should be identified and routinely sampled.

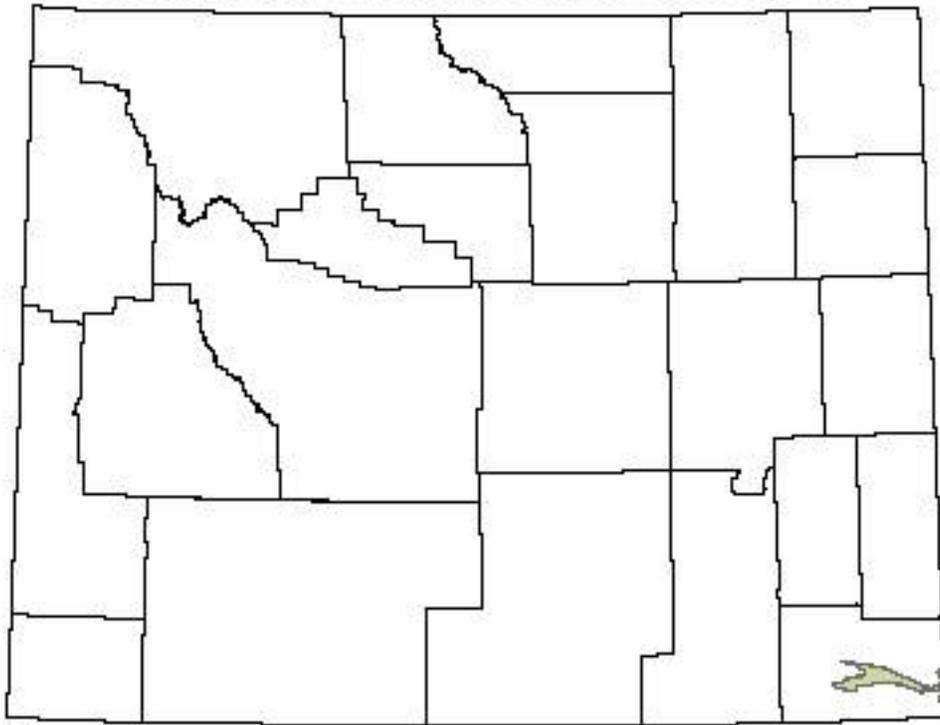
References and Additional Reading:

Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

Cross, F.B. 1967. Handbook of fishes of Kansas. Univ. Kansas Mus. of Nat. Hist. Misc. Pub. 45:1-357.

Weitzel, D. L., 2002. Conservation and Status Assessments for the Hornyhead Chub (*Nocomis biguttatus*), Suckermouth Minnow (*Phenacobius mirabilis*), and Orangethroat Darter (*Etheostoma spectabile*): Rare Stream Fish Species of the Platte River Drainages, Wyoming. Wyoming Game and Fish Department, Cheyenne. 40pp.

Orangethroat Darter Distribution



Paiute Sculpin (*Cottus beldingi*)**Status: NSS4; NatureServe G5 S5****Abundance:** Common

Introduction: The genus name, loosely translated as bull's head aptly describes the head of the Paiute sculpin, as it is large, broad and compressed. The body is slender; the mouth is large. Pectoral fins are very large and the caudal fin is rounded. Paiute sculpin typically hide in gravel, rubble and other cover during daylight hours but actively feed at night. The nymphs of stoneflies, mayflies, and caddisflies make up the majority of the diet but they are also known to feed on snails, beetles, and algae. Paiute sculpin spawn from late spring through early summer. In lakes, Paiute sculpin spawn along wind-swept shorelines, usually near a stream inlet; in streams, spawning is associated with riffle habitats.

Habitat: Paiute sculpin require cold, clear water but may be found in water that is slightly turbid. They are commonly found in high gradient headwater streams and prefer rocky riffles. They are occasionally found in lakes; in Lake Tahoe they have been found at depths greater than 200 feet. Paiute sculpin hide during the day, typically under rocks, and forage at night. Relics of the ancient Lahontan system, Paiute sculpin have a limited distribution in Wyoming but they are commonly found in headwaters of the Snake River in Teton, Lincoln, and Sublette counties.

Problems:

Existence of the Paiute sculpin appears to be stable; habitat conditions also appear to be stable. There is no immediate concern for the Paiute sculpin in Wyoming.

Conservation Actions:

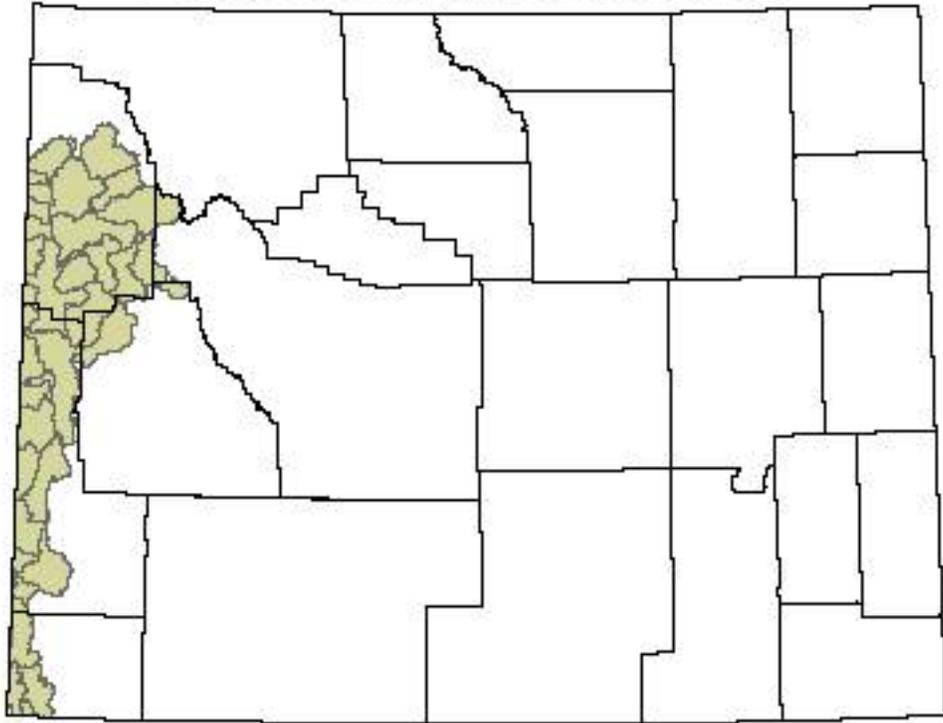
- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- Monitoring protocols and sites should be identified and routinely sampled.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.

References and Additional Reading:

Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

Weitzel, D. L., 2002. Conservation and Status Assessment for the Paiute sculpin (*Cottus bairdi*) and Paiute sculpin (*Cottus beldingi*): Common sculpin of Wyoming. Wyoming Game and Fish Department, Cheyenne. 54pp.

Paiute Sculpin Distribution



Plains Minnow (*Hybognathus placitus*)

Status: NSS3; NatureServe G4 S3

Abundance: Uncommon

Introduction: The body is stout with a short head and small inferior like mouth. Adult plains minnows grow 4 to 6 inches in length. The spawning habits of the plains minnow are not well known, although the fact that gravid females can be found throughout the summer indicates an extended breeding season. This minnow feeds mostly on algae and other vegetation along the bottom of quiet waters.

Habitat: The plains minnow prefers large, turbid streams, slow water and side pool habitat. They are typically found in streams with sand or silt bottoms. They may be found in the slower waters of side pools and river backwaters. The plains minnow is tolerant of high water temperature, high salinity and low oxygen, making them well adapted for survival in intermittent pools.

Problems:

Plains minnow existence is considered secure range-wide, though Colorado and Wyoming consider it a species of concern. It has been suggested that the distribution of the plains minnow in Wyoming may be in decline at local and subdrainage scales. The reason for the trend is not known though diminished turbidity, decreased sediment transport and increased flow associated with construction of dams in the Missouri river drainage is believed to be a contributing factor.

Conservation Actions:

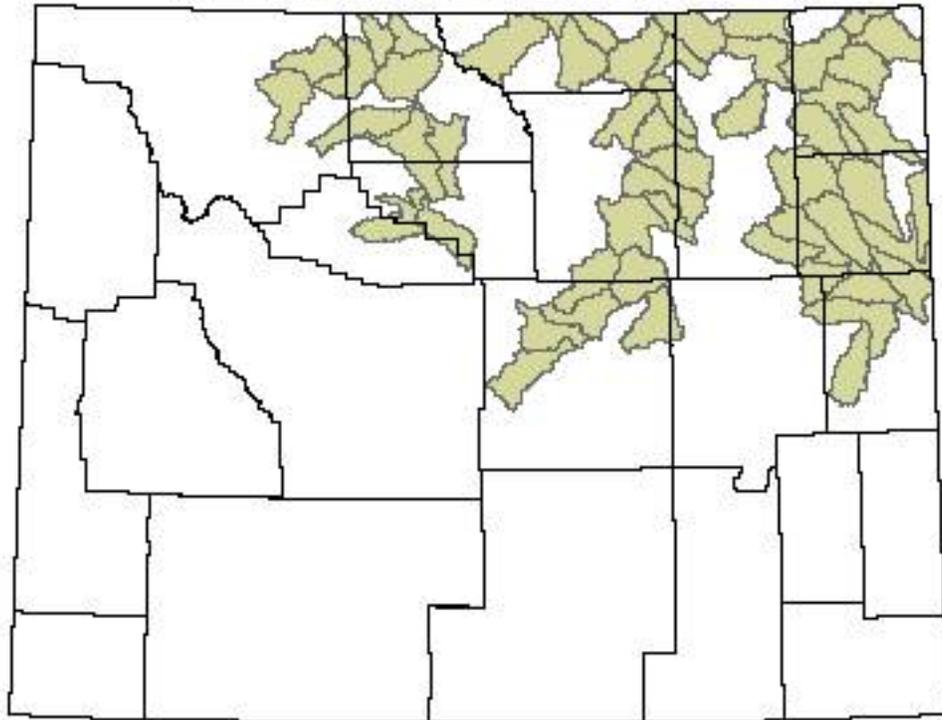
- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- A better understanding of the basic biology, life history and ecology is needed.
- Monitoring protocols and sites should be identified and routinely sampled.
- A better understanding of movement, dispersal, and colonization patterns is needed.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.

References and Additional Reading:

Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

Weitzel, D. L., 2002. Conservation and Status Assessment for the Lake Chub (*Couesius plumbeus*), Flathead Chub (*Platygobio gracilis*), Plains Minnow (*Hybognathus placitus*), and Brassy Minnow (*Hybognathus hankinsoni*) in Wyoming.

Plains Minnow Distribution



Abundance: Uncommon

Introduction: Little is known about the life history of the plains topminnow. They are known to feed at or near the surface in shallow water often in water that is less than 2 inches deep. Their diet consists of insect larvae, including mosquito larvae. One study notes that spawning occurs in early summer, with the eggs deposited on submerged vegetation or algae.

Habitat: The plains topminnow prefers shallow water in clear streams with sand or gravel substrate and much vegetation. It is also seen in vegetation-filled sloughs and backwaters. Extreme conditions often exist in shallow pools making them inhospitable to most fish species. Plains topminnows are well suited to life in shallow pools. They are tolerant of high water temperatures and low oxygen.

Problems:

The plains topminnow is considered to be of special concern in Minnesota, Missouri, Kansas, Nebraska, and Colorado. In Wyoming plains topminnows are considered rare and their distribution appears to be declining. The plains topminnow occupies habitats that are impacted by natural and anthropogenic dewatering. Introductions of western mosquito fish have been implicated in current restricted distribution of plains topminnow in Nebraska.

Conservation Actions:

- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- Monitoring protocols and sites should be identified and routinely sampled.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.

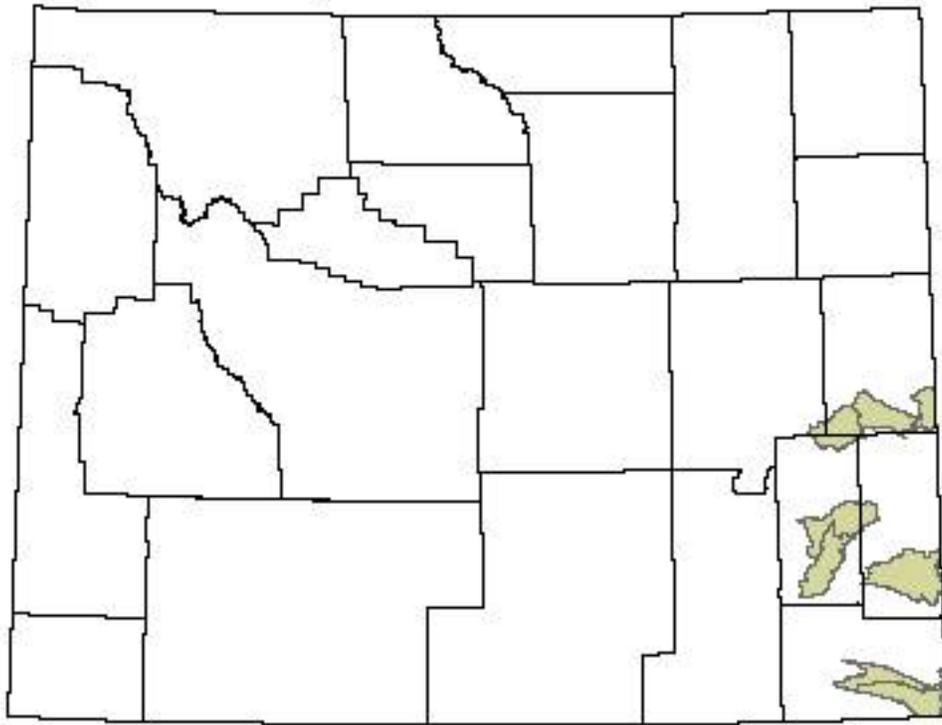
References and Additional Reading:

Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

Pflieger, W.L. 1975. The fishes of Missouri. Mo. Dept. Conserv., Jefferson City, MO.

Weitzel, D. L., 2002. Conservation and Status Assessments for the Finescale Dace (*Phoxinus neogaeus*), Pearl Dace (*Margariscus margarita*), and Plains Topminnow (*Fundulus sciadicus*): Rare Native Fish Species of the Niobrara and Platte River Basins, Wyoming.

