June 13, 2012

MEMORANDUM TO: Jeremy J. Susco, Acting Chief
Environmental Review and
Guidance Update Branch
Division of License Renewal
Office of Nuclear Reactor Regulation

FROM: Briana Balsam, Biologist ***/RA/***
Environmental Review and
Guidance Update Branch
Division of License Renewal
Office of Nuclear Reactor Regulation

Dennis Logan, Aquatic Ecologist ***/RA B. Balsam for/***
Environmental Review and
Guidance Update Branch
Division of License Renewal
Office of Nuclear Reactor Regulation

SUBJECT: CONCLUSION OF INFORMAL SECTION 7 CONSULTATION WITH U.S. FISH AND WILDLIFE SERVICE FOR COLUMBIA GENERATING STATION AND SECTION 7 CONSULTATION REPORT

The U.S. Nuclear Regulatory Commission (NRC) has fulfilled its obligations under section 7 of the Endangered Species Act of 1973, as amended (ESA) for species under the U.S. Fish and Wildlife's (FWS) jurisdiction for the proposed license renewal of Columbia Generating Station. The enclosed FWS Section 7 Consultation Report summarizes the consultation and includes the staff's biological assessment and all relevant correspondence between the NRC and FWS pursuant to the consultation. Dennis Logan, Aquatic Biologist, and Briana Balsam, Biologist, were the main points of contact for this consultation.

Docket No. 50-397

Enclosure:
As stated

CONTACT: Dennis Logan, NRR/DLR 301-415-0490
Brian Balsam, NRR/DLR 301-415-1042

June 13, 2012

MEMORANDUM TO: Jeremy J. Susco, Acting Chief
Environmental Review and
Guidance Update Branch
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Office of Nuclear Reactor Regulation

FROM: Briana Balsam, Biologist ***/RA/***
Environmental Review and
Guidance Update Branch
Division of License Renewal
Office of Nuclear Reactor Regulation

Dennis Logan, Aquatic Ecologist ***/RA B. Balsam for/***
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Docket No. 50-397

Enclosure:
As stated

CONTACT: Dennis Logan, NRR/DLR 301-415-0490
Brian Balsam, NRR/DLR 301-415-1042

DISTRIBUTION:
See next page
ADAMS Accession No: ML12102A238

OFFICE	RERB:DLR	LA:RPB2:DLR	OGC (NLO)	RERB:DLR	RERB: DLR
NAME	BBalsam	IKing	LSubin	BBalsam	DLogan (BBalsam for)
DATE	4/18/12	4/18/12	5/8/12	6/13/12	6/13/12

OFFICIAL RECORD COPY

Memo to J. Susco from B. Balsam and D. Logan dated June 13, 2012

SUBJECT: CONCLUSION OF INFORMAL SECTION 7 CONSULTATION WITH U.S. FISH AND WILDLIFE SERVICE FOR COLUMBIA GENERATING STATION AND SECTION 7 CONSULTATION REPORT

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BBalsam
DLogan
PCooper
LSubin

FWS Section 7 Consultation Report

Columbia Generating Station
License Renewal

June 2012

Docket Number 50-397

U.S. Nuclear Regulatory Commission
Rockville, Maryland

Prepared by:

Briana Balsam
Division of License Renewal
Office of Nuclear Reactor Regulation

FWS Section 7 Consultation Report for Columbia Generating Station License Renewal

Introduction

Section 7(a)(2) of the Endangered Species Act of 1973, as amended (ESA) directs Federal agencies to consult with the U.S. Fish and Wildlife Service (FWS) or National Marine Fisheries Service (NMFS), as appropriate, to ensure that any action that the agency authorizes, funds, or carries out does not jeopardize the continued existence of any endangered or threatened species or cause adverse modification to designated critical habitat.

This report summarizes the U.S. Nuclear Regulatory Commission's (NRC; the staff) efforts to comply with section 7 of the ESA, during the staff's review of Energy Northwest's license renewal application for Columbia Generating Station (CGS), located in the town of Benton County, Washington.

Section 7 Consultation Summary

In a letter dated January 20, 2010, Energy Northwest submitted an application to the NRC to issue a renewed operating license for CGS that, if granted, would allow the facility to operate for an additional 20-year period beyond the initial 40-year licensing term. The current licensing term ends on December 20, 2023. As part of the NRC's environmental review for the proposed license renewal, the NRC staff coordinated with the NMFS to determine potential adverse impacts to species and habitats protected under the ESA. The staff also performed a concurrent assessment of potential impacts all environmental resources, which is documented in NUREG-1437, Supplement 47, the NRC's supplemental environmental impact statement (SEIS) for CGS license renewal, which the NRC prepared pursuant to the National Environmental Policy Act of 1969, as amended (NEPA).

During its review, the staff concluded that the proposed license renewal may affect, but is not likely to adversely affect the bull trout (*Salvelinus confluentus*) and would have no effect on any other Federally listed species under FWS's jurisdiction. The FWS concurred with this determination on October 5, 2011.

Species and Habitats Considered

The table on the following page identifies the three Federally listed species under FWS's jurisdiction that occur or have the potential to occur in the vicinity of CGS and that NRC considered during its environmental review of the license renewal application. The biological assessment also considers designated critical habitat for the bull trout. The NRC did not identify any proposed species or proposed critical habitat that would be affected by the proposed license renewal. In addition to listed species, the SEIS considers three species that are candidates for Federal listing. These species appear in the following table, but were not included in the biological assessment.

Table 1. Federally Listed Species Considered Under FWS's Jurisdiction

Species	Federal Status[(a)]	ESA Effect Determination
pygmy rabbit (*Brachylagus idahoensis*)	E	no effect
greater sage grouse (*Centrocercus urophasianus*)	C	no effect
yellow-billed cuckoo (*Coccyzus americanus*)	C	no effect
Ute ladies'-tresses (*Spiranthes diluvialis*)	T	no effect
Umtanum desert buckwheat (*Eriogonum codium*)	C	no effect
bull trout (*Salvelinus confluentus*)	T	may affect, but not likely to adversely affect

[(a)] C=candidate; E=endangered; T=threatened

Consultation History

The NRC staff initiated informal section 7 consultation with the FWS on March 22, 2010, when the NRC sent a letter requesting information on Federally listed endangered or threatened, proposed, and candidate species, as well as any designated critical habitat that may be in the vicinity of CGS and its associated transmission line rights-of-way. The NRC followed up on this request via e-mail on November 5, 2010. The FWS responded in an e-mail dated November 8, 2010, and identified a single aquatic species—the bull trout—under its jurisdiction that is Federally listed as threatened and has been reported in the Hanford Reach in the vicinity of the CGS facility. Further, the FWS indicated that proposed critical habitat for the bull trout occurred within the action area.

Because the NRC did not prepare its biological assessment within the 180-day timeframe specified at Title 50 of the *Code of Federal Regulations* (50 CFR) 402.12(i), the NRC confirmed the accuracy of the species list in an e-mail to FWS on June 15, 2011. The FWS responded on June 16, 2011, confirming that the bull trout was the only listed species in the area under the NRC's review and that the FWS had designated bull trout critical habitat, which had been proposed at the time of the NRC and FWS's last correspondence.