Plains Topminnow Distribution



Quillback (*Carpiodes cyprinus*)

Status: NSS4; NatureServe G5 S4

Abundance: Common

Introduction: The plains form of the quillback has a lower dorsal fin and a more slender body compared with those of the Midwest and Atlantic Coast. It's believed these differences are due to its more extreme environment. The body is heavy and slab sided, the head and eyes are moderately large. Unlike the river carpsucker the lower lip is without the nipple-like protrusion. They grow to 16 inches. The quillback spawns in spring and summer over sand and mud bottoms in quiet waters of streams or overflow areas in bends of rivers or bays of lakes. Its diet consists of bottom debris, plant materials and insect larvae.

Habitat: The quillback prefers pools, backwaters, and main channels in clear or turbid waters of creeks, rivers, and lakes. A carpsucker, it ranges from Manitoba and the Lake States south to Florida, and from the Rocky Mountains to the Atlantic Coast. In Wyoming, it is associated with the river carpsucker in the lower North Platte and Laramie rivers and in some lakes near Torrington.

Problems:

Besides a lack of some basic information, there are no immediate concerns for this fish.

Conservation Actions:

- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- Monitoring protocols and sites should be identified and routinely sampled.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.

References and Additional Reading:

Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

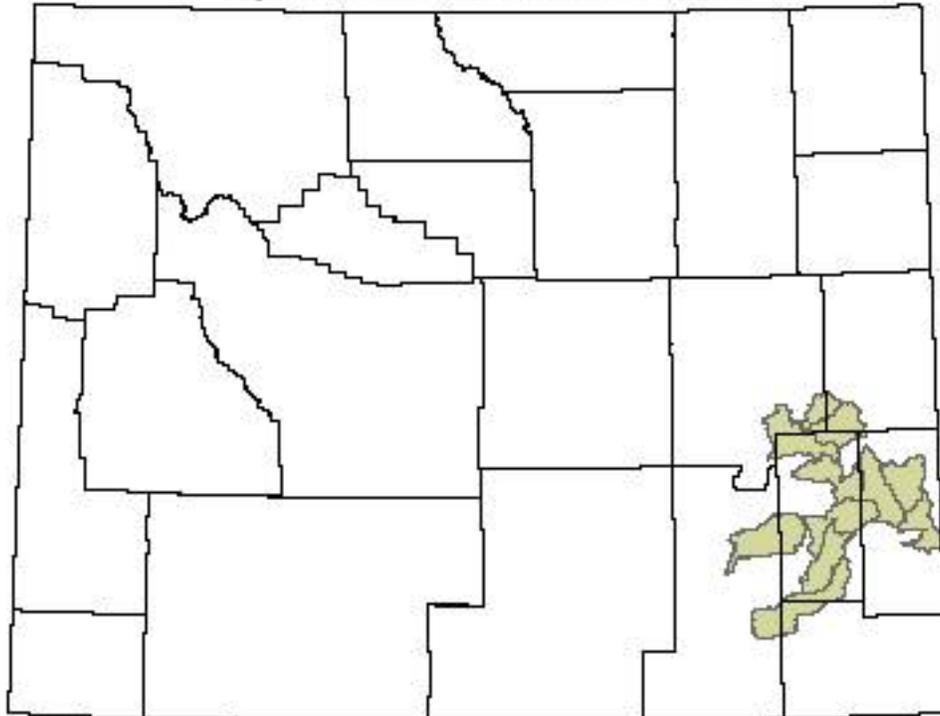
NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 1, 2004).

Scott, W.B., and E.J. Crossman. 1973. Freshwater fishes of Canada. Bull. 184 Fish. Res. Bd. Canada. 966pp.

Trautman, M.B. 1981. The fishes of Ohio. Ohio State Univ. Press. 782pp. Revised, 1982.

Weitzel, D. L., 2002. Conservation and Status Assessments for Wyoming's Common Suckers: White Sucker, (*Catostomus commersoni*), Mountain Sucker (*Catostomus platyrhynchus*), Longnose Sucker (*Catostomus catostomus*), Utah Sucker (*Catostomus ardens*), Quillback (*Carpoides cyprinus*), River Carpsucker (*Carpoides carpio*), and Shorthead Redhorse (*Maxostoma macrolepidotum*). Wyoming Game and Fish Department, Cheyenne. 54pp.

Quillback Distribution



River Carpsucker (*Carpoides carpio*)**Status: NSS4; NatureServe G5 S5****Abundance:** Common

Introduction: River carpsuckers have a heavy, laterally compressed body, with a moderate sized head. The mouth is inferior but has a nipple-like protrusion on the lower lip helping differentiate it from the quillback. They can grow to 20 inches. The river carpsucker's diet includes algae, higher vegetation and some small invertebrates. Spawning from April to June, the eggs are broadcast over the bottom and left unattended.

Habitat: This fish occurs in large rivers in either clear or turbid waters, although it seems to somewhat prefer turbidity. Less commonly, it can be found in rubble-bottomed streams. In Wyoming, the river carpsucker lives in the Big Horn, Powder, Little Powder, Belle Fourche and North Platte river drainages. Often associated with the flathead chub and the plains minnow, it prefers quiet waters, many times at the mouths of tributary streams. It also occurs in reservoirs, sometimes replacing the white sucker. The river carpsucker is common in Keyhole and Boysen reservoirs. Outside of Wyoming, this species is distributed from Montana to Pennsylvania, south to Tennessee and Texas.

Problems:

Although there are no immediate concerns for the river carpsucker in Wyoming, the distribution appears to be declining from historic levels.

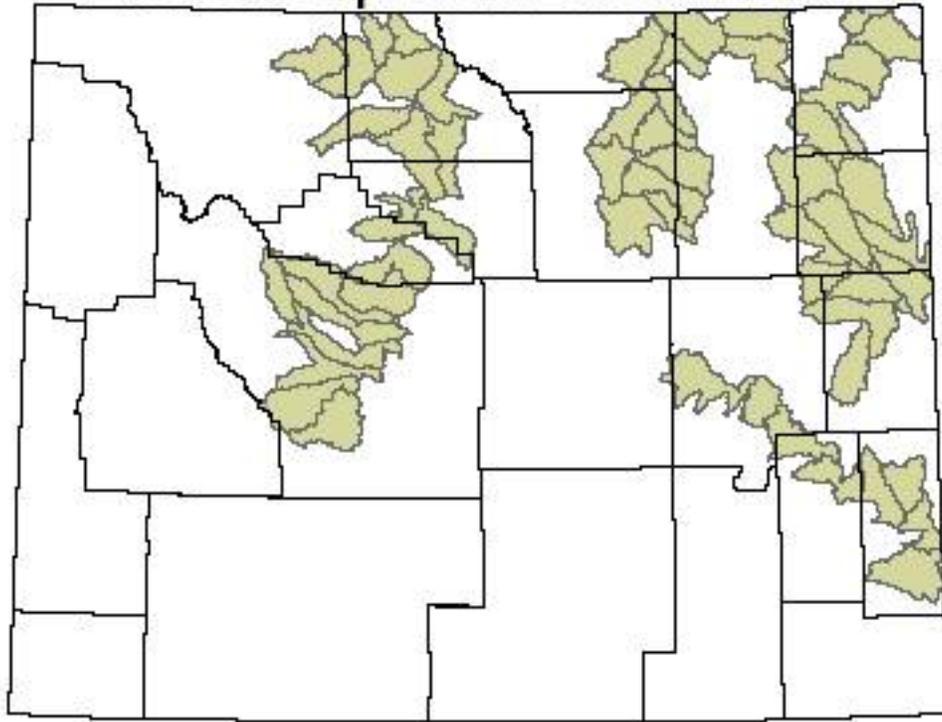
Conservation Actions:

- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- Monitoring protocols and sites should be identified and routinely sampled.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.

References and Additional Reading:

- Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.
- Buchholz, M.M. 1957. Life history of the river carpsucker (*Carpoides c. carpio*) in the Des Moines River, Iowa. Proc. Iowa Acad. Sci. 64:589-600.
- Weitzel, D. L., 2002. Conservation and Status Assessments for Wyoming's Common Suckers: White Sucker, (*Catostomus commersoni*), Mountain Sucker (*Catostomus platyrhynchus*), Longnose Sucker (*Catostomus catostomus*), Utah Sucker (*Catostomus ardens*), Quillback (*Carpoides cyprinus*), River Carpsucker (*Carpoides carpio*), and Shorthead Redhorse (*Maxostoma macrolepidotum*). Wyoming Game and Fish Department, Cheyenne. 54pp.

River Carpsucker Distribution



Roundtail Chub (*Gila robusta*)

Status: NSS1; NatureServe G3 S3

Abundance: Rare

Introduction: The roundtail chub has a streamlined body with a flat head and a narrow caudal peduncle. Adults may grow to 20 inches, but lengths of up to 10 inches are more typical. Roundtail chubs are opportunistic carnivores; their diet includes adult and larval insects, crustaceans, fish, gastropods, and filamentous algae. Spawning occurs in late spring, with the adhesive eggs being scattered in gravel. Individuals may migrate up to 20 miles to spawn.

Habitat: The roundtail chub occurs solely in the Colorado River drainage. It is a strong swimmer with a streamlined form, narrow caudal peduncle, and forked tail; this fish is well adapted to large, swift rivers. In Wyoming, it's found in the Green and Little Snake river drainages. It may also, occasionally, live in small streams and lakes.

Problems:

The Natural Heritage Program assigns the roundtail chub the global ranking of G3. They are considered endangered in New Mexico, threatened in Utah, and of special concern in Arizona, Wyoming, and Colorado. Status in Wyoming of NSS1 suggests its existence to be physically isolated and the amount of suitable habitat is decreasing. Although stable on a drainage scale, the distribution of the roundtail chub in Wyoming appears to be declining on site, stream, and subdrainage scales. Habitat alterations and the introduction of nonnative species are believed responsible for the decline in this species. Habitat alterations include:

- The manipulation of flood regimes that cause the degradation or loss of spawning habitats;
- Cold water discharges from dams that limit spawning and contribute to fish mortality; and
- Depending upon the watershed, land use practices that dewater stretches of streams, increase bank erosion and siltation, increase water salinity, and result in nutrient loading and pollution.
- Much of the habitat is bounded by private land complicating assessment and management.

The introduction of channel catfish may in some instances threaten roundtail chubs populations through predation, competition for deep water habitats and exposure to the Asian tapeworm.

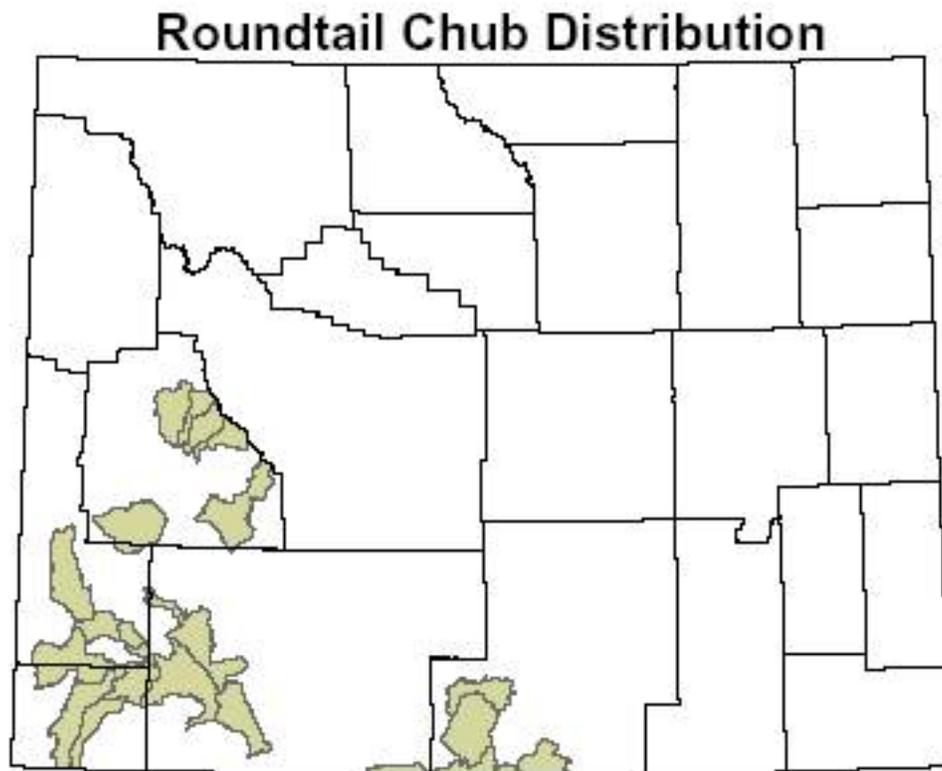
Conservation Actions:

- A better understanding of the basic biology, life history and ecology is needed.
- Monitoring protocols and sites should be identified and routinely sampled.
- Methods and strategies detailed in the Multi-agency Conservation Agreement and Strategy need to be implemented and evaluated.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.
- Evaluate the potential for restoring within suitable portions of historic range that are currently uninhabited or where competing or hybridizing species can be removed.

References and Additional Reading:

Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

Weitzel, D. L., 2002. Conservation and Status Assessments for the Bluehead Sucker (*Catostomus discobolus*), Flannelmouth Sucker (*Catostomus latipinnis*), Roundtail Chub (*Gila robusta*), and Leatherside Chub (*Gila copei*): Rare Fishes West of the Continental Divide, Wyoming. Wyoming Game and Fish Department, Cheyenne. 51pp.



Sauger (*Sander canadensis*)

Status: NSS2; NatureServe G5 S3S4

Abundance: Uncommon

Introduction: The body is elongate with a large eye. The head is moderate with a large mouth having many canine-type teeth. Young sauger feed on aquatic insects and crustaceans, adults are piscivorous. When water temperatures reach the mid-40s, the adults migrate into tributary streams or backwaters to spawn in shallow water with rocky or gravel bottoms. A 3-pound female will produce about 50,000 eggs, which are deposited randomly and left unattended until they hatch. In the Big Horn River drainage, sauger and walleye mix in both reservoirs and rivers and genetic testing shows they have done so without hybridizing.

Habitat: The sauger prefers large rivers but may also be found in reservoirs. The fish is tolerant of turbid waters. In rivers the key component of sauger habitat is velocity. In the summer and spring they select low velocity areas having sand or silt substrates. Pool habitats are preferred by sauger especially in winter where they tend to select low velocity pools greater than 6 feet deep. Native to streams east of the Continental Divide, the sauger occurs in Wyoming today in the Wind-Big Horn River drainage and in the Tongue and Powder river drainages. It has apparently been extirpated from the North Platte River, where it had once been common.

Problems: Sauger migrate extensively. Dams, even very short ones, create barriers preventing sauger from reaching suitable spawning habitats. Sauger and walleye spawn at different times; unintentional stocking of saugeye - a walleye and sauger hybrid - could break down this separation in timing and lead to hybridized populations in the wild. Velocity and flow regimes are critical habitat factors for sauger, which is problematic because much of the current habitat is affected by the operation of large and small reservoirs.

Conservation Actions:

- Continue to maintain HACCP policies and test sources of walleye prior to stocking to ensure no saugeye hybrids are accidentally stocked in reservoirs of the Big Horn River drainage.
- Studies are needed to better understand habitat requirements for juvenile sauger, and begin protection, restoration or enhancement activities to ensure suitable spawning and juvenile habitat is available in the future.
- Studies are needed to understand the habitat requirements of the sauger and in relation to annual discharges from large impoundments.
- A better understanding of the basic biology, life history and ecology is needed.
- Monitoring protocols and sites should be identified and routinely sampled.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.
- Evaluate the potential for restoring within suitable portions of historic range that are currently uninhabited or where competing or hybridizing species can be removed.

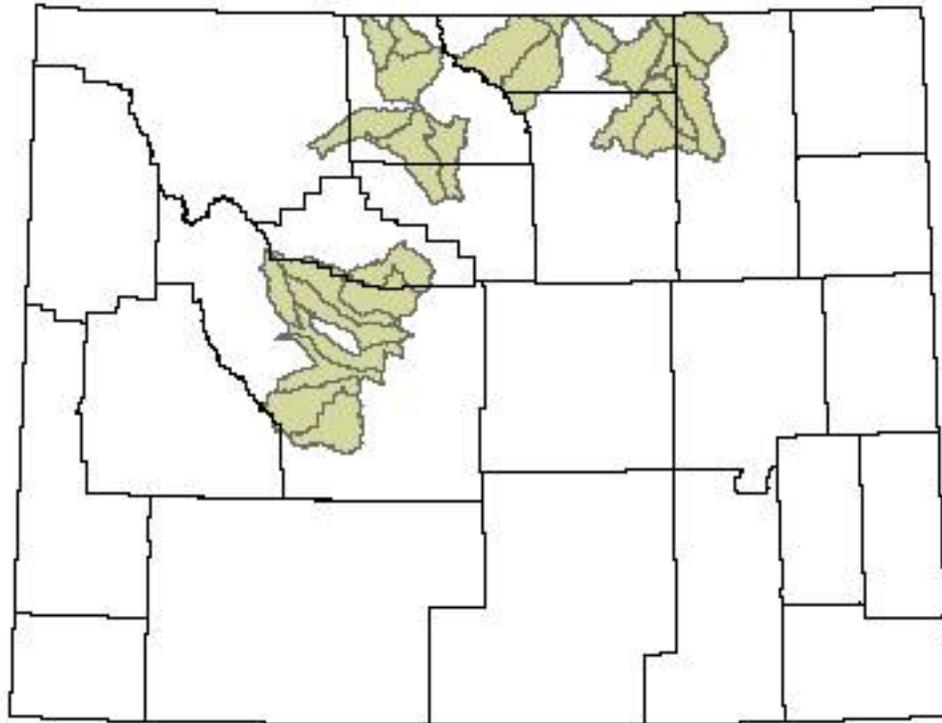
References and Additional Reading:

Amadio, C. J. December, 2003 Factors Affecting the Distribution and Life History of Sauger in the Wind River Watershed Upstream From Boysen Reservoir, Wyoming. Master's Thesis. University of Wyoming. Laramie, Wyoming.

Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

Welker, M.T., E.L. Roberts, L.K. Stahl, and J. Wendel. 2002. Seasonal Habitat Use and Habitat Preference for Sauger in the Big Horn River, Wyoming. Wyoming Game and Fish Department, Cheyenne. 22pp.

Sauger Distribution



Shorthead Redhorse (*Moxostoma macrolepidotum*)

Status: NSS4; NatureServe G5 S5

Abundance: Common

Introduction: Shorthead redhorse are large, often in excess of 20 inches. They have an elongate and robust body, with a short head and large eyes. Their scales are large. They are colorful; the dorsal fin is orange to red with the paired and caudal fins are red to purple. Female shorthead redhorse produce 15,000 to 30,000 eggs when spawning in late April (according to a study done in Iowa). The fish mature at 3 years of age. Their diet consists of aquatic insects, including midges, mayflies and caddis flies.

Habitat: This sucker does not thrive in small creeks, but does well in medium-sized clear streams and some lakes. In Wyoming, the shorthead redhorse can be found east of the Continental Divide in lower elevations of most drainages where the water temperatures are intermediate and the water is not too turbid. Elsewhere in North America, this species ranges from Saskatchewan and Montana to the Atlantic Coast, and south to Oklahoma.

Problems:

Besides a lack of some basic information, there are no immediate concerns for this fish.

Conservation Actions:

- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- Monitoring protocols and sites should be identified and routinely sampled.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.

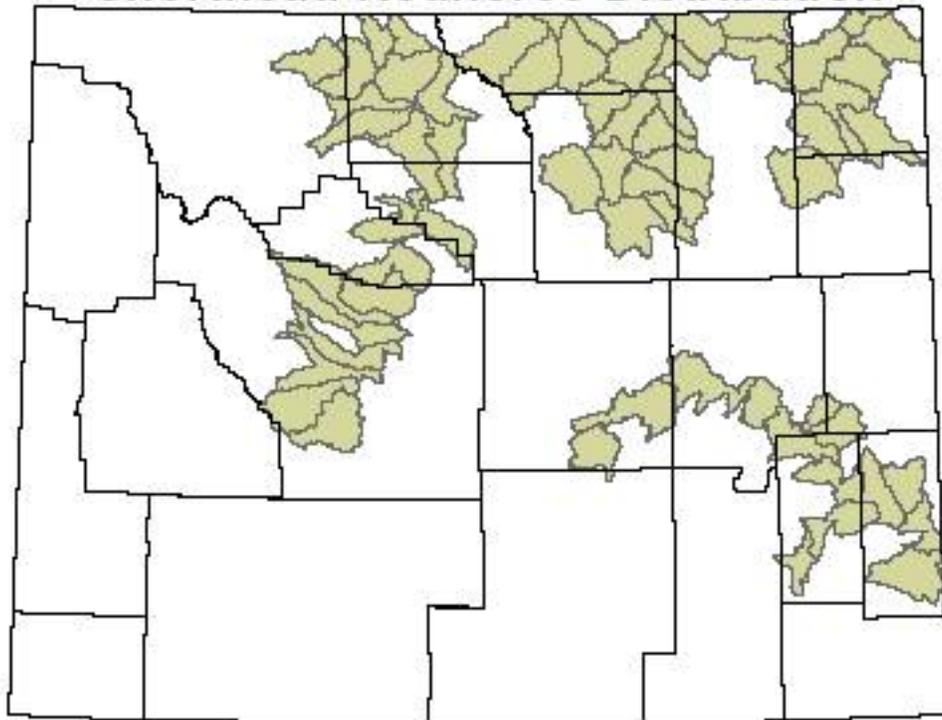
References and Additional Reading:

Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

Meyer, W.H. 1962. Life history of three species of redhorse (*Moxostoma*) in the Des Moines River, Iowa. Trans. Amer. Fish. Soc. 91(4):412-419.

Weitzel, D. L., 2002. Conservation and Status Assessments for Wyoming's Common Suckers: White Sucker, (*Catostomus commersoni*), Mountain Sucker (*Catostomus platyrhynchus*), Longnose Sucker (*Catostomus catostomus*), Utah Sucker (*Catostomus ardens*), Quillback (*Carpoides cyprinus*), River Carpsucker (*Carpoides carpio*), and Shorthead Redhorse (*Maxostoma macrolepidotum*). Wyoming Game and Fish Department, Cheyenne. 54pp.

Shorthead Redhorse Distribution



Shovelnose Sturgeon (*Scaphirhynchus platorynchus*) Status: NSS2; NatureServe G4 S1

Abundance: Rare in the eastern part of the state, Controlled in the Big Horn River Drainage

Introduction: The shovelnose sturgeon has a flattened and shovel-shaped snout with 4 barbels extending downward just forward of the ventrally oriented mouth. The caudal peduncle is long, flattened in cross section and completely covered with scaly plates. Adults may grow to 36 inches, but lengths of up to 28 inches are more typical. The diet consists primarily of bottom-dwelling invertebrates as well as some minnows, fish eggs, and vegetation. It migrates upstream to spawn in late spring. Spawning occurs in June and adhesive eggs are incubated for about one week at 60 to 70 degrees F. Males generally do not spawn until they are 5 years old and females usually do not spawn until they are 7 years old. Some individuals may live to be 40 years old or more.

Habitat: The shovelnose sturgeon lives at or near the bottom of large rivers with a sand substrate. Widespread in the Missouri River drainage, this fish is rare in Wyoming. It has been found only seasonally in the lower Powder River and in Crazy Woman Creek, and years ago there were unconfirmed reports of the shovelnose sturgeon in the Big Horn and Greybull Rivers. The species was reintroduced to this part of its historic range in the late 1990's.

Problems:

Information gleaned from studies in the Powder River drainage indicate this species is highly mobile and commonly travels several hundred miles from Montana to Wyoming to spawn. Observations and other studies indicate that low flow and related natural or constructed barriers significantly limit the ability of the species to move upstream and complete its life history in some years. It is likely that the construction of numerous dams and diversions on the North Platte and Bighorn River drainages led to the elimination of the native species from these parts of their historic range in Wyoming. New dams that create physical barriers or change water quality by making water cooler and cleaner would negatively affect the abundance and growth of the species. There is no indication that effective fish passage features can be built into dams to allow shovelnose sturgeon to move up and downstream past the dam due to the fish's inability or disinclination to move very high off the river bottom or jump.

Conservation Actions:

- Investigate spawning habitats and early life history habitat requirements in their undisturbed range of the Powder River. It is unknown if water quality changes associated with coal bed methane development will affect spawning, incubation or survival of shovelnose sturgeon eggs or larvae.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.
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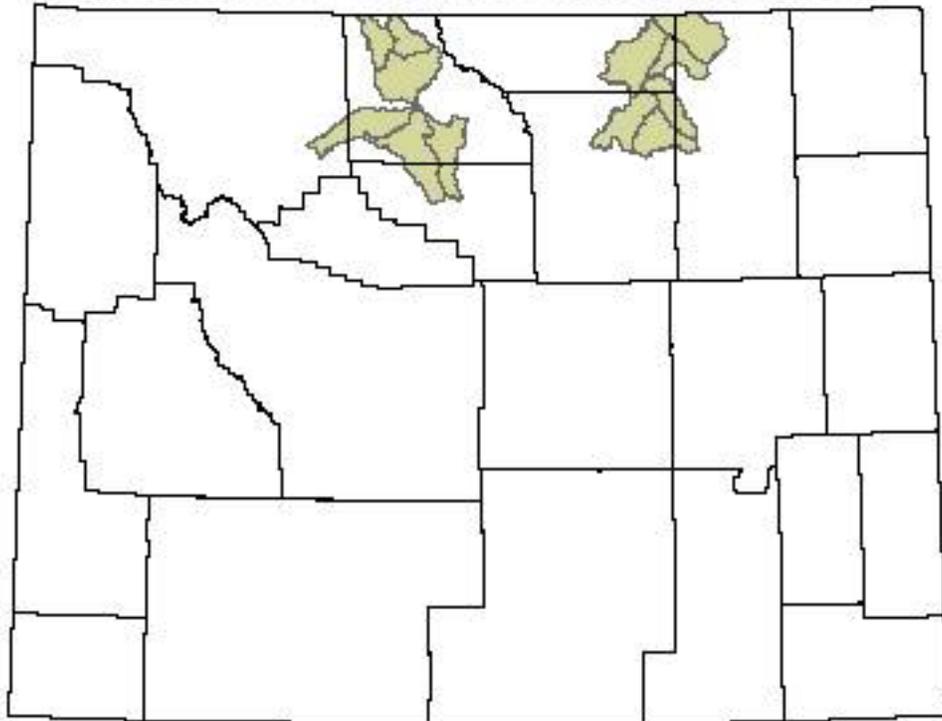
- Conduct surveys to determine the growth, survival and movement of the limited number of shovelnose sturgeon that were stocked into the Bighorn River and its significant tributaries in the late 1990's.
- Develop and implement strategies to overcome barriers to spawning migration.

References and Additional Reading:

Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

Brown, C.J.D. 1971. Fishes of Montana. Big Sky Books, Bozeman, MT. 207pp.

Shovelnose Sturgeon Distribution



Snake River Cutthroat Trout (*Oncorhynchus clarki ssp.*)

**Status: NSS4
NatureServe G4T1T2Q S1**

Abundance: Abundant

Introduction: Some Snake River cutthroats have large spots, but are typically distinguished from other cutthroat trout by its pattern of very fine spots. Larger fish, which can grow to greater than 20 inches, feed on other fish, insects, annelids, snails and small rodents, while smaller cutthroat feed mainly on aquatic insects. Spawning begins in late March and continues until June or July. Fry emerge about 50 days later.

Habitat: This subspecies will thrive in lakes, reservoirs and large rivers, although its native habitat is the upper Snake River, Greys and Salt rivers above Palisades Reservoir. When introduced to new habitat, it does best in medium-sized and larger streams with good overhead cover.

Problems: Habitat alterations and the introduction of nonnative species are believed to be responsible for declines in this species. Habitat alterations include:

- Manipulation of the hydrograph by Jackson Lake Dam that alters both summer and winter available habitats;
- Loss of connectivity due to the construction of Jackson Lake Dam and dewatered stretches caused by irrigation diversions;
- Construction of an extensive levee system has altered between levee aquatic habitat and prevented flushing flows to adjoining spring creek systems; and
- Depending upon the watershed, land use practices may increase bank erosion and siltation, increase water salinity, and result in nutrient loading and pollution.

In localized areas, nonnative species have contributed to the decline of this fish either through direct predation or competition for food and spawning sites and hybridization with rainbow trout.