NRC prepared a biological assessment, in which the staff concluded that the proposed CGS license renewal would have no effect on the bull trout or its critical habitat. The NRC forwarded its biological assessment to FWS in a letter dated August 23, 2011. After discussing the biological assessment with FWS staff, the NRC revised its effect determination regarding bull trout to "may affect, but not likely to adversely affect" the species in an e-mail dated September 28, 2011. The FWS concurred with this determination in a letter dated October 5, 2011. This letter concluded informal section 7 consultation. Thus, the NRC has fulfilled its obligations under the ESA for the proposed CGS license renewal.

Relevant Correspondence

The table below lists all relevant letters, e-mails, and other correspondence related to the NRC's informal section 7 consultation with FWS for the proposed CGS license renewal. Copies of each item appear chronologically in Appendix A.

March 22, 2010	Letter from B. Pham, RPB1 Chief, NRC, to R. Thorson, Pacific Regional Director, FWS. Subject: Request for list of protected species within the area under evaluation for the Columbia Generating Station license renewal application. ML100710046.
November 5, 2010	E-mail from D. Doyle, Project Manager, NRC, to G. Kurz, Fish and Wildlife Biologist, FWS. Subject: NRC – Columbia Generating Station license renewal. ML103120452.
November 8, 2010	E-mail from G. Kurz, Fish and Wildlife Biologist, FWS, to D. Doyle, Project Manager, NRC. Subject: Re: NRC – Columbia Generating Station license renewal. ML103120486.
June 15, 2011	E-mail from D. Doyle, Project Manager, NRC, to G. Kurz, Fish and Wildlife Biologist, FWS. Subject: Re: NRC – Columbia Generating Station license renewal. ML111662229.
June 16, 2011	E-mail from G. Kurz, Fish and Wildlife Biologist, FWS, to D. Doyle, Project Manager, NRC. Subject: Re: NRC – Columbia Generating Station license renewal. ML111680221.
August 23, 2011	Letter from D. Wrona, RPB2 Chief, NRC, to R. Thorson, Pacific Regional Director, FWS. Subject: Biological assessment for informal section 7 consultation related to the license renewal of Columbia Generating Station. ML11161A003.
August 23, 2011	Biological Assessment and Essential Fish Habitat Assessment for Columbia Generating Station License Renewal. Appendix D-1 to NUREG-1437, Supplement 47. ML11227A007.
September 28, 2011	E-mail from D. Logan, Aquatic Ecologist, NRC, to L. Gauthier, FWS. Subject: Revised biological assessment conclusion for bull trout in Columbia Generating Station section 7 consultation with FWS. ADAMS No. ML11272A066.
October 5, 2011	Letter from K.S. Berg, Washington Fish and Wildlife Office Manager, FWS, to D. Wrona, PRB2 Chief, NRC. Subject: Concurrence with the NRC's biological assessment for Columbia Generating Station license renewal. ADAMS No. ML11291A157.

.

APPENDIX A

SECTION 7 CONSULTATION CORRESPONDENCE

March 22, 2010

Ms. Robyn Thorson, Regional Director
U.S. Fish & Wildlife Service
Pacific Region
911 NE 11th Ave
Portland, OR 97232

SUBJECT: REQUEST FOR LIST OF PROTECTED SPECIES WITHIN THE AREA UNDER EVALUATION FOR THE COLUMBIA GENERATING STATION LICENSE RENEWAL APPLICATION REVIEW

Dear Ms. Thorson:

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application submitted by Energy Northwest for the renewal of the operating license for Columbia Generating Station (CGS). CGS is located on the Columbia River, 12 miles northwest of Richland, WA. As part of the review of the license renewal application, the NRC is preparing a Supplemental Environmental Impact Statement (SEIS) under the provisions of the National Environmental Policy Act (NEPA) of 1969, as amended. The SEIS includes an analysis of pertinent environmental issues, including endangered or threatened species and impacts to fish and wildlife. This letter is being submitted under the provisions of the Endangered Species Act of 1973, as amended, and the Fish and Wildlife Coordination Act of 1934, as amended.

Energy Northwest stated that it has no plans to alter current operations over the license renewal period and that CGS, operating under a renewed license, would use existing plant facilities and transmission lines and would not require additional construction or disturbance of new areas. Any maintenance activities would be limited to previously disturbed areas. The CGS site is in the southeastern area of the U.S. Department of Energy (USDOE) Hanford Site, a 586 square mile reservation established in 1943 by the federal government for the production of defense nuclear materials. The CGS site comprises 1,089 acres that are leased by Energy Northwest from the USDOE. The lease describes the site in two parcels – a nearly square section containing the plant power block and associated structures and an elongated area running to the river east of the plant.

CGS employs a closed-cycle cooling system that removes heat from its condenser and rejects it to the atmosphere by evaporation using six mechanical draft cooling towers. Water is circulated from the cooling towers through the condenser and back to the circulating water pumphouse at a rate of about 550,000 gpm. Makeup water to replenish water losses due to evaporation, drift, and blowdown is supplied from the makeup water pumphouse located at Columbia River approximately three miles east of the plant. The three 800-hp makeup water pumps are each designed to pump 12,500 gallons per minute (gpm), although normally two pumps are used to supply makeup water to the plant.

The intake system for the makeup water pumps includes two offshore perforated pipe inlets mounted above the riverbed and approximately parallel to the river flow. The intake system is designed for a withdrawal capacity of 25,000 gpm.

Actual makeup water withdrawal during operating periods averages about 17,000 gpm. This is about 0.1% of the minimum river flow in the vicinity of CGS or 0.03% of the average annual flow.

As part of the SEIS, the applicable transmission line corridors will be reviewed. Energy produced at CGS is delivered to the Bonneville Power Authority at the H.J. Ashe Substation located 0.5 mile north of the station. The CGS main generator output is transmitted to Ashe Substation via the step-up main transformer bank and a 2,900-ft long 500-kV tie line. The plant start-up transformer is connected to the Ashe Substation via a 230-kV line. The 230-kV and 500-kV overhead lines run approximately parallel in a 280-ft wide corridor. The lines between CGS and Ashe Substation comprise the transmission intertie that is within the scope of license renewal. The third line supporting CGS is a 115-kV power source that serves as a backup power source for safe shutdown under accident conditions. This line has a right-of-way width of 90 feet and runs between the CGS switchyard and a tap off the 115-kV line that runs from the Benton Switchyard to USDOE Fast Flux Test Facility. This tap is located about 1.8 miles southeast of the plant. (Please see the site area map, Enclosure 3.)

To support the SEIS preparation process and to ensure compliance with Section 7 of the Endangered Species Act, the NRC requests a list of species and information on protected, proposed, and candidate species and critical habitat that may be in the vicinity of CGS and its associated transmission line right-of-way. In addition, please provide any information you consider appropriate under the provisions of the Fish and Wildlife Coordination Act.

The NRC staff plans to hold two public NEPA scoping meetings on April 6, 2010 at the Richland Public Library in Richland, WA. You and your staff are invited to attend the public meetings. The first session will convene at 12:30 p.m. and will continue until 3:30 p.m., as necessary. The second session will convene at 5:00 p.m., with a repeat of the overview portions of the meeting, and will continue until 8:00 p.m., as necessary.

The week of June 7th, we plan to conduct a site audit. You and your staff are invited to attend both the site audit and the public meetings. Your office will also receive a copy of the draft SEIS along with a request for comments. The anticipated publication date for the draft SEIS is December 2010.

The CGS license renewal application is available at:

http://www.nrc.gov/reactors/operating/licensing/renewal/applications/columbia.html

If you have any questions concerning the NRC staff review of this license renewal application, please contact Mr. Daniel Doyle, Project Manager, at (301) 415-3748 or daniel.doyle@nrc.gov.