Conservation Actions:

- Determine if genetic integrity of native stocks has been altered by introduced stocks. Prevent further introgression.
- The genetic distinction between Snake River cutthroat trout and Yellowstone cutthroat trout needs to be better understood.
- New methods to restore habitat at a watershed level need to be developed and then implemented range-wide especially replacement of declining aspen communities in headwaters of most sub basins.
- The relative contribution of spring creeks and mountain tributaries to the fishery needs to be better understood.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.
- Evaluate the potential for restoring within suitable portions of historic range that are currently uninhabited or where competing or hybridizing species can be removed.

References and Additional Reading:

Baxter, G.T., and M.D. Stone. 1995. *Fishes of Wyoming*. Wyoming Game and Fish Department, Cheyenne, Wyoming. 290pp.

Foster, L.E. 1978. Food habits of the cutthroat trout in the Snake River, Wyoming. M.S. Thesis. University of Wyoming. 50pp.

Hayden, P.S. 1968. The reproductive behavior of Snake River cutthroat trout in three tributary streams in Wyoming. M.S. thesis, Univ. Wyoming. 114pp.

Kiefling, J.W. 1978. Studies on the ecology of the Snake River cutthroat trout. Wyoming Game and Fish Department administrative report, Cheyenne, Wyoming. 198pp.



Stonecat (*Noturus flavus*)

Status: NSS4; NatureServe G5 S5

Abundance: Common

Introduction: The body form of the stonecat is small and elongate. The caudal fin is rounded and the terminal mouth sports long barbels used to aid in food detection. Stonecats are nocturnal feeders along the bottom. They use taste and smell to locate food. The stonecat diet consists mostly of aquatic insect larvae, mollusks, crayfish, earthworms, plant material and fish. It is small for a gamefish; adults rarely are over 12 inches and 8 inches in length would be considered long. Spawning occurs in June and July, with the adult fish guarding the nest they make in the rubble. Young stonecats remain in the nest for a while after hatching.

Habitat: The stonecat likes a variety of stream types, usually living in riffle habitats that have a fair current and rubble substrate. They eschew high velocity and intermittent stream types but are seen in lakes where they are found in shoals comprised of boulder or rubble. In Wyoming, it occurs in the drainages of the North Platte, Belle Fourche, Powder, Tongue and Big Horn rivers.

Problems:

Except for a lack of extensive biological and ecological data, there are no immediate concerns for the stonecat in Wyoming. Its existence is considered widespread, abundant, and globally secure. In Colorado, the stonecat is of special concern.

Conservation Actions:

- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- A better understanding of the basic biology, life history and ecology is needed.
- Monitoring protocols and sites should be identified and routinely sampled.
- A better understanding of movement, dispersal, and colonization patterns is needed.

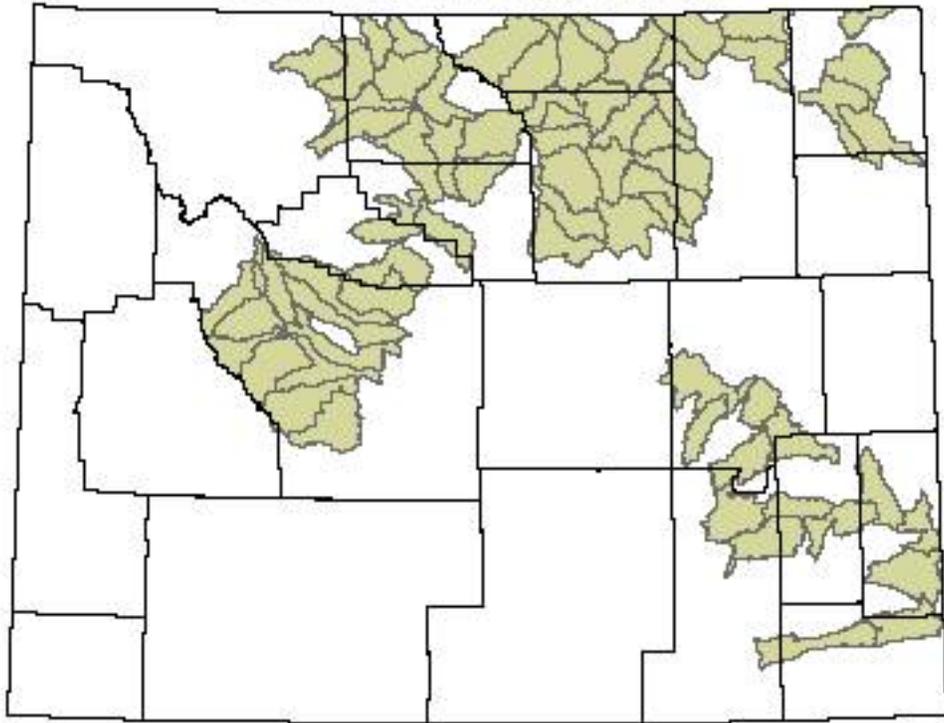
References and Additional Reading:

Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

Dobie, J.R., O.L. Meehan, and G.N. Washburn. 1948. Propagation of minnows and other bait species. Circular 12, U.S. Dept. of Interior, Fish and Wildl. Serv. 113pp.

Weitzel, D. L., 2002. Conservation and Status Assessments for the Plains Killifish (*Fundulus zebrinus*) and Stonecat (*Noturus flavus*) in Wyoming. Wyoming Game and Fish Department, Cheyenne. 19pp.

Stonecat Distribution



Sturgeon Chub (*Macrhybopsis gelida*)**Status: NSS1; NatureServe G3 S1****Abundance:** Rare

Introduction: With its streamlined body, large and deeply forked caudal fin, and narrow caudal peduncle, the sturgeon chub is adapted to life in fast current and turbid waters. The snout is distinctive for being long and flat, extending well beyond the horizontal mouth. It has a small eye but taste buds in the fins and large barbel of the sturgeon chub help this minnow find food and identify physical structures in turbid waters. They feed on a variety of insects. They have keeled scales.

Habitat: Sturgeon chubs are found in the large, shallow, turbid streams of the Missouri River drainage as well as in the Mississippi River in Louisiana. . They are obligates of free flowing, turbid, rivers that have shallow gravel riffles and strong currents that prevent siltation. In Wyoming, the sturgeon chub can be found in the Powder River from the Montana border to near Salt Creek.

Problems:

Throughout the Missouri River drainage in Kansas, Nebraska, North and South Dakota, Montana and Wyoming the sturgeon chub is considered imperiled because of extreme rarity making it vulnerable to extinction. In Wyoming it is of special concern because its presence is extremely isolated and habitats are declining or vulnerable. Dewatering and habitat degradation are the most serious threats to the sturgeon chub. A variety of water uses result in the intermittency of many tributary streams.

Conservation Actions:

- Studies are needed to better understand the population genetic structure.
- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- A better understanding of the basic biology, life history and ecology is needed.
- Monitoring protocols and sites should be identified and routinely sampled.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.
- Continue efforts to maintain water flow and water quality within watersheds occupied by sturgeon chubs.

References and Additional Reading:

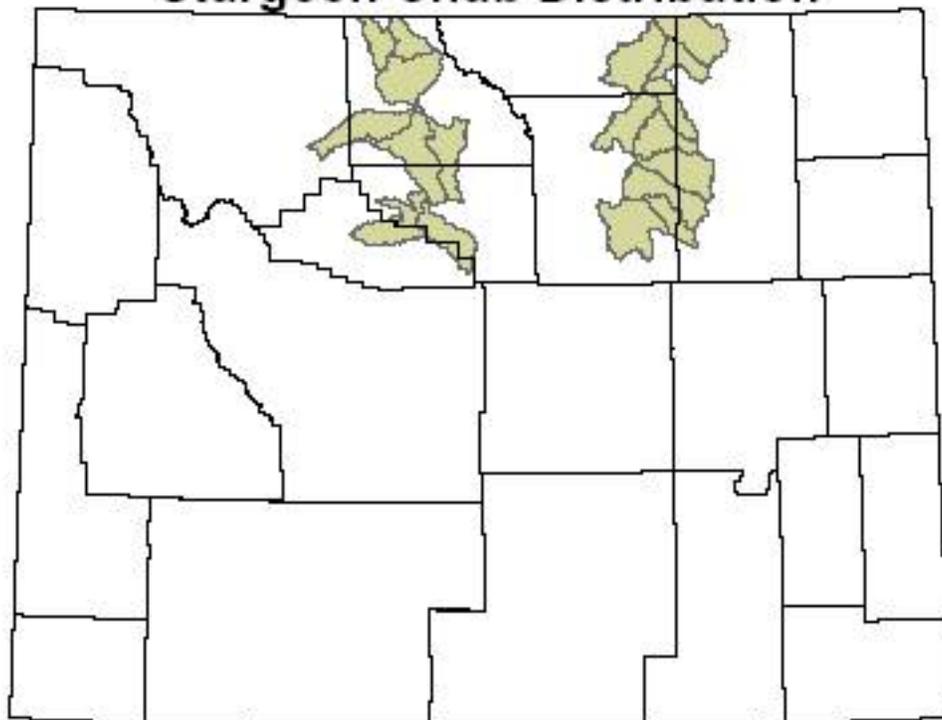
Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

Stewart, D. 1981. The biology of the sturgeon chub (*Hybopsis gelida* Girard) in Wyoming. M.S. thesis (unpublished). Univ. Wyoming. 53pp.

Weitzel, D. L., 2002. Conservation and Status Assessments for the Sturgeon Chub (*Macrhybopsis gelida*), Western Silvery Minnow (*Hybognathus argyritis*), and Goldeye

(Hiodon alsosides): Rare Fish Species of the Upper Missouri River Drainage, Wyoming.
Wyoming Game and Fish Department, Cheyenne. 38pp.

Sturgeon Chub Distribution



Suckermouth Minnow (*Phenacobius mirabilis*)

Status: NSS1; NatureServe G5 S2

Abundance: Rare

Introduction: These slender-bodied minnows are named for their sucker-like mouth. Barbels are absent. Adults range in length from 2 to 4.5 inches. The suckermouth minnow's diet includes insects and other bottom-dwelling invertebrates. Spawning occurs throughout the summer months.

Habitat: The suckermouth minnow seems to be most abundant in streams with moderate current and turbidity. They are intolerant of intermittency and need silt free sand, gravel and cobble substrates. In Wyoming this minnow is found rarely in tributaries of the North Platte River in Goshen County, and more commonly in lower Horse Creek.

Problems:

The population trend of the suckermouth minnow in Wyoming is believed to be declining but actual abundance is undocumented. Suckermouth are considered to be widespread, abundant, and globally secure. It is considered of special concern in Alabama, threatened in Louisiana, South Dakota, New Mexico, and West Virginia and endangered in Colorado. In Wyoming, the suckermouth minnow is rare and of special concern. A variety of anthropogenic and climatic factors have led to the dewatering of some streams, impacting this minnow. The suckermouth is especially sensitive to man caused/associated sedimentation of riffle habitats.

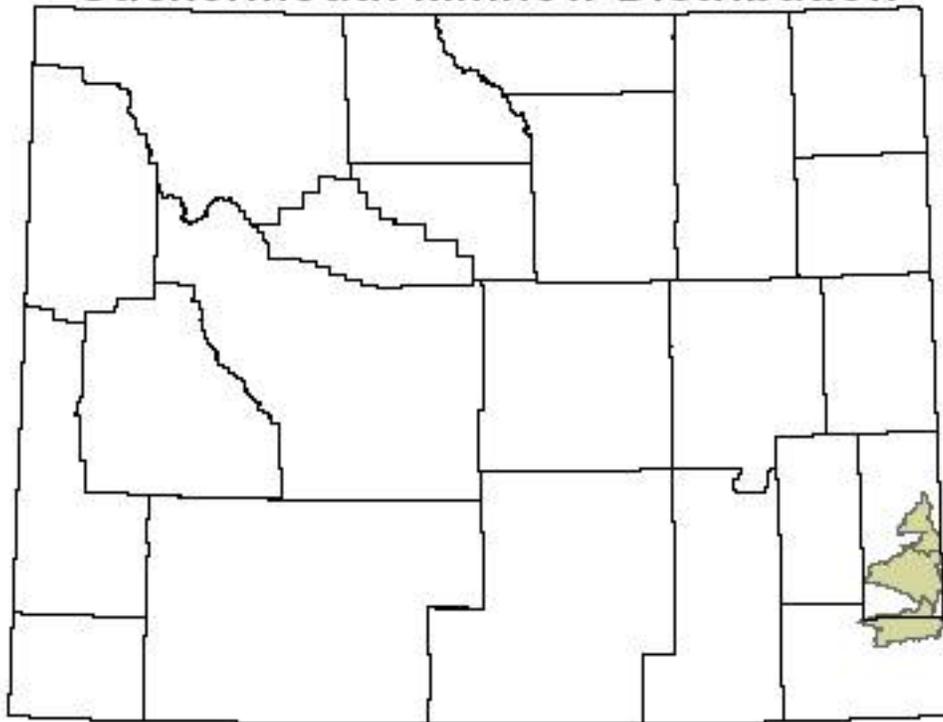
Conservation Actions:

- Studies are needed to better understand the population genetic structure.
- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- A better understanding of the basic biology, life history and ecology is needed.
- Monitoring protocols and sites should be identified and routinely sampled.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.

References and Additional Reading:

- Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.
- Cross, F. B. 1967. Handbook of fishes of Kansas. Univ. Kansas Mus. of Nat. Hist. Misc. Pub. 45:1-357.
- Weitzel, D. L., 2002. Conservation and Status Assessments for the Hornyhead Chub (*Nocomis biguttatus*), Suckermouth Minnow (*Phenacobius mirabilis*), and Orangethroat Darter (*Etheostoma spectabile*): Rare Stream Fish Species of the Platte River Drainages, Wyoming. Wyoming Game and Fish Department, Cheyenne. 40pp.

Suckermouth Minnow Distribution



Western Silvery Minnow (*Hybognathus argyritis*) Status: NSS1; NatureServe G4 S2

Abundance: Uncommon

Introduction: The stout body of the western silvery minnow terminates in a deeply forked tail. It has a relatively small head and large eye and is stout bodied. The head is small with a large eye; its caudal fin is deeply forked. Western silvery minnows are difficult to distinguish from the plains minnow and the brassy minnow. The western silvery minnow's diet and breeding behavior are poorly understood.

Habitat: This minnow prefers large to medium sized rivers with sluggish flow and silted bottoms. They are typically found in shallow backwaters and slow pools with sand or gravel substrates. They are more abundant in clear water and show intolerance for turbidity and pollution. Western silvery minnows occur in the Belle Fourche, Little Powder, and Little Missouri rivers. They are believed to persist in the Powder River but recent surveys did not find them. They are believed extirpated from the Big Horn River. Often, it's associated with the more common plains minnow.

Problems:

Dewatering and habitat degradation, especially increased siltation are serious threats to the western silvery minnow. Introduced competitors like the emerald shiner and predacious gamefish have been considered a potential problem. It is considered secure and fairly widespread across its range though in Saskatchewan, Kansas, and Missouri it is of special concern. In Wyoming its presence is extremely isolated and habitats are declining or vulnerable.

Conservation Actions:

- Studies are needed to better understand the population genetic structure.
- A better understanding of the habitat and flow requirements of this species is needed to assess the impacts of water and land use activities.
- A better understanding of the basic biology, life history and ecology is needed.
- Monitoring protocols and sites should be identified and routinely sampled.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.

References and Additional Reading:

Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.

Cross, F. B. 1967. Handbook of fishes of Kansas. Univ. Kansas Mus. of Nat. Hist. Misc. Pub. 45:1-357.

Scott, W.B., and E.J. Crossman. 1973. Freshwater fishes of Canada. Bull. 184 Fish. Res. Bd. Canada. 966pp.

Weitzel, D. L., 2002. Conservation and Status Assessments for the Sturgeon Chub (*Macrhybopsis gelida*), Western Silvery Minnow (*Hybognathus argyritis*), and Goldeye (*Hiodon alsosides*): Rare Fish Species of the Upper Missouri River Drainage, Wyoming. Wyoming Game and Fish Department, Cheyenne. 38pp.



Westslope Cutthroat (*Oncorhynchus clarki lewisi*) Status: NSS4; NatureServe G4T3 S1

Abundance: Uncommon

Introduction: Westslope cutthroat trout are native to the upper Columbia basin in Idaho, Montana and very northwestern Wyoming. Westslope and Yellowstone cutthroat are often confused, which has led, in part, to one species being stocked into historic range of the other. Behnke (1992) indicates the two subspecies have distinctive spotting and coloration patterns which can be used to identify individuals.

Habitat: Three life history forms of westslope cutthroat are known to occur, each utilizing combination of lakes, rivers and small tributary/headwater streams during some or all of the lives (Liknes and Graham, 1988). Westslope cutthroat migrations of considerable magnitude occur within some systems. Typical westslope cutthroat trout streams are cold, nutrient poor waters where conditions for growth are marginal. Westslope cutthroat are generally considered not to be piscivorous, and tend to be opportunistic feeders on invertebrates.

Problems: There are four primary reasons for the decline of this species. Habitat loss is considered to be a widespread problem. Cutthroat trout have declined due to poor grazing practices, historic logging practices, mining, agriculture, residential development and the lingering impact of forest roads. Fish have been unable to use countless miles of spawning habitat due to dewatering of streams for irrigation and because of barriers created by dams and road culverts. Non-native species have also taken a huge toll on westslope cutthroat trout. Brook trout outcompete juvenile cutthroat trout for food (Novinger and Rahel 1999). Other non-native species like lake trout, brown trout and northern pike prey on cutthroat trout. A third reason for decline is the more insidious role of hybridization with other species. Westslope cutthroat trout do hybridize with rainbow trout and even other non-native cutthroat trout subspecies. This is difficult to ascertain since it takes extensive genetic testing to verify the problem. Many remnant genetically pure cutthroat trout populations, on both sides of the Continental Divide, are located above barriers that protected them from non-native species. A fourth cause of decline has probably been overfishing. Westslope cutthroat trout are highly susceptible to angling (Behnke 1992) but it is uncertain how much of an impact this has had on the species overall decline.

Conservation Actions: Conservation of this species involves protecting the population strongholds and making tough decisions on restoration priorities for the depressed populations. Montana has developed a Conservation Agreement signed by nine government agencies and conservation groups (Montana Department of Fish, Wildlife and Parks 1999). This agreement prioritizes protecting genetically pure populations first, then slightly introgressed populations. Recovering depressed populations will involve habitat restoration and removing non-native species. Research suggests that it is not a good idea to bolster populations with stocked fish from other watersheds due to considerable genetic variation between watersheds (Leary, Allendorf and Kanda 1998). It will be especially challenging to recover migratory life forms. Governmental agencies will need to work together to share expertise, pool financial resources and monitor progress toward restoration of this species.

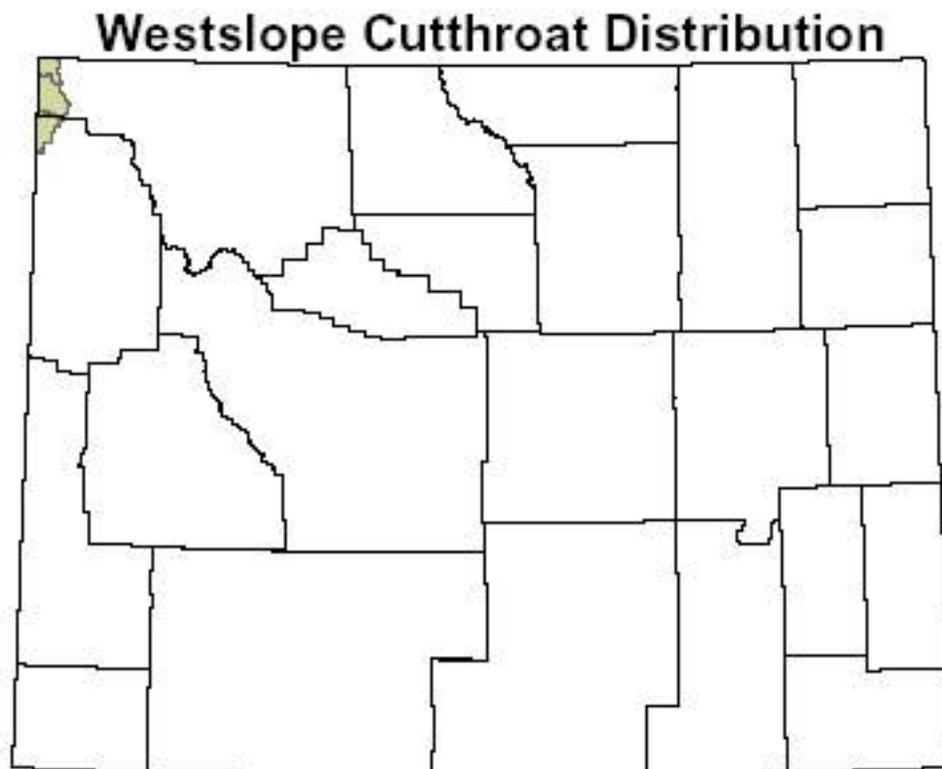
References and Additional Reading:

Behnke, R. 1992. Native Trout of North America. American Fisheries Monograph 6. American Fisheries Society. Bethesda, MD.

Likens, G.A. and P.J. Graham. 1988. Westslope cutthroat trout in Montana: Life history, status and management. Pages 53-60, *In: Status and Management of Interior Stocks of Cutthroat Trout*. American Fisheries Society Symposium 4. Bethesda, MD.

Montana Department of Fish, Wildlife and Parks. 1999. Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout (*Oncorhynchus clarki lewisi*) in Montana. Helena, Montana.

Novinger, D.C. and F.J. Rahel. 1999. Exploring competitive mechanisms that allow nonnative brook trout to displace native cutthroat trout in a rocky mountain stream. American Fisheries Society 129th Annual Meeting Abstracts. Charlotte, North Carolina.



Yellowstone Cutthroat (*Oncorhynchus clarki bouvieri*) Status: NSS2; NatureServe G4T2 S2

Abundance: Uncommon

Introduction: Yellowstone cutthroat trout is distinguished from other cutthroat trout by large black spots concentrated in the caudal peduncle. It feeds on zooplankton, freshwater shrimp, a wide variety of insects, mollusks and other trout. In Yellowstone Lake, this subspecies migrates to inflowing streams to spawn from May to July. In late summer or early fall, the fry emerge from the gravels. Present management strategy is to protect, enhance and restore Yellowstone Cutthroat populations and their habitats where possible. Extensive studies have been completed in a large portion of their habitat within the Absaroka Range of the Big Horn Basin of Wyoming; one is presently ongoing in the largest contiguous drainage with pure populations, the Upper Yellowstone River.

Habitat: The Yellowstone cutthroat lives in lakes, large rivers and small tributary streams. Native to the Yellowstone River drainage downstream to the Tongue River, including the Big Horn and Clarks Fork River drainages, this trout is also found in Pacific Creek and other Snake River tributaries. All other occupation by this species east of the Continental Divide is from introductions.

Problems:

The number one threat to Yellowstone Cutthroat trout existence since European colonization is the introduction of hybridizing and competing trout species. Loss of habitat from human development is also a contributing factor. In addition, extensive dam construction has limited free movement of the species to some of their major spawning headwater tributaries.

Conservation Actions:

- The genetic distinction between Snake River cutthroat trout and Yellowstone cutthroat trout needs to be better understood.
- Determine if genetic integrity of native stocks has been altered by introduced stocks. Prevent further introgression.
- Surveys are needed to provide baseline data and monitor distribution and population trends. These data may be used to identify specific threats and identify management needs and priorities.
- Evaluate the potential for restoring within suitable portions of historic range that are currently uninhabited or where competing or hybridizing species can be removed.

References and Additional Reading:

- Ball, O.P., and O.B. Cope. 1961. Mortality studies on cutthroat trout in Yellowstone Lake. U.S. Fish and Wildl. Ser. Res. Rept. 55. 62pp.
- Baxter, G.T., and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne. 290pp.
- Benson, N.G. 1961. Limnology of Yellowstone Lake in relation to the cutthroat trout. U.S. Fish and Wildl. Ser. Res. Rept. 56. 31pp.

Bulkley, R.V. 1961. Fluctuations in age composition and growth rate of cutthroat trout in Yellowstone Lake. U.S. Fish and Wildl. Ser. Res. Rpt. 54. 31pp.



Crayfish

Status: NSS3/NSS4; NatureServe G4/G5 SNR

Abundance: Unknown

Introduction: Three species of Crayfish; the *Cambarus diogenes* (NSSC 3/G5), the *Orconectes neglectus* (NSSC 4/G5), and the *Pacifastacus gambelii* (NSSC 4/G4G5) have been classified as species of concern by the Wyoming Game and Fish Department. The abundance of these species are largely unknown, and little life history information is available on any of these species. The *Cambarus diogenes* is an opportunistic feeder, that eats mostly detritus and plant material. It is nocturnal except when it emerges from its burrow to breed. The *Pacifastacus gambelii* is believed to be an opportunistic feeder that breeds in the springtime and has a home range estimated to be no more than 50 meters. No life history information could be found for the *Orconectes neglectus*.

Habitat: In Wyoming, these species occupy aquatic habitats east of the continental divide, but specific drainages have not been identified.

Problems:

- Population status and distribution are unknown;
- Crayfish require high quality water and have a low tolerance for pollution and siltation; and
- The sources of pollution and siltation are yet to be precisely identified.

Conservation Actions:

The population status and distribution of these three species needs to be researched.

References and Additional Reading:

- Hobbs, H.H. Jr. 1989. An illustrated checklist of the American crayfishes (Decapoda: Astacidae, Cambaridae & Parastacidae). Smithsonian Contributions to Zoology 480. Smithsonian Institute Press, Washington, D.C. 236pp.
- Hobbs, H.H. III. 1991. Decapoda. *In*: A.P. Covich and J.H. Thorp, eds., Ecology and Classification of North American Freshwater Invertebrates. Academic Press, San Diego, Calif. pp 823-858.
- NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 10, 2004).
- World Wildlife Fund. 1994. Nashville crayfish, *Orconectes shoupi*. *In*: J.R. Matthews and C.J. Moseley, eds., World Wildlife Fund Guide to Endangered Species of North America, Vol. 2. Beacham Publishing, Wash., DC. pp 1027-1028.

Map: Insufficient distribution information exists for these species and suitable maps could not be generated.

Shrimp

Status: NSS4; NatureServe G4 G5 SNR

Abundance: Unknown

Introduction: The following species of shrimp are found in Wyoming: Pocked pouch fairy shrimp (*Branchinecta campestris*), Colorado fairy shrimp (*Branchinecta coloradensis*), giant fairy shrimp (*Branchinecta gigas*), versitle fairy shrimp (*Branchinecta lindahli*), rock pool fairy shrimp (*Branchinecta packardi*), circumpolar fairy shrimp (*Branchinecta paludosa*), eastern alkali fairy shrimp (*Branchinecta readingi*), knobbedlip fairy shrimp (*Eubbranchipus bundyi*), ethologist fairy shrimp (*Eubbranchipus serratus*), New Mexico fairy shrimp (*Streptocephalus dorotheae*), crenatethumb fairy shrimp (*Streptocephalus mattoxi*), greater plains fairy shrimp (*Streptocephalus texanus*), beavertail fairy shrimp (*Thamnocephalus platyurus*), lemon tadpole shrimp (*Lepidurus lemmoni*), longtail tadpole shrimp (*Triops longicaudatus*) and San Francisco brine shrimp (*Artemia franciscana*). Of these species, NatureServe identifies the following as being of a higher conservation priority than the others: *Streptocephalus mattoxi*, *Branchinecta campestris*, and *Branchinecta gigas*.

Most freshwater shrimp species, since they often live in temporary waters, produce one or two generations each time potential habitat is made available. Over a short time period, they produce as many small resistant eggs as possible that become torpid and then hatch when the pool fills again. Population fluctuations are common, with one species disappearing completely after several years of abundance, and then reappearing mysteriously. The fairy shrimp and brine shrimp are free-swimming filter feeders, while the tadpole shrimp are bottom-feeders whose diet consists of detritus.

Habitat: Most species of freshwater shrimp have few specific habitat preferences and often occur in small (less than one hectare) roadside ditches and vernal pools, as well as various sizes of permanent and sometimes temporary ponds. They do not, however, inhabit flowing waters, and they are typically absent in areas where fish are present. Most are tolerant of fluctuations in osmotic pressure, oxygen concentration, salinity, alkalinity and pH, although they do prefer alkaline waters.

Problems:

Population status and distribution are unknown.

Conservation Actions:

Research needs include field studies on patterns of life history evolution, grazing and predator-prey relationships, individual behavior, population dynamics, community structure and landscape ecology.