Sincerely,

/RA/

Bo Pham, Chief
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-397

Enclosures:
1. Area Map, 50-mile radius
2. Area Map, 6-mile radius
3. Site Area Map

cc w/encls.: See next page

If you have any questions concerning the NRC staff review of this license renewal application, please contact Mr. Daniel Doyle, Project Manager, at (301) 415-3748 or daniel.doyle@nrc.gov.

Sincerely,

/RA/

Bo Pham, Chief
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-397

Enclosures:
1. Area Map, 50-mile radius
2. Area Map, 6-mile radius
3. Site Area Map

cc w/encls.: See next page

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RidsNrrDlrRapb Resource
RidsNrrDlrRasb Resource
RidsNrrDlrRerb Resource
RidsNrrDlrRpob Resource

EGettys
DDoyle
FLyon
WWalker, RIV
RCohen, RIV
LSubin, OGC

ADAMS Accession No: ML100710046

OFFICE	PM:RPB1:DLR	PM:RPB1:DLR	LA:RPOB:DLR
NAME	JSusco	DDoyle	SFigueroa
DATE	03/11/10	03/19/10	03/18/10
OFFICE	OGC	BC:RPB1:DLR	
NAME	LSubin (NLO)	BPham	
DATE	03/22/10	03/22/10	

OFFICIAL RECORD COPY

Columbia Generating Station

cc:

Mr. J.V. Parrish, Chief Executive Officer
Energy Northwest
MD 1023
P.O. Box 968
Richland, WA 99352-0968

Mr. S. K. Gambhir
Energy Northwest
MD PE04
P.O. Box 968
Richland, WA 99352-0968

Mr. Douglas W. Coleman, Manager,
Regulatory Programs
Energy Northwest
P.O. Box 968
MD PE20
Richland, WA 99352-0968

Mr. William A. Horin, Esq.
Winston and Strawn
1700 K Street, NW
Washington, DC 20006-3817

Chairman, Benton County
Board of Commissioners
P.O. Box 190
Prosser, WA 99350-0190

Mr. Richard Cowley
Washington State Department of
Health
111 Israel Road, SE
Tumwater, WA 98504-7827

Mr. Ron Cohen
U.S. Nuclear Regulatory Commission
P.O. Box 69
Richland, WA 99352

Regional Administrator
U.S. NRC Region IV
Texas Health Resources Tower
612 E. Lamar Boulevard, Suite 400
Arlington, TX 76011-4125

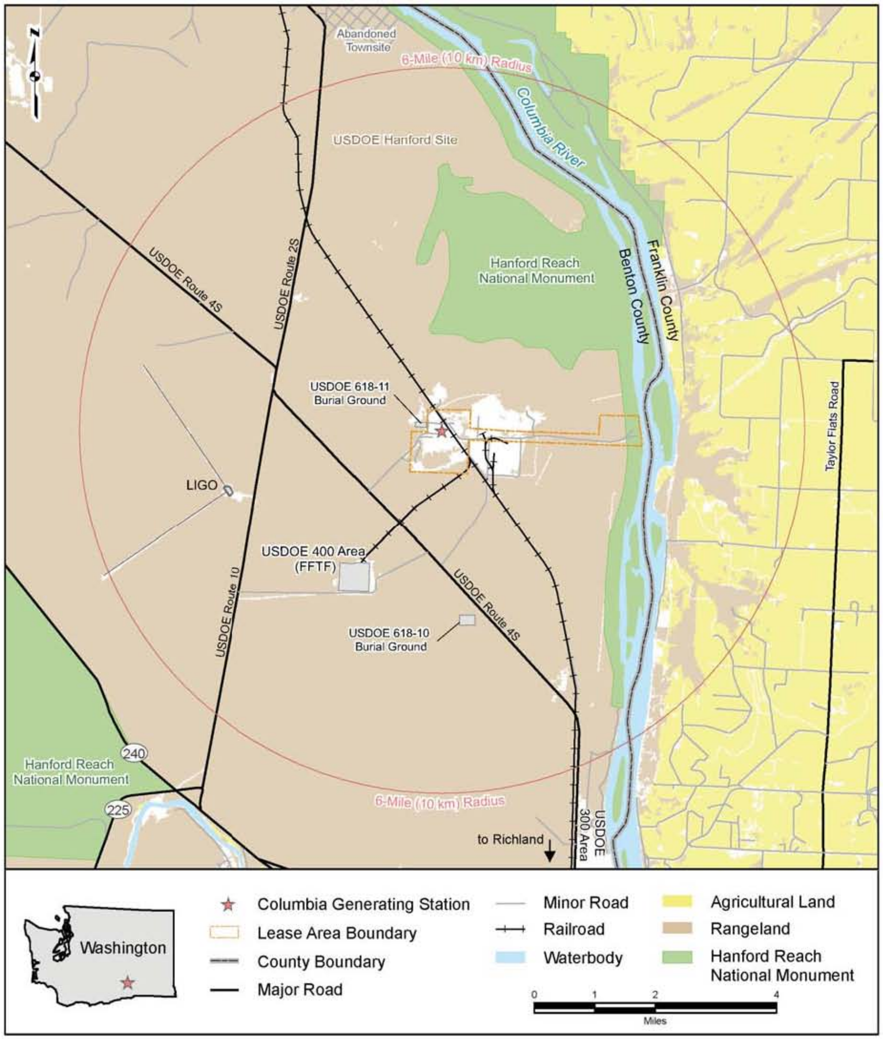
EFSEC Manager
Energy Facility Site Evaluation Council
P.O. Box 43172
Olympia, WA 98504-3172

Mr. W.S. Oxenford, Senior Vice President,
Generation and Chief Nuclear Officer
Columbia Generating Station
Energy Northwest
MD PE08
P.O. Box 968
Richland, WA 99352