References and Additional Reading:

Dodson, S.I., and D.G. Frey. 1991. Cladocera and other branchiopoda. *In*: A.P. Covich and J.H. Thorp, eds., Ecology and Classification of North American Freshwater Invertebrates. Academic Press, San Diego, Calif. pp 723-786.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 25, 2004).

Saunders, J. F., D. Belk, and R. Dufford. 1993. Persistence of *Branchinecta paludosa* (Anostraca) in southern Wyoming, with notes on zoogeography. *J. Crustacean Biology* 13:184-189.

Map: Insufficient distribution information exists for these species and suitable maps could not be generated.

California Floater (*Anodonta californiensis*)

Status: NSS4; NatureServe G3 SNR

Abundance: Unknown

Introduction: Adult freshwater mussels are sedentary and spend their lives near the area where they first settled. They will move during spawning or if prompted by a stimulus such as water disturbance, exposure due to low water, or seasonal temperature changes. In these instances, they may burrow into sediments (often doing so in the fall and emerging in the spring) or move away from the area horizontally. Horizontal movement appears to be associated with length of day and spawning, and is usually only a distance of a few meters. Dispersal which covers a greater distance is believed to be attributed to stream size and surface geology, use of flow refuges during flood stages, and patterns of host fish distribution during spawning periods. Most mussels require species-specific host fish during the parasitic larval portion of their life cycle.

Habitat: The California floater prefers standing water or backwater areas of flowing water, such as oxbows and sloughs, in low elevations. It may be found in lakes and lake-like streams. This species is believed to have been widespread in the Pacific Drainage from British Columbia into Mexico, but its current range is much reduced and disjunct. Today, it's thought to occur in California, Nevada, Utah, and Arizona. Also, in 2003, empty shells of this species were collected at the northwest edge of Woodruff Narrows Reservoir (Bear River drainage) in Uinta County in Wyoming.

Problems:

- Population status and distribution are unknown;
- Threats to freshwater mussels and their habitats are thought to include:
 - Pollution
 - Diversion of rivers for irrigation, hydroelectric and water supply projects
 - Elimination of natural fish hosts
 - Eutropification due to agricultural runoff and urbanization

The source, severity and longevity of these impacts have yet to be precisely defined in Wyoming.

Conservation Actions:

- Collection of freshwater mussels by Wyoming Game and Fish Department staff beginning in 2004 will help identify distribution and population status; and
- This species may tolerate some water pollution, but cannot tolerate heavy nutrients.

References and Additional Reading:

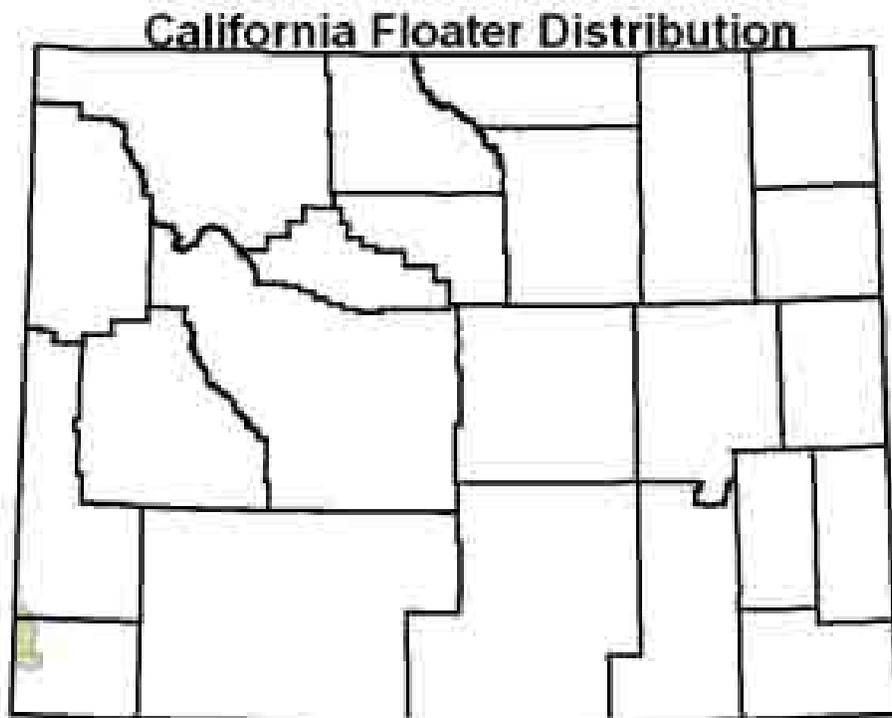
Clarke, A.H., and P. Hovingh. 1993. Final Report: Status survey of fifteen species and subspecies of aquatic and terrestrial mollusks from Utah, Colorado, and Montana. Ecosearch, Inc., Portland, Texas. Report submitted to U.S. Fish and Wildlife Service. Contract no. 14-16-0006-91-046 (revised).

Cvancara, A.M. 2004. Wyoming native species status: Freshwater mussels. Report submitted to Wyoming Game and Fish Department, Cheyenne, WY. 2pp.

Frest, T.J. and E.J. Johannes. 1995. Freshwater mollusks of the Upper Klamath Drainage, Oregon. Final report to the Oregon Natural Heritage Program, Portland, Oregon. Contract #ORFO 092094. 68pp.

Frest, T.J. and E.J. Johannes. 1995. Interior Columbia Basin mollusk species of special concern. Final report to the Interior Columbia Basin Ecosystem Management Project, Walla Walla, WA. Contract #43-0E00-4-9112. 274pp.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 15, 2004).



Cylindrical Papershell (*Anodontoides ferussacianus*) Status: NSS4; NatureServe G5 SNR

Abundance: Unknown

Introduction: Adult freshwater mussels are mostly sedentary and spend their lives near the area where they first settled. They will move during spawning or if prompted by a stimulus such as a water disturbance nearby, exposure due to low water, or seasonal temperature changes. In these instances, they may burrow into sediments (often doing so in the fall and emerging in the spring) or move away from the area horizontally. Horizontal movement appears to be associated with length of day and spawning, and is usually only a distance of a few meters. Dispersal which occurs over a greater distance is believed to be attributed to stream size and surface geology, use of flow refuges during flood stages, and patterns of host fish distribution during spawning periods. Most mussels require species-specific host fish during the parasitic larval portion of their life cycle. The cylindrical papershell uses mottled sculpin and sea lampreys as hosts.

Habitat: The cylindrical papershell prefers standing water or backwater areas of flowing water, such as oxbows and sloughs, in low elevations. It may be found in lakes and lake-like streams. It's believed to occur in areas of the central United States as far south as Oklahoma and Arkansas, and northeast to Vermont. In Canada it may occupy areas from Saskatchewan to Quebec. In Wyoming, specimens have been collected in Goshen, Laramie and Platte counties.

Problems:

- Population status and distribution are unknown;
- Threats to freshwater mussels and their habitats are thought to include:
 - Pollution
 - Diversion of rivers for irrigation, hydroelectric and water supply projects
 - Elimination of natural fish hosts
 - Eutrophication due to agricultural runoff and urbanization

The source, severity and longevity of these impacts have yet to be precisely defined in Wyoming.

Conservation Actions:

Collection of freshwater mussels by Wyoming Game and Fish Department staff beginning in 2004 will help identify distribution and population status.

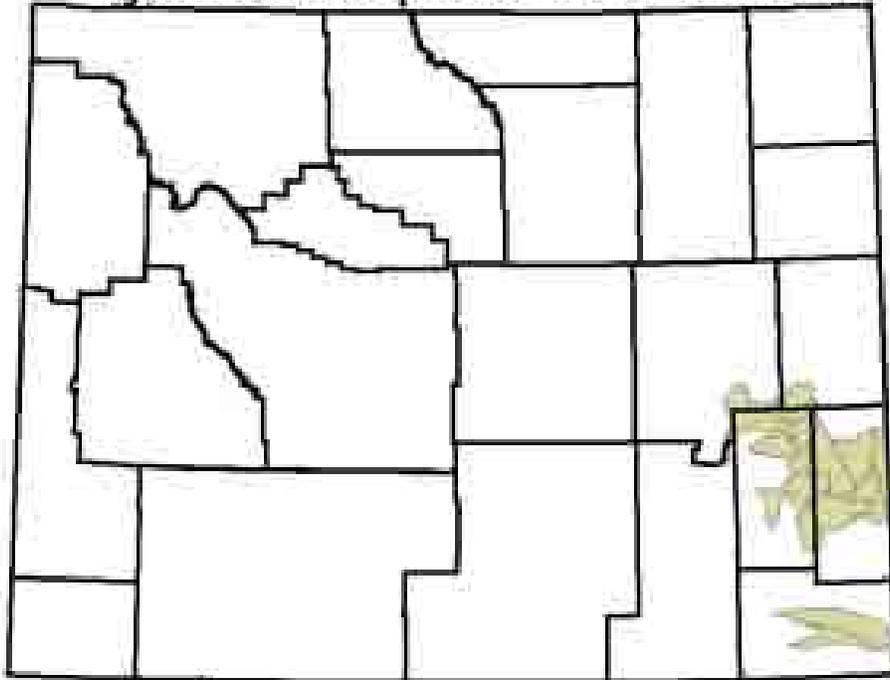
References and Additional Reading:

Cvancara, A.M. 2004. Wyoming native species status: Freshwater mussels. Report submitted to Wyoming Game and Fish Department, Cheyenne, WY. 2pp.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 15, 2004).

World Wildlife Fund. 1994. Freshwater mussels from the Mobile River Basin. *In*: W. Beacham, ed., World Wildlife Fund Guide to Endangered Species of North America, Vol. 4. Beacham Publishing, Wash., DC. pp 2135-2139.

Cylindrical Papershell Distribution



Fatmucket (*Lampsilis siliquoidea*)

Status: NSS4; NatureServe G5 SNR

Abundance: Unknown

Introduction: Adult freshwater mussels are mostly sedentary and spend their lives near the area where they first settled. They will move during spawning or if prompted by a stimulus such as a water disturbance nearby, exposure due to low water, or seasonal temperature changes. In these instances, they may burrow into sediments (often doing so in the fall and emerging in the spring) or move away from the area horizontally. Horizontal movement appears to be associated with length of day and spawning, and is usually only a distance of a few meters. Dispersal which occurs over a greater distance is believed to be attributed to stream size and surface geology, use of flow refuges during flood stages, and patterns of host fish distribution during spawning periods. Most mussels require species-specific host fish during the parasitic larval portion of their life cycle.

Habitat: Not much is known about the habitat preferences of the fatmucket. It's believed to occur in areas of the central United States from Montana, the Dakotas, and Nebraska east to New York, and as far south as Louisiana and Mississippi. In Canada it may occupy areas from the Northern Territories and Alberta to Quebec. Specimens of this species have been collected in Wyoming in Converse, Fremont, Natrona and Platte counties. In Big Horn County, shells and flesh were collected from the Nowood River of the Big Horn drainage in 2003. In 2004, live specimens were collected from the Tongue River near Ranchester.

Problems:

- Population status and distribution are unknown;
- Threats to freshwater mussels and their habitats are thought to include:
 - Pollution
 - Diversion of rivers for irrigation, hydroelectric and water supply projects
 - Elimination of natural fish hosts
 - Eutropification due to agricultural runoff and urbanization

The source, severity and longevity of these impacts have yet to be precisely defined in Wyoming.

Conservation Actions:

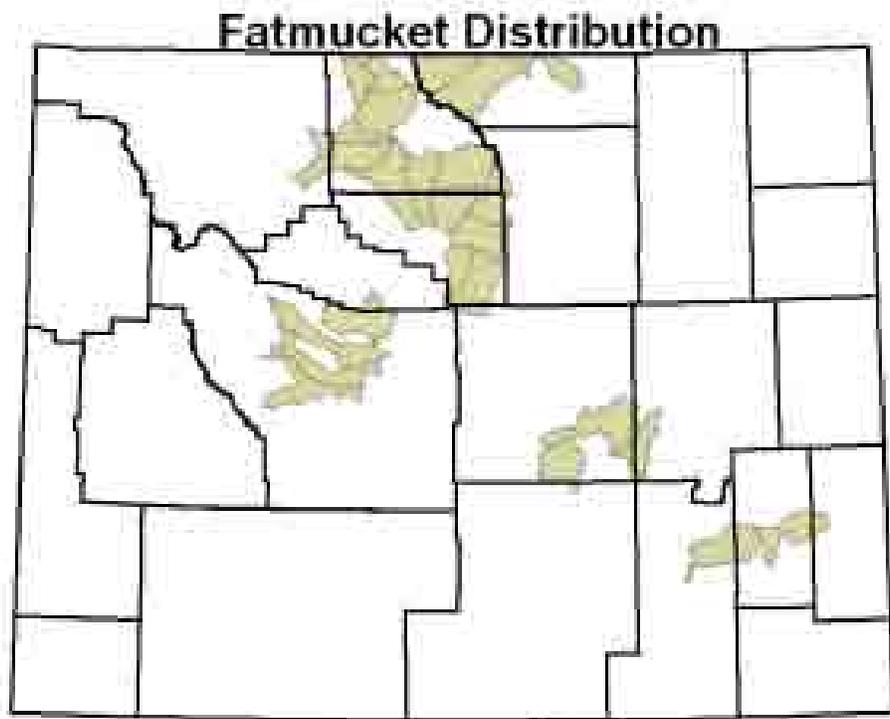
Collection of freshwater mussels by Wyoming Game and Fish Department staff beginning in 2004 will help identify distribution and population status.

References and Additional Reading:

Cvancara, A.M. 2004. Wyoming native species status: Freshwater mussels. Report submitted to Wyoming Game and Fish Department, Cheyenne, WY. 2pp.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 15, 2004).

World Wildlife Fund. 1994. Freshwater mussels from the Mobile River Basin. *In*: W. Beacham, ed., World Wildlife Fund Guide to Endangered Species of North America, Vol. 4. Beacham Publishing, Wash., DC. pp 2135-2139.



Freshwater Gastropods

Status: NSS4; NatureServe (Varies)

Abundance: Unknown

Introduction: With very few exceptions, little is known about Wyoming's freshwater gastropods. Although this taxa has been surveyed sporadically, this group has received little attention since the 1980s, and research regarding their life history, habitat needs, or management status is sparse. The following genera are thought to occur in Wyoming: *Amnicola*, *Aplexa*, *Colligyrus*, *Ferrissia*, *Fluminicola*, *Fossaria*, *Gyraulus*, *Helisoma*, *Physa*, *Physella*, *Planorbella*, *Planorbella*, *Planorbula*, *Promenetus*, *Pyrgulopsis*, *Stagnicola* and *Valvata*. Each genus could represent one or more species, however, without additional studies, disputes over nomenclature make it difficult to determine an exact number of species. Except for the Jackson Lake Spring Snail (*Pyrgulopsis robusta*), this account is meant to provide an overview of what little is known about this group.

The NatureServe Explorer prioritizes the following aquatic snail species as being HIGH conservation priorities; *Physella Spelunca*, *Stagnicola bonnevillensis*, *Fluminicola coloradoensis*, *Physella utahensis*, *Pyrgulopsis pilsbryana*, and *Pyrgulopsis robusta*. The following species are identified as MED/HIGH conservation priorities; *Helisoma newberryi* and *Physella columbiana*. The following species are identified as MEDIUM conservation priorities; *Physella cooperi*, *Stagnicola montanensis*, *Fluminicola fuscus*, and *Stagnicola traski*. The following species are identified as MED/LOW conservation priorities; *Physa megalochlamys*, and *Planorbula campestris*.

Habitat: Having adapted to nearly all freshwater habitats in North America, freshwater snails may be found in ponds, lakes, swamps, marshes, pools, ditches, springs, creeks, streams and rivers. Generally speaking, calcium carbonate is essential for shell construction in mollusks; therefore, about 95 percent of all freshwater gastropods are limited to waters with calcium concentrations greater than 3 mg/liter. Most species are found in hard, alkaline waters. Freshwater snails are not often found in lakes and streams with a surface acidity greater than pH 5. They are also typically absent from severely polluted waters, in which algae blooms consume dissolved oxygen (although some, like *Physella spp.* are more tolerant of polluted conditions). Salinity, high temperature and food availability associated with water depth are also limiting factors for freshwater snails. Unfortunately, specific distribution information for individual aquatic snail species in Wyoming is lacking.

Problems:

Little is known regarding the population and habitat status of most aquatic gastropods in Wyoming.

Conservation Actions:

Aquatic gastropods need to be inventoried so their population trends and habitat needs can be identified. This information can then be used to identify additional research and monitoring which may be necessary.

References and Additional Reading:

- Brown, K. 1991. Mollusca: Gastropoda. *In*: A.P. Covich and J.H. Thorp, eds., Ecology and Classification of North American Freshwater Invertebrates. Academic Press, San Diego, Calif. pp 285-314.
- Burch, J.B. and J.L. Tottenham. 1980. North American freshwater snails. *Walkerana* 1(3): 81-215.
- Hershler, R. 1998. A systematic review of the hydrobiid snails in the Great Basin, Western United States: Part I, Genus *Pyrgulopsis*. *Veliger* 41(1):1-132.
- Hershler, R. 1999. Systematic review of the hydrobiid snails in the Great Basin, Western United States: Part II, Genera *Colligyrus*, *Eremopyrgus*, *Fluminicola*, *Pristinicola*, and *Tryonia*. *Veliger* 42(4):306-337.
- NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 27, 2004).
- Pip, E. 2000. The decline of freshwater mollusks in southern Manitoba. *Canadian Field Naturalist*, 114(4): 555-560.

Map:

Due to the general lack of information, no map is available for any of these species.

Giant Floater (*Pyganodon grandis*)**Status: NSS4; NatureServe G5 SNR****Abundance:** Unknown

Introduction: The adults of this species are mainly sessile, except when they burrow deeper into soft substrate. During high water flows, passive movement downstream may occur. Dispersal occurs as the glochidia (larvae) are encysted on their host, most likely one of many fish species. Giant floaters are thought to be long-term brooders, or bradytictic. Adults likely feed on detritus, zooplankton and phytoplankton, while the glochidia are parasitic.

Habitat: The giant floater occurs in permanent ponds, lakes and rivers of various sizes, usually with a mud substrate. It's found at a depth of 0.2 meters and beyond. This species is more tolerant of low oxygen levels and impounded areas than are others in its taxonomic family. Gross water pollution, however, would probably kill them. Widespread and common in North America, the giant floater can tolerate a rather wide range of habitats. It is commonly throughout Canada and the United States in the Mississippi, Great Lakes, and Hudson Bay basins. It also occurs in the Gulf of Mexico drainage area of Louisiana and Texas, and in the Red River drainage in Texas and Oklahoma. In Wyoming, empty shells have been found in the Belle Fourche River near Moorcoft and live specimens have been found in Keyhole Reservoir and the Little Missouri drainage.

Problems:

- Population status and distribution are unknown;
- Threats to freshwater mussels and their habitats are thought to include:
 - Pollution
 - Diversion of rivers for irrigation, hydroelectric and water supply projects
 - Elimination of natural fish hosts
 - Eutropification due to agricultural runoff and urbanization

The source, severity and longevity of these impacts have yet to be precisely defined in Wyoming.

Conservation Actions:

- Collection of freshwater mussels by Wyoming Game and Fish Department staff beginning in 2004 will help identify distribution and population status.

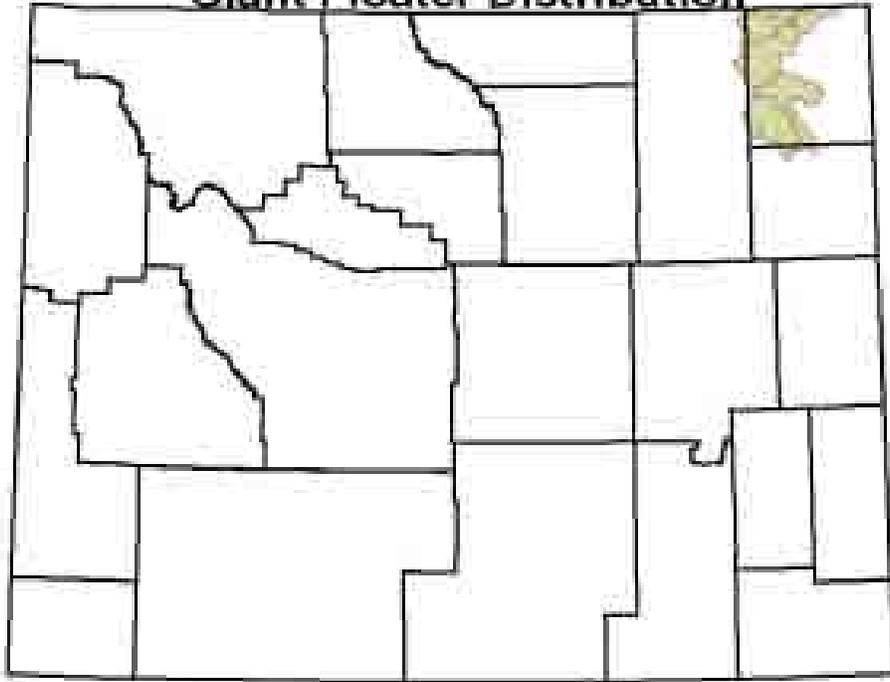
References and Additional Reading:

Cvancara, A.M. 2004. Wyoming native species status: Freshwater mussels. Report submitted to Wyoming Game and Fish Department, Cheyenne, WY. 2pp.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 15, 2004).

World Wildlife Fund. 1994. Freshwater mussels from the Mobile River Basin. *In*: W. Beacham, ed., World Wildlife Fund Guide to Endangered Species of North America, Vol. 4. Beacham Publishing, Wash., DC. pp 2135-2139.

Giant Floater Distribution



Jackson Lake Springsnail (*Pyrgulopsis robusta*) Status: NSS4; NatureServe G2/G3 S1/S2

Abundance: Unknown

Introduction: This aquatic snail is largely herbivorous and is about one half a centimeter in length. They are believed to live about a year and breed only once. The species is commonly preyed upon by fish, larger aquatic invertebrates, amphibians, reptiles, and a variety of birds. Although once common throughout the Jackson Lake drainage, this species is believed to have been extirpated from all but one site in Wyoming, Polecat Creek. The status of the snail within Jackson Lake is unknown following modifications to the dam's spillway.

The taxonomy and nomenclature of this species is currently at the heart of a significant controversy. During 1992, the Idaho Springsnail (*Pyrgulopsis idahoensis*) was protected under the Federal Endangered Species Act (ESA). During June of 2004, the State of Idaho and the Idaho Power Company petitioned to have the Idaho Springsnail removed from ESA petitions based upon recent research that indicated the Idaho Springsnail, the Jackson Lake Spring Snail, and the Harney Lake Springsnail (*Pyrgulopsis hendersoni*) were, in fact, the same species (*Pyrgulopsis robusta*). During August of 2004, a coalition of academics and conservation organizations filed a petition with the U.S. Fish and Wildlife Service to protect, the Jackson Lake Springsnail, the Harney Lake Springsnail and the unrecognized Columbia Springsnail under the ESA in addition to the Idaho Springsnail. During April 2005, the U.S. Fish and Wildlife Service (USFWS), after reviewing both ESA petitions, has determined a need to conduct a 12-month status review to determine if the Idaho Springsnail should be delisted and whether the other three species should receive Federal ESA protections. The USFWS will be taking public comment on this issue until June 20, 2005.

Habitat: The Jackson Lake Springsnail is found on the undersides of pebbles and cobbles in very shallow water, and at depths of more than 15 feet. It also occurs on submerged aquatic plants. The species prefers permanent, cold, and unpolluted habitats with dissolved oxygen levels near saturation.

Problems:

- The Jackson Lake Springsnail has been heavily impacted by the introduction of New Zealand Mudsnaileds to the Jackson Lake drainage;
- Drastic water fluctuations have cause declines in this snail's populations and distribution; and
- The current status of the Jackson Lake populations is uncertain, following the remodeling of the lake bottom and rebuilding of the dam's spillway.

Conservation Actions:

Effective efforts to limit the spread and propagation of the New Zealand Mudsnailed are needed.

References and Additional Reading:

Brown, K. 1991. Mollusca: Gastropoda. *In:* A.P. Covich and J.H. Thorp, eds., Ecology and Classification of North American Freshwater Invertebrates. Academic Press, San Diego, Calif. pp 285-314.

Hershler, R. 1994. A review of the North American freshwater snail genus PYRGULOPSIS (Hydrobiidae). *Smithsonian Contributions to Zoology* 554:1-115.

Hershler, R. & S-P. Liu (2000b) A molecular phylogeny of aquatic gastropods provides a new perspective on biogeographic history of the Snake River region. *Molec. Phyl. Evol.* 32: 927-937.

Hershler, R. & H-P Liu (2004a) Taxonomic reappraisal of species assigned to the North American freshwater gastropod subgenus *Natricola* (Rissooidea: Hydrobiidae). *The Veliger* 47: 66-81.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: May 2, 2004).

Pip, E. 2000. The decline of freshwater molluscs in southern Manitoba. *Canadian Field Naturalist*, 114(4): 555-560.

Bowler, P., et. Al. 2004. Petition to List the Jackson Lake Springsnail (*Pyrgulopsis robusta*), Harney Lake Springsnail (*Pyrgulopsis hendersoni*), Columbia Springsnail (*Pyrgulopsis* new species 6) as Threatened or Endangered.

US Fish & Wildlife Service. Notice of two 90-day petition findings... Federal Register 70: 20512-20514. (PDF) <http://www.cofc.edu/~dillonr/IdahoSpringsnail.pdf>

U.S. Fish & Wildlife Service, Snake River Office: <http://idahoes.fws.gov/>



Terrestrial Gastropods

Status: NSS4; NatureServe (Varies)

Introduction: With very few exceptions, little is known about Wyoming's terrestrial gastropods. Although this taxa has been surveyed sporadically, this group has received little attention since the 1980s, and research regarding their life history, habitat needs, or management status is sparse. The following genera are thought to occur in Wyoming: *Catinella*, *Columella*, *Discus*, *Microphysula*, *Oreohelix*, *Oxyloma*, *Pupilla*, *Succinea*, *Vertigo*, *Vallonia*, *Pupoides*, and *Zonitoides*. Each genus could represent one or more species, however, without additional studies, disputes over nomenclature make it difficult to determine an exact number of species. Except for the *Oreohelix* species and the *Vertigo* species, this account is meant to provide an overview of what little is known about this group.

The NatureServe Explorer prioritizes the following terrestrial snail species as being HIGH conservation priorities; *Oreohelix pygmaea*, *Oreohelix pilsbryi*, *Oreohelix swopei*, *Oreohelix carinifera*, and *Oreohelix strigosa cooperi*. The following species are identified as MED/HIGH conservation priorities; *Oreohelix strigosa berryi*, *Oreohelix strigosa* spp 2, *Catinella wandae*, and *Pupoides hordaceus*. The following species are identified as MEDIUM conservation priorities; *Oxyloma haydeni* and *Catinella stretchiana*. The following species are identified as MED/LOW conservation priorities; *Vertigo arthuri*, *Vertigo paradoxa*, and *Vallonia albula*.

Habitat: Little, if anything, is known about the habitat requirements of the terrestrial gastropods found in Wyoming. However, terrestrial gastropods, in general, occur in vegetated areas that supply sufficient shelter, moisture, food, and calcium (i.e. limestone substrates).

Problems: Little is known regarding the population and habitat status of most terrestrial gastropods in Wyoming.

Conservation Actions:

Terrestrial gastropods need to be inventoried so their population trends and habitat needs can be identified. This information can then be used to identify additional research and monitoring which may be necessary.

References and Additional Reading:

Frest, T.J. and E.J. Johannes. 1995. Interior Columbia Basin Mollusk Species of Special Concern. Final Report to Interior Columbia Basin Ecosystem Management Project. Deixis Consultants, 2517 NE 65th St, Seattle, WA 98115. 362 p.

Frest, T.J. and E.J. Johannes. 1995. Land Snail Survey of the Black Hills National Forest, South Dakota and Wyoming, Summary Report, 1991-2001. Deixis Consultants, 2517 NE 65th St, Seattle, WA 98115. 127 p.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

Map:

Due to the general lack of information, no map is available for any of these species.

Mountainsnails (Genus *Oreohelix*)

Status: (All) NSS4; NatureServe Varies

Abundance: Unknown

Introduction: Several species of Mountainsnails are thought to occur in Wyoming. These include *Oreohelix strigosa*, *O. carinifera*, *O. pilsbryi*, *O. swopei*, and *O. pygmaea*. Of these, NatureServe identifies the *O. carinifera*, *O. pilsbryi*, and *O. pygmaea* as having a G1 status due to their narrow geographic range. The *O. strigosa* (G5) is considered to be abundant throughout its range, but some of its subspecies are identified as having a rating of T2, which indicates a higher concern. Little recent information is available regarding the distribution, abundance, or status of any of these species in Wyoming.