Area Map, 50-Mile Radius

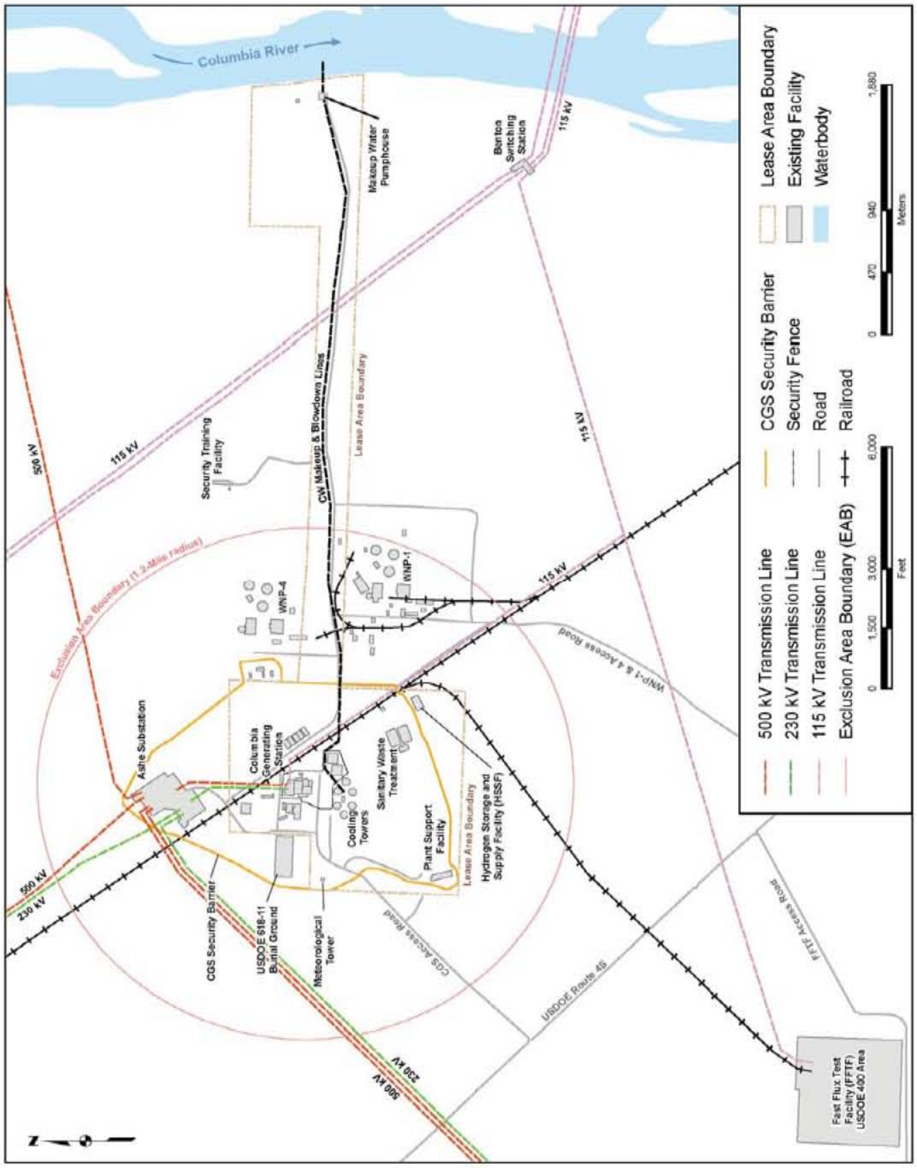
ENCLOSURE 1

Area Map, 6-Mile Radius



ENCLOSURE 2

Site Area Map



ENCLOSURE 3

From:	Doyle, Daniel
Sent:	Friday, November 05, 2010 3:11 PM
To:	Gregg Kurz (gregg_kurz@fws.gov)
Subject:	NRC - Columbia Generating Station license renewal
Attachments:	CGS scoping letter to FWS ML100710046.pdf; BentonCounty092910.pdf

Dear Mr. Kurz,

This e-mail is a follow-up to my telephone call on Tuesday, November 2, 2010. As I explained in the call, I am the project manager for the U.S. Nuclear Regulatory Commission's environmental review of the Columbia Generating Station license renewal application. I am following up on the attached letter dated March 22, 2010, that was sent to Ms. Robyn Thorson, Regional Director, U.S. Fish and Wildlife Service, Pacific Region, requesting a list of Federally protected species for this review. This letter was submitted under the provisions of the Endangered Species Act and the Fish and Wildlife Coordination Act.

To support preparation of a draft supplemental EIS and to ensure compliance with Section 7 of the Endangered Species Act, the NRC requests concurrence on the below list of Federally threatened, endangered, proposed, and candidate species that may be in the vicinity of the Columbia Generating Station site and its associated transmission line rights-of-way (as described in the attached letter to Ms. Thorson). If there are any species that your office would like us to address in addition to the Federally listed, proposed, and candidate species shown below, please let me know. The NRC also requests any additional information on protected species and critical habitat that may be in the vicinity of the Columbia Generating Station site if such information is available. In addition, please provide any information you consider appropriate under the provisions of the Fish and Wildlife Coordination Act.

The NRC reviewed the attached list of species and habitat in Benton County (revised September 29, 2010) from: http://www.fws.gov/wafwo/pdf/BentonCounty092910.pdf.

LISTED
Bull trout (*Salvelinus confluentus*)
Pygmy rabbit (*Brachylagus idahoensis*)
Ute ladies'-tresses (*Spiranthes diluvialis*)

DESIGNATED
Critical habitat for bull trout

PROPOSED
Revised bull trout critical habitat

CANDIDATE
Greater sage grouse (*Centrocercus urophasianus*)
Yellow-billed cuckoo (*Coccyzus americanus*)
Umtanum desert buckwheat (*Eriogonum codium*)
*White Bluffs bladderpod (*Lesquerella tuplashensis*)
*Louie's western pocket gopher (*Thomomys mazama louiei*)
*Tacoma western pocket gopher (*Thomomys mazama tacomensis*)
* obtained from http://www.fws.gov/endangered

The NRC is also in consultation with the National Marine Fisheries Service regarding this project. We are currently planning on doing a single document that contains the biological assessment on the bull trout (for U.S. Fish and Wildlife Service review), the biological assessment on the Chinook salmon and steelhead (for National Marine Fisheries Service review) and the Essential Fish Habitat (for National Marine Fisheries Service review).

A copy of the draft supplemental EIS containing the NRC staff's analysis and preliminary conclusions will be sent to your office when it is published for your review.

If you have any questions concerning the NRC staff review of this license renewal application, please feel free to contact me.

Sincerely,

Daniel Doyle

Project Manager
Division of License Renewal
U.S. Nuclear Regulatory Commission
daniel.doyle@nrc.gov
(301) 415-3748

E-mail Properties

Mail Envelope Properties ()

Subject: NRC - Columbia Generating Station license renewal
Sent Date: 11/5/2010 2:57:08 PM
Received Date: 11/5/2010 3:10:00 PM
From: Doyle, Daniel

Created By: Daniel.Doyle@nrc.gov

Recipients:
gregg_kurz@fws.gov (Gregg Kurz (gregg_kurz@fws.gov))
Tracking Status: None

Post Office:

Files	Size	Date & Time
MESSAGE	2872305	11/5/2010
CGS scoping letter to FWS ML100710046.pdf	2837935	
BentonCounty092910.pdf	19422	

Options
Expiration Date:

Priority: olImportanceNormal
ReplyRequested: False
Return Notification: False

Sensitivity: olNormal
Recipients received:

From: Gregg_Kurz@fws.gov
Sent: Monday, November 08, 2010 1:12 PM
To: Doyle, Daniel
Subject: Re: NRC - Columbia Generating Station license renewal
Attachments: pic31111.gif

Follow Up Flag: Follow up
Flag Status: Completed

Categories: CGS

Mr. Doyle,

Thank you for forwarding the information regarding this project. The species list you obtained from our website is accurate. Please note that the revised bull trout critical habitat designation currently on the list as Proposed will become Designated on November 17, 2010.

Preparation of a biological assessment for this project should include an analysis of potential effects to all species listed as Endangered or Threatened and to any designated or proposed critical habitat. Information regarding the presence of these species and habitats can be obtained from the Washington Natural Heritage Program at
http://www1.dnr.wa.gov/nhp/refdesk/index.html

We look forward to working with you.

Gregg L. Kurz
Fish and Wildlife Biologist
Central Washington Field Office
Wenatchee, WA 98801
Phone: (509) 665-3508 extension 22
E-mail: Gregg_Kurz@fws.gov
"Doyle, Daniel" <Daniel.Doyle@nrc.gov>

"Doyle, Daniel"
<Daniel.Doyle@nrc.gov>

11/05/2010 12:10 PM

To "Gregg Kurz (gregg_kurz@fws.gov)" <gregg_kurz@fws.gov>

cc

Subject NRC - Columbia Generating Station license renewal

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*Tacoma western pocket gopher (*Thomomys mazama tacomensis*)
* obtained from http://www.fws.gov/endangered

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If you have any questions concerning the NRC staff review of this license renewal application, please feel free to contact me.