Recent surveys of *Oreohelix* in the Black Hills National Forest has sparked an ongoing debate regarding the taxonomy of the subspecies *Oreohelix strigosa cooperi*. Some feel this subspecies should be classified as two separate organisms; *Oreohelix cooperi*, a new species of *Oreohelix*, and the Pahasapa Mountainsnail, another, as yet undescribed, subspecies of *Oreohelix strigosa*. With this proposed change, the *Oreohelix cooperi* is currently petitioned for protection under the Endangered Species Act. The U.S. Forest Service does not currently recognize the proposed division, but does recognize the *O. strigosa cooperi* and considers it to be a regionally sensitive species and a management indicator species for the Black Hills National Forest.

Habitat: For most of the *Oreohelix* species, little is known about their habitats in Wyoming. In general, they appear to prefer vegetated habitats and talus slopes with sufficient water and calcium.

Problems:

- Population status and distribution are unknown; and
- The taxonomy of this genus remains a topic of significant debate.

Conservation Actions:

- The population status and distribution of these species needs to be researched; and
- Taxonomic issues related to the *O. strigosa cooperi* and other *Oreohelix* species need to be resolved.

References and Additional Reading:

Anderson, T. 2005. *Oreohelix strigosa cooperi* (Cooper's Rocky Mountainsnail): A Technical Conservation Assessment.

Frest, Terrance, A. and Johannes, E. 2002. Land Snail Survey of the Black Hills National Forest, South Dakota and Wyoming, Summary Report, 1991 – 2001.

Nichols, J., et. Al. 2003. Petition for a rule to list the Black Hills Mountainsnail (*Oreohelix cooperi*) as ENDANGERED under the Endangered Species Act 16 USC 1531 et seq (1973 as amended) and for the designation of Critical Habitat.

Map: Insufficient distribution information exists for these species and suitable maps could not be generated.

Abundance: Unknown

Introduction: Adult freshwater mussels are mostly sedentary and spend their lives near the area where they first settled. They will move during spawning or if prompted by a stimulus such as a water disturbance nearby, exposure due to low water, or seasonal temperature changes. In these instances, they may burrow into sediments (often doing so in the fall and emerging in the spring) or move away from the area horizontally. Horizontal movement appears to be associated with length of day and spawning, and is usually only a distance of a few meters. Dispersal, which occurs over a greater distance, is believed to be attributed to stream size and surface geology, use of flow refuges during flood stages, and patterns of host fish distribution during spawning periods. Most mussels require species-specific host fish during the parasitic larval portion of their life cycle.

Habitat: Not much is known about the habitat preferences of the plain pocketbook. It's believed to occur in areas of the central United States from South Dakota and Nebraska east to New York, and as far south as Louisiana, Alabama and Mississippi. In Canada it may occupy areas from Saskatchewan to Quebec. Empty shells of this species have been collected in Wyoming in the North Platte and Laramie rivers and Deer Creek in Natrona, Converse and Platte counties.

Problems:

- Population status and distribution are unknown;
- Threats to freshwater mussels and their habitats are thought to include:
 - Pollution
 - Diversion of rivers for irrigation, hydroelectric and water supply projects
 - Elimination of natural fish hosts
 - Eutropification due to agricultural runoff and urbanization

The source, severity and longevity of these impacts have yet to be precisely defined in Wyoming.

Conservation Actions:

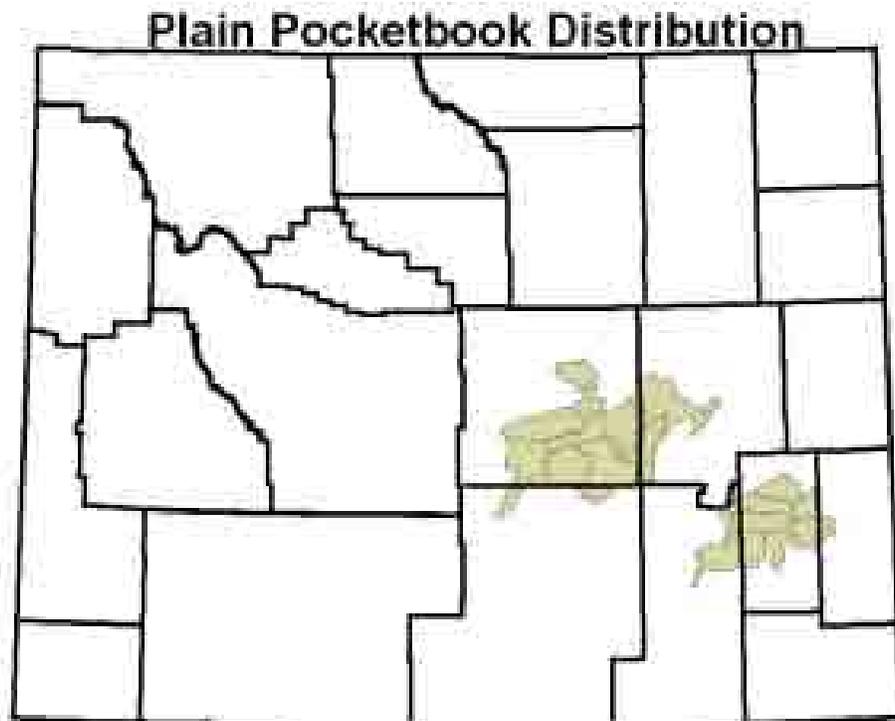
Collection of freshwater mussels by Wyoming Game and Fish Department staff beginning in 2004 will help identify distribution and population status.

References and Additional Reading:

Cvancara, A.M. 2004. Wyoming native species status: Freshwater mussels. Report submitted to Wyoming Game and Fish Department, Cheyenne, WY. 2pp.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 15, 2004).

World Wildlife Fund. 1994. Freshwater mussels from the Mobile River Basin. *In*: W. Beacham, ed., World Wildlife Fund Guide to Endangered Species of North America, Vol. 4. Beacham Publishing, Wash., DC. pp 2135-2139.



Vertigo Snails

Status: (Both) NSSC 4; NatureServe G3 SNR

Abundance: Unknown

Introduction: The Callused Vertigo Snail occupies portions of Minnesota, North Dakota, South Dakota, and Wyoming. Within Wyoming, this species is known from eight sites within the Black Hills National Forest. The Mystery Vertigo Snail is known to inhabit portions of Maine, Michigan, Minnesota, Vermont, New York, Wisconsin, South Dakota, Wyoming and several Canadian provinces. The Mystery Vertigo Snail is known from two sites within the Black Hills National Forest. No information is available regarding the abundance of either species at known Wyoming locations.

Habitat: Both species are known to consume decaying wood and vegetation and the microorganisms living on those surfaces. They are generally found in sites described as, wet, relatively undisturbed forests with deep litter, north facing slopes, slope bases, and adjacent flood plains. Likewise, both are found in areas with limestone or schist substrates. The Callused Vertigo Snail has been found in Ponderosa Pine forests, White Spruce forests, Bur Oak riparian areas, or Mountain Mahogany shrublands. The Mystery Vertigo Snail has only been found in closed canopy Ponderosa Pine or White Spruce forests.

Problems: Anderson indicates, “Because of (their) limited dispersal ability, patchy distribution, and sensitivity to environmental conditions such as temperature and moisture, populations of *Vertigo arthuri* (and *Vertigo paradoxa*) are subject to extirpation from events that alter or destroy habitat at a particular location.” These events can include fire, roads, timber harvesting, mining, grazing, and recreation. However, the chance of extirpation is dependent upon the severity of the habitat-altering event and may also be influenced by regional environmental conditions such as drought.

Conservation Actions:

- Conduct additional survey research to more precisely determine the distribution and status of these species; and
- Conduct additional research to help quantify the effects habitat altering activities have on these species.

References and Additional reading:

Frest, Terrance, A. and Johannes, E. 2002. Land snail survey of the Black Hills National Forest, South Dakota and Wyoming, Summary Report, 1991 – 2001.

Anderson, Tamara. 2004. Callused Vertigo (*Vertigo arthuri*): A Technical Conservation Assessment. USDA

Anderson, Tamara. 2004. Mystery Vertigo (*Vertigo paradoxa*): A Technical Conservation Assessment. USDA

Map: Insufficient distribution information exists for these species and suitable maps could not be generated.

Abundance: Unknown

Introduction: Adult freshwater mussels are mostly sedentary and spend their lives near the area where they first settled. They will move during spawning or if prompted by a stimulus such as a water disturbance nearby, exposure due to low water, or seasonal temperature changes. In these instances, they may burrow into sediments (often doing so in the fall and emerging in the spring) or move away from the area horizontally. Horizontal movement appears to be associated with length of day and spawning, and is usually only a distance of a few meters. Dispersal which occurs over a greater distance is believed to be attributed to stream size and surface geology, use of flow refuges during flood stages, and patterns of host fish distribution during spawning periods. Most mussels require species-specific host fish during the parasitic larval portion of their life cycle. The western pearlshell is declining, with few populations indicating repeated reproduction over several age classes as was once the norm. This species, however, is fairly resistant to intrusions that are not destructive.

Habitat: Not much is known about the habitat preferences of the western pearlshell. Historically, it has occurred from southern Alaska to central California, east to the western parts of Montana and Wyoming, as well as in northern Utah. Presently, however, this species is known only locally in parts of the Coeur d'Alene system, including the Coeur d'Alene River and St. Maries River. In Wyoming, specimens of the western pearlshell have been collected in Lincoln, Sublette, Teton and Uinta counties in the Snake and Bear river drainages, and the Missouri drainage in Yellowstone National Park.

Problems:

- Population status and distribution are unknown;
- Influx of fine sediment and siltation has extirpated populations outside of Wyoming.
- Threats to freshwater mussels and their habitats are thought to include:
 - Pollution
 - Diversion of rivers for irrigation, hydroelectric and water supply projects
 - Elimination of natural fish hosts
 - Eutropification due to agricultural runoff and urbanization

The source, severity and longevity of these impacts have yet to be precisely defined in Wyoming.

Conservation Actions:

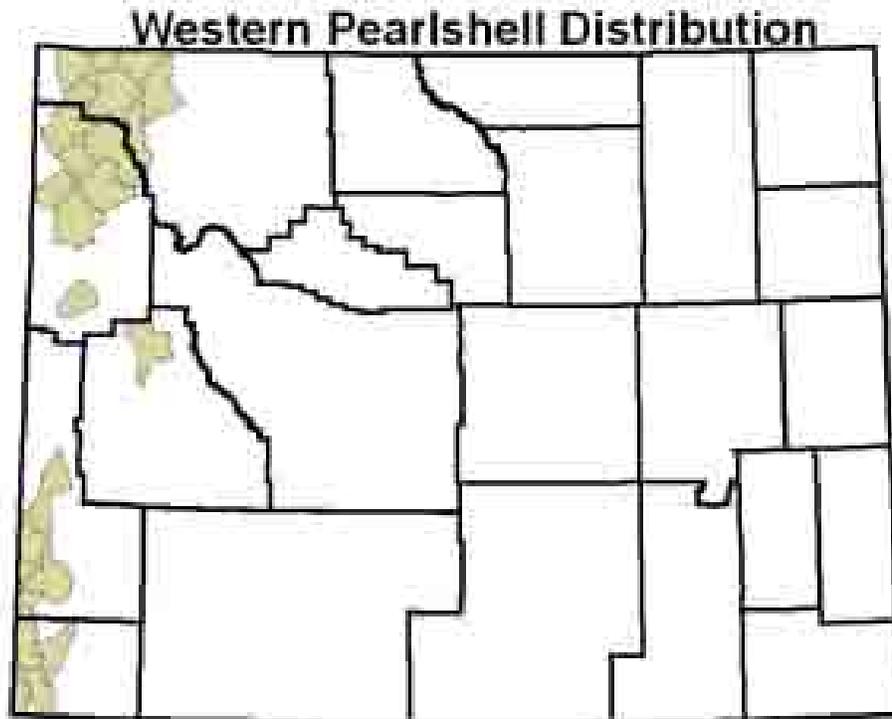
- Collection of freshwater mussels by Wyoming Game and Fish Department staff beginning in 2004 will help identify distribution and population status; and
- Throughout its range, study is needed to document range changes.

References and Additional Reading:

Cvancara, A.M. 2004. Wyoming native species status: Freshwater mussels. Report submitted to Wyoming Game and Fish Department, Cheyenne, WY. 2pp.

Frest, T.J. and E.J. Johannes. 1995. Freshwater mollusks of the Upper Klamath Drainage, Oregon. Final report to the Oregon Natural Heritage Program, Portland, Oregon. Contract #ORFO 092094. 68pp.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 15, 2004).



White Heelsplitter (*Lasmigona complanata*)

Status: NSS4; NatureServeG5 SNR

Abundance: Unknown

Introduction: The White Heelsplitter is a relatively common mussel in North America. It can be found as far south as the Tennessee River, throughout the Midwest and Plains States of the U.S., and into southern Canada. It has been identified as a species of concern in eight states and may have been extirpated from another. In Wyoming, this species is known from only one specimen collected in the Belle Fourche river within the town of Hulett.

Habitat: The White Heelsplitter prefers pools or sluggish streams with a mud, sand, or fine gravel bottom. This mussel has been found to occupy very shallow waters and habitats as deep as 20 feet. Known host fish species include the Common Carp, Green Sunfish, Largemouth Bass, White Crappie, Orangespotted Sunfish, and Banded Killfish.

Problems:

- Population status and distribution are unknown;
- Threats to freshwater mussels and their habitats are thought to include:
 - Pollution
 - Diversion of rivers for irrigation, hydroelectric and water supply projects
 - Elimination of natural fish hosts
 - Eutropification due to agricultural runoff and urbanization

The source, severity and longevity of these impacts have yet to be precisely defined in Wyoming.

Conservation Actions:

Collection of freshwater mussels by Wyoming Game and Fish Department staff beginning in 2004 will help identify distribution and population status.

References and Additional Reading:

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: Oct. 20, 2004).

Murray, Harold and Leonard, B. 1962. Handbook of Unionid Mussels in Kansas. Kansas University Museum of Natural History, Miscellaneous Publication #28.

White Heel Splitter Distribution