Sincerely,

Daniel Doyle

Project Manager
Division of License Renewal
U.S. Nuclear Regulatory Commission
daniel.doyle@nrc.gov
(301) 415-3748
[attachment "CGS scoping letter to FWS ML100710046.pdf" deleted by Gregg Kurz/WNES/R1/FWS/DOI] [attachment "BentonCounty092910.pdf" deleted by Gregg Kurz/WNES/R1/FWS/DOI]

From: Doyle, Daniel
Sent: Wednesday, June 15, 2011 7:39 PM
To: 'Gregg_Kurz@fws.gov'
Subject: RE: NRC - Columbia Generating Station license renewal

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: CGS

Mr. Kurz,

Thanks for your time on the phone today. As we discussed, I am contacting you regarding the NRC's review of the Columbia Generating Station license renewal environmental review. I would like to confirm the accuracy of the list of species and habitats in the e-mail below.

We expect to publish our draft environmental impact statement in August 2011. The combined BA/EFH assessment will be included as an appendix to that document. The assessment will contain the NRC staff's analysis of the potential impact to those species and habitats by the license renewal of Columbia Generating Station (detailed analysis for bull trout critical habitat).

This website contains more information about the NRC's review of the Columbia Generating Station license renewal application:
http://www.nrc.gov/reactors/operating/licensing/renewal/applications/columbia.html

If you have any questions about this review, please feel free to contact me or the lead aquatic reviewer, Rebekah Krieg (509-371-7155 or Rebekah.krieg@pnl.gov).

Sincerely,

Dan Doyle

Project Manager
Division of License Renewal
U.S. Nuclear Regulatory Commission
daniel.doyle@nrc.gov
(301) 415-3748

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Sent: Monday, November 08, 2010 1:12 PM
To: Doyle, Daniel
Subject: Re: NRC - Columbia Generating Station license renewal

Mr. Doyle,

Thank you for forwarding the information regarding this project. The species list you obtained from our website is accurate. Please note that the revised bull trout critical habitat designation currently on the list as Proposed will become Designated on November 17, 2010.

Preparation of a biological assessment for this project should include an analysis of potential effects to all species listed as Endangered or Threatened and to any designated or proposed critical habitat. Information regarding the presence of these species and habitats can be obtained from the Washington Natural Heritage Program at http://www1.dnr.wa.gov/nhp/refdesk/index.html

We look forward to working with you.

Gregg L. Kurz
Fish and Wildlife Biologist
Central Washington Field Office
Wenatchee, WA 98801
Phone: (509) 665-3508 extension 22
E-mail: Gregg_Kurz@fws.gov
"Doyle, Daniel" <Daniel.Doyle@nrc.gov>

"Doyle, Daniel" <Daniel.Doyle@nrc.gov>

11/05/2010 12:10 PM

To "Gregg Kurz (gregg_kurz@fws.gov)" <gregg_kurz@fws.gov>

cc

Subject NRC - Columbia Generating Station license renewal

Dear Mr. Kurz,

This e-mail is a follow-up to my telephone call on Tuesday, November 2, 2010. As I explained in the call, I am the project manager for the U.S. Nuclear Regulatory Commission's environmental review of the Columbia Generating Station license renewal application. I am following up on the attached letter dated March 22, 2010, that was sent to Ms. Robyn Thorson, Regional Director, U.S. Fish and Wildlife Service, Pacific Region, requesting a list of Federally protected species for this review. This letter was submitted under the provisions of the Endangered Species Act and the Fish and Wildlife Coordination Act.

To support preparation of a draft supplemental EIS and to ensure compliance with Section 7 of the Endangered Species Act, the NRC requests concurrence on the below list of Federally threatened, endangered, proposed, and candidate species that may be in the vicinity of the Columbia Generating Station site and its associated transmission line rights-of-way (as described in the attached letter to Ms. Thorson). If there are any species that your office would like us to address in addition to the Federally listed, proposed, and candidate species shown below, please let me know. The NRC also requests any additional information on protected species and critical habitat that may be in the vicinity of the Columbia Generating Station site if such information is available. In addition, please provide any information you consider appropriate under the provisions of the Fish and Wildlife Coordination Act.

The NRC reviewed the attached list of species and habitat in Benton County (revised September 29, 2010) from: http://www.fws.gov/wafwo/pdf/BentonCounty092910.pdf.

LISTED
Bull trout (*Salvelinus confluentus*)
Pygmy rabbit (*Brachylagus idahoensis*)
Ute ladies'-tresses (*Spiranthes diluvialis*)

DESIGNATED
Critical habitat for bull trout

PROPOSED
Revised bull trout critical habitat

CANDIDATE
Greater sage grouse (*Centrocercus urophasianus*)
Yellow-billed cuckoo (*Coccyzus americanus*)
Umtanum desert buckwheat (*Eriogonum codium*)
*White Bluffs bladderpod (*Lesquerella tuplashensis*)
*Louie's western pocket gopher (*Thomomys mazama louiei*)
*Tacoma western pocket gopher (*Thomomys mazama tacomensis*)
* obtained from http://www.fws.gov/endangered

The NRC is also in consultation with the National Marine Fisheries Service regarding this project. We are currently planning on doing a single document that contains the biological assessment on the bull trout (for U.S. Fish and Wildlife Service review), the biological assessment on the Chinook salmon and steelhead (for National Marine Fisheries Service review) and the Essential Fish Habitat (for National Marine Fisheries Service review).

A copy of the draft supplemental EIS containing the NRC staff's analysis and preliminary conclusions will be sent to your office when it is published for your review.

If you have any questions concerning the NRC staff review of this license renewal application, please feel free to contact me.

Sincerely,

Daniel Doyle

Project Manager
Division of License Renewal
U.S. Nuclear Regulatory Commission

daniel.doyle@nrc.gov
(301) 415-3748
[attachment "CGS scoping letter to FWS ML100710046.pdf" deleted by Gregg Kurz/WNES/R1/FWS/DOI] [attachment "BentonCounty092910.pdf" deleted by Gregg Kurz/WNES/R1/FWS/DOI]

From: Gregg_Kurz@fws.gov
Sent: Thursday, June 16, 2011 6:36 PM
To: Doyle, Daniel
Subject: RE: NRC - Columbia Generating Station license renewal
Attachments: pic16858.gif

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: CGS

Dan,

There has been an update to the species list since your list was obtained. Your list contains revised critical habitat for the bull trout as being proposed. The proposed revised critical habitat is now **designated** critical habitat for the bull trout. As I stated on our call, this should not result in any changes to your analysis since you have addressed the potential effects to revised critical habitat.

Gregg

Gregg L. Kurz
Fish and Wildlife Biologist
Central Washington Field Office
Wenatchee, WA 98801
Phone: (509) 665-3508 extension 22
E-mail: Gregg_Kurz@fws.gov
"Doyle, Daniel" <Daniel.Doyle@nrc.gov>

"Doyle, Daniel"
<Daniel.Doyle@nrc.gov>

06/15/2011 04:39 PM

To "Gregg_Kurz@fws.gov" <Gregg_Kurz@fws.gov>

cc

Subject RE: NRC - Columbia Generating Station license renewal

Mr. Kurz,

Thanks for your time on the phone today. As we discussed, I am contacting you regarding the NRC's review of the Columbia Generating Station license renewal environmental review. I would like to confirm the accuracy of the list of species and habitats in the e-mail below.

We expect to publish our draft environmental impact statement in August 2011. The combined BA/EFH assessment will be included as an appendix to that document. The assessment will contain the NRC staff's analysis of the potential impact to those species and habitats by the license renewal of Columbia Generating Station (detailed analysis for bull trout critical habitat).

This website contains more information about the NRC's review of the Columbia Generating Station license renewal application:
http://www.nrc.gov/reactors/operating/licensing/renewal/applications/columbia.html

If you have any questions about this review, please feel free to contact me or the lead aquatic reviewer, Rebekah Krieg (509-371-7155 or Rebekah.krieg@pnl.gov).

Sincerely,

Dan Doyle

Project Manager
Division of License Renewal
U.S. Nuclear Regulatory Commission
daniel.doyle@nrc.gov
(301) 415-3748

From: Gregg_Kurz@fws.gov [mailto:Gregg_Kurz@fws.gov]
Sent: Monday, November 08, 2010 1:12 PM
To: Doyle, Daniel
Subject: Re: NRC - Columbia Generating Station license renewal

Mr. Doyle,

Thank you for forwarding the information regarding this project. The species list you obtained from our website is accurate. Please note that the revised bull trout critical habitat designation currently on the list as Proposed will become Designated on November 17, 2010.

Preparation of a biological assessment for this project should include an analysis of potential effects to all species listed as Endangered or Threatened and to any designated or proposed critical habitat. Information regarding the presence of these species and habitats can be obtained from the Washington Natural Heritage Program at http://www1.dnr.wa.gov/nhp/refdesk/index.html

We look forward to working with you.

____

Gregg L. Kurz

Fish and Wildlife Biologist
Central Washington Field Office
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"Doyle, Daniel" <Daniel.Doyle@nrc.gov>

"Doyle, Daniel" <Daniel.Doyle@nrc.gov>
11/05/2010 12:10 PM

To "Gregg Kurz (gregg_kurz@fws.gov)" <gregg_kurz@fws.gov>
cc
Subject NRC - Columbia Generating Station license renewal

Dear Mr. Kurz,

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To support preparation of a draft supplemental EIS and to ensure compliance with Section 7 of the Endangered Species Act, the NRC requests concurrence on the below list of Federally threatened, endangered, proposed, and candidate species that may be in the vicinity of the Columbia Generating Station site and its associated transmission line rights-of-way (as described in the attached letter to Ms. Thorson). If there are any species that your office would like us to address in addition to the Federally listed, proposed, and candidate species shown below, please let me know. The NRC also requests any additional information on protected species and critical habitat that may be in the vicinity of the Columbia Generating Station site if such information is available. In addition, please provide any information you consider appropriate under the provisions of the Fish and Wildlife Coordination Act.

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Yellow-billed cuckoo (*Coccyzus americanus*)
Umtanum desert buckwheat (*Eriogonum codium*)
*White Bluffs bladderpod (*Lesquerella tuplashensis*)
*Louie's western pocket gopher (*Thomomys mazama louiei*)
*Tacoma western pocket gopher (*Thomomys mazama tacomensis*)
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The NRC is also in consultation with the National Marine Fisheries Service regarding this project. We are currently planning on doing a single document that contains the biological assessment on the bull trout (for U.S. Fish and Wildlife Service review), the biological assessment on the Chinook salmon and steelhead (for National Marine Fisheries Service review) and the Essential Fish Habitat (for National Marine Fisheries Service review).

A copy of the draft supplemental EIS containing the NRC staff's analysis and preliminary conclusions will be sent to your office when it is published for your review.

If you have any questions concerning the NRC staff review of this license renewal application, please feel free to contact me.

Sincerely,

Daniel Doyle

Project Manager
Division of License Renewal
U.S. Nuclear Regulatory Commission
daniel.doyle@nrc.gov
(301) 415-3748
[attachment "CGS scoping letter to FWS ML100710046.pdf" deleted by Gregg Kurz/WNES/R1/FWS/DOI] [attachment "BentonCounty092910.pdf" deleted by Gregg Kurz/WNES/R1/FWS/DOI]

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 23, 2011

Ms. Robyn Thorson, Regional Director
U.S. Fish and Wildlife Service
Pacific Region
911 NE 11th Ave
Portland, OR 97232

SUBJECT: BIOLOGICAL ASSESSMENT FOR INFORMAL SECTION 7 CONSULTATION RELATED TO THE LICENSE RENEWAL OF COLUMBIA GENERATING STATION

Dear Ms. Thorson:

The U.S. Nuclear Regulatory Commission (NRC) staff has completed the enclosed draft Supplement 47 to NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," to evaluate the proposed renewal of the Columbia Generating Station (CGS) operating license for a period of an additional 20 years. In accordance with the Endangered Species Act of 1973, as amended, the NRC's biological assessment for license renewal of CGS is included in Appendix D-1 of the enclosed draft supplemental environmental impact statement.

CGS is located in Benton County, Washington, 12.5 miles northwest of Richland. CGS is equipped with a closed-cycle heat dissipation system that withdraws makeup water from, and discharges that water to, the Columbia River from six mechanical draft cooling towers. The plant is operated by Energy Northwest.

In a letter dated March 22, 2010[1], the NRC requested that your office of the U.S. Fish and Wildlife Service (FWS) provide the NRC with information on Federally listed endangered or threatened, proposed, and candidate species, as well as any designated critical habitat that may be in the vicinity of CGS and its associated transmission line rights-of-way. This letter initiated informal section 7 consultation under the Endangered Species Act of 1973, as amended. The FWS responded in an e-mail dated November 8, 2010[2], and identified a single aquatic species—the bull trout (*Salvelinus confluentus*)—under its jurisdiction that is Federally listed as threatened and has been reported in the Hanford Reach in the vicinity of the CGS facility. Further, the FWS indicated that critical habitat for the bull trout occurred within the action area, as previously defined. Because the NRC did not prepare its biological assessment within the 180-day timeframe specified at Title 50 of the *Code of Federal Regulations* (50 CFR) 402.12(i), the NRC confirmed the accuracy of the species list in an e-mail to FWS on June 15, 2011. The FWS responded on June 16, 2011, confirming that the bull trout was the only listed species in the area under the NRC's review.

---

[1] [NRC] U.S. Nuclear Regulatory Commission. 2010. Letter from Pham B, Branch Chief, to Thorson R, Pacific Regional Director, FWS. Subject: Request for list of species for Columbia Generating Station license renewal application review. March 22, 2010. ADAMS No. ML100710046.
[2] [FWS] U.S. Fish and Wildlife Service. 2010. E-mail from Kurz GL, Fish and Wildlife Biologist, to Doyle D, Project Manager, NRC. Subject: Columbia Generating Station license renewal. November 8, 2010. ADAMS No. ML103120486.

The NRC's biological assessment provides an evaluation of the potential impact of renewing the CGS operating license for an additional 20 years of operation on the bull trout and its critical habitat. In the biological assessment, the NRC concludes that continued operation of CGS will have **no effect** on the bull trout.

The other species from the list potentially occurring in the vicinity of the plant are addressed in Section 2.2.7.1 (page 2-44), and Section 4.7.2 (page 4-10).

We are requesting your concurrence with our determination within 30 days per 50 CFR 402.12(j). In reaching our conclusion, the NRC staff relied on information provided by your office, information provided by the applicant, and on research performed by NRC staff. Please note that the comment period ends on November 16, 2011. If you have any questions regarding this issue or the staff's request, please contact Daniel Doyle, environmental project manager, or Dennis Logan, aquatic biologist. Mr. Doyle can be reached at 301-415-3748 or Daniel.Doyle@nrc.gov. Mr. Logan can be reached at 301-415-0490 or Dennis.Logan@nrc.gov.

Sincerely,

David J. Wrona, Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-397

Enclosure:
As stated

cc w/encl: Listserv

[7590-01-P]

NUCLEAR REGULATORY COMMISSION

ENERGY NORTHWEST

COLUMBIA GENERATING STATION

DOCKET NUMBER 50-397

NOTICE OF AVAILABILITY OF DRAFT SUPPLEMENT 47 TO THE GENERIC ENVIRONMENTAL IMPACT STATEMENT FOR LICENSE RENEWAL OF NUCLEAR PLANTS AND PUBLIC MEETINGS FOR THE LICENSE RENEWAL OF COLUMBIA GENERATING STATION

[NRC-2010-0029]

Notice is hereby given that the U.S. Nuclear Regulatory Commission (NRC) has published a draft plant-specific supplement to the Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS), NUREG-1437, regarding the renewal of operating license NPF-21 for an additional 20 years of operation for Columbia Generating Station. Columbia Generating Station is located in Richland, Washington. Possible alternatives to the proposed action (license renewal) include no action and reasonable alternative energy sources.

Any interested party may submit comments on the draft supplement to the GEIS for consideration by the NRC staff. To be considered, comments on the draft supplement to the GEIS and the proposed action must be received by November 16, 2011. The NRC staff is able to ensure consideration only for comments received on or before this date.

ADDRESSES: You may submit comments by any one of the following methods. Please include Docket ID **NRC-2010-0029** in the subject line of your comments. Comments submitted in writing or in electronic form will be posted on the NRC website and on the Federal rulemaking website http://www.regulations.gov. Because your comments will not be edited to remove any identifying or contact information, the NRC cautions you against including any information in your submission that you do not want to be publicly disclosed.

The NRC requests that any party soliciting or aggregating comments received from other persons for submission to the NRC inform those persons that the NRC will not edit their comments to remove any identifying or contact information, and, therefore, they should not include any information in their comments that they do not want publicly disclosed.

Federal Rulemaking Website: Go to http://www.regulations.gov and search for documents filed under Docket ID **NRC-2010-0029**. Address questions about NRC dockets to Carol Gallagher at 301-492-3668 or by e-mail at Carol.Gallagher@nrc.gov.

Mail comments to: Cindy Bladey, Chief, Rules, Announcements, and Directives Branch (RADB), Division of Administrative Services, Office of Administration, Mail Stop: TWB-05-B01M, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001. Faxes may be sent to RADB at 301-492-3446.

You can access publicly available documents related to this notice using the following methods:

NRC's Public Document Room (PDR): The public may examine and have copied, for a fee, publicly available documents at the NRC's PDR, Public File Area O-1F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852.

NRC's Agencywide Documents Access and Management System (ADAMS): Publicly available documents created or received at the NRC are available electronically at the NRC's Electronic Reading Room at http://www.nrc.gov/reading-rm/adams.html. From this website, the public can gain entry into ADAMS, which provides text and image files of NRC's public documents. If you do not have access to ADAMS or if there are problems in accessing the documents located in ADAMS, contact the NRC's PDR reference staff at 1-800-397-4209, 301-415-4737, or by e-mail at pdr.resource@nrc.gov. The Accession Number for draft Supplement 47 to the GEIS is ML11227A007.

Federal Rulemaking Website: Public comments and supporting materials related to this notice can be found at http://www.regulations.gov by searching for Docket ID **NRC-2010-0029**.

In addition, a copy of the draft supplement to the GEIS is available to local residents near the site at the Richland Public Library, 955 Northgate Drive, Richland, Washington 99352 and at the Kennewick Branch of Mid-Columbia Libraries, 1620 South Union Street, Kennewick, Washington 99338.

All comments received by the NRC, including those made by Federal, State, and local agencies; Native American Tribes; or other interested persons, will be made available electronically at the NRC's PDR in Rockville, Maryland, and through ADAMS. Comments received after the due date will be considered only if it is practical to do so.

The NRC staff will hold public meetings prior to the close of the public comment period to present an overview of the draft plant-specific supplement to the GEIS and to accept public comments on the document. Two meetings will be held at the Red Lion Hotel, 802 George Washington Way, Richland, Washington, on Tuesday, September 27, 2011. The first session will convene at 2:00 p.m. and will continue until 5:00 p.m., as necessary. The second session will convene at 7:00 p.m. and will continue until 10:00 p.m., as necessary. The meetings will be transcribed and will include: (1) a presentation of the contents of the draft plant-specific supplement to the GEIS and (2) the opportunity for interested government agencies, organizations, and individuals to provide comments on the draft report. Additionally, the NRC staff will host informal discussions one hour prior to the start of each session at the same location. No comments on the draft supplement to the GEIS will be accepted during the informal discussions. To be considered, comments must be provided either at the transcribed public meeting or in writing. Persons may pre-register to attend or present oral comments at the meeting by contacting Mr. Daniel Doyle, the NRC Environmental Project Manager, at 1-800-368-5642, extension 3748, or by e-mail at Daniel.Doyle@nrc.gov no later than Friday, September 23, 2011. Members of the public may also register to provide oral comments within 15 minutes of the start of each session. Individual oral comments may be limited by the time available, depending on the number of persons who register. If special equipment or accommodations are needed to attend or present information at the public meeting, the need should be brought to Mr. Doyle's attention no later than September 23, 2011, to provide the NRC staff adequate notice to determine whether the request can be accommodated.

FOR FURTHER INFORMATION, CONTACT: Mr. Daniel Doyle, Division of License Renewal, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Mail Stop O-11F1, Washington, DC 20555-0001. Mr. Doyle may be contacted at the aforementioned telephone number or e-mail address.

Dated at Rockville, Maryland, this 23rd day of August 2011.

FOR THE NUCLEAR REGULATORY COMMISSION

David J. Wrona, Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

The NRC's biological assessment provides an evaluation of the potential impact of renewing the CGS operating license for an additional 20 years of operation on the bull trout and its critical habitat. In the biological assessment, the NRC concludes that continued operation of CGS will have **no effect** on the bull trout.

The other species from the list potentially occurring in the vicinity of the plant are addressed in Section 2.2.7.1 (page 2-44), and Section 4.7.2 (page 4-10).

We are requesting your concurrence with our determination within 30 days per 50 CFR 402.12(j). In reaching our conclusion, the NRC staff relied on information provided by your office, information provided by the applicant, and on research performed by NRC staff. Please note that the comment period ends on November 16, 2011. If you have any questions regarding this issue or the staff's request, please contact Daniel Doyle, environmental project manager, or Dennis Logan, aquatic biologist. Mr. Doyle can be reached at 301-415-3748 or Daniel.Doyle@nrc.gov. Mr. Logan can be reached at 301-415-0490 or Dennis.Logan@nrc.gov.

Sincerely,

/RA/

David J. Wrona, Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-397

Enclosure:
As stated

cc w/encl: Listserv

DISTRIBUTION:
See next page

ADAMS Accession Nos.:
Package: ML11161A002
Letter: ML11161A003
FRN: ML11091A028
GEIS for License Renewal of Nuclear Plants, Supplement 47: ML11227A007

*concurrence via email

OFFICE	LA: DLR*	PM:DLR/RPB1	GS:DLR/RERB	GS:DLR/RERB	OGC	BC:DLR/RPB2
NAME	IKing	DDoyle	ATravers	DLogan (BBalsam for)	LSubin	DWrona
DATE	06/14/2011	06/17/2011	06/21/2011	06/29/2011	07/12/2011	08/23/2011

OFFICIAL RECORD COPY

Letter to Robyn Thorson from David J. Wrona dated August 23, 2011

SUBJECT: BIOLOGICAL ASSESSMENT FOR INFORMAL SECTION 7 CONSULTATION RELATED TO THE LICENSE RENEWAL OF COLUMBIA GENERATING STATION

DISTRIBUTION:

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RidsNrrDlrRapb Resource
RidsNrrDlrRerb Resource
RidsNrrDlrRpob Resource
RidsOgcMailCenter Resource

ACunanan
MThadani
ICouret, OPA
NOKeefe, RIV
GPick, RIV
WWalker, RIV
RCohen, RIV
MHayes, RIV
BMaier, RIV
VDricks, RIV

Biological Assessment and Essential Fish Habitat Assessment

Columbia Generating Station License Renewal

August 2011

Docket Number 50-397

U.S. Nuclear Regulatory Commission

Rockville, Maryland

TABLE OF CONTENTS

Figures

Tables

ABBREVIATIONS, ACRONYMS, AND SYMBOLS

°C	degrees Celsius
°F	degrees Fahrenheit
ac	acre(s)
ADAMS	Agencywide Document Access and Management System
BA	Biological Assessment
BPA	Bonneville Power Administration
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGS	Columbia Generating Station
CHU	critical habitat unit
cm	centimeter(s)
DO	dissolved oxygen
DOE	Department of Energy
DPS	distinct population segment
EFH	Essential Fish Habitat
EN	Energy Northwest
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FCRPS	Federal Columbia River Power System
fm	fathom(s)
FMO	foraging, migration, and overwintering
fps	feet per second
FR	Federal Register
ft	foot(feet)
ft^3/s	cubic feet per second
GEIS	Generic Environmental Impact Statement
gpm	gallons per minute
ha	hectare(s)
in.	inch(es)

kg	kilogram(s)
km	kilometer(s)
km^2	square kilometer(s)
lb	pound(s)
m	meter(s)
m/s	meter(s) per second
m^3/s	cubic meter(s) per second
mg/L	milligram(s) per liter
mi	mile(s)
mi^2	square mile(s)
mm	millimeter
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSL	mean sea level
NEPA	U.S. National Environmental Policy Act of 1969
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRC	U.S. Nuclear Regulatory Commission
RM	river mile(s)
s	second(s)
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WPPSS	Washington Public Power Supply System
WSDOT	Washington State Department of Transportation

D-1 BIOLOGICAL ASSESSMENT AND ESSENTIAL FISH HABITAT ASSESSMENT FOR THE PROPOSED LICENSE RENEWAL FOR THE COLUMBIA GENERATING STATION

D-1.1 Introduction

The purpose of this Biological Assessment (BA)/Essential Fish Habitat (EFH) Assessment is to address the effect of the renewing the operating license of Columbia Generating Station (CGS) on endangered or threatened species—under the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1536(a)-(d))—or their designated critical habitat. It also addresses the EFH for designated fish species. The U.S. Nuclear Regulatory Commission (NRC) prepared this joint BA/EFH Assessment to support the draft supplemental environmental impact statement for the renewal of the operating license for CGS, which is operated by Energy Northwest, under the NRC's regulations in Title 10 of the *Code of Federal Regulations* (CFR) Parts 50 and 51.

Under Section 7 of the ESA of 1973, the NRC must consult with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS), as appropriate, to provide information on the potential impact that the operation of CGS could have on the Federally-listed species near the site. Adherence to the practices set forth in Section 7 ensures that, through consultation with the Service, Federal actions do not jeopardize the continued existence of any threatened, endangered, or proposed species or result in the destruction or adverse modification of critical habitat.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996, requires Federal agencies to consult with NMFS on activities that may adversely affect EFH. The objective of an EFH Assessment is to determine if the proposed action(s) "may adversely affect" designated EFH for relevant commercially, Federally-managed fisheries species within the proposed action area. It also describes any proposed conservation measures to avoid, minimize, or otherwise offset potential adverse effects on designated EFH resulting from the proposed action.

This combined BA/EFH Assessment, as prepared by the NRC, examines the potential impacts of the proposed action on the Federally-listed aquatic species within the NMFS and USFWS jurisdiction as well as the designated and revised critical habitat and the EFH.

D-1.2 Description of the Proposed Action

Energy Northwest initiated the proposed Federal action by submitting an application for license renewal for CGS. The existing license for CGS expires on December 20, 2023. The NRC's Federal action is the decision whether or not to renew the license for an additional 20 years.

The purpose and need for the proposed action (issuance of a renewed license) is to provide an option that allows for power generation capability beyond the term of the current nuclear power plant operating license to meet future system generating needs. Such needs may be determined by other energy-planning decisionmakers, such as State, utility, and, where authorized, Federal agencies (other than NRC). This definition of purpose and need reflects the NRC's recognition that—unless there are findings in the safety review required by the Atomic Energy Act or findings in the National Environmental Policy Act of 1969 (NEPA) environmental analysis that would lead the NRC to reject a license renewal application—the NRC does not have a role in the energy-planning decisions of State regulators and utility officials as to whether a particular nuclear power plant should continue to operate.

If the renewed license is issued, State regulatory agencies and Energy Northwest will ultimately decide if the plant will continue to operate based on factors such as the need for power or other matters within the State's jurisdiction or the purview of the owners. If the operating license is not renewed, then the facility must be shut down on or before the expiration date of the current operating license—December 20, 2023.

Energy Northwest has indicated it does not plan to conduct refurbishment activities, although routine plant operation and maintenance activities will continue during the license renewal period (EN, 2010). Routine plant operations and maintenance do not include any dredging or in-water equipment replacement or activities.

D-1.2.1 Site Location and Description

CGS is located in south-central Washington State in Benton County. The CGS site is located within the Hanford Site on land leased from the U.S. Department of Energy (DOE). The Columbia River bounds the CGS site on the east side. Figure D-1-1 and Figure D-1-2 provide maps of the 50-mile (mi) (80-kilometer (km)) and 6-mi (10-km) vicinities, respectively. The nearest population center is the Tri-Cities, which includes the cities of Richland, Kennewick, and Pasco. The nearest city is located approximately 15 mi (24 km) southeast of the site. The nearest residence is 4.25 mi (6.8 km) from CGS in an east-southeasterly direction across the Columbia River. There is one Native American reservation within a 50-mi (80-km) radius of CGS—the Yakama Reservation to the west.

CGS is a single unit nuclear power plant that began commercial operation in December 1984. The CGS site boundary encloses approximately 1,089 acres (ac) (441 hectares (ha)) leased to Energy Northwest by the DOE. The most conspicuous structures on the CGS site include the reactor containment building, the turbine building, six cooling towers, and various auxiliary support buildings (EN, 2010). Figure D-1-3 provides a general layout of the CGS site.

Figure D-1-1. Location of CGS, 50-mi (80-km) region

Source: (EN, 2010a)

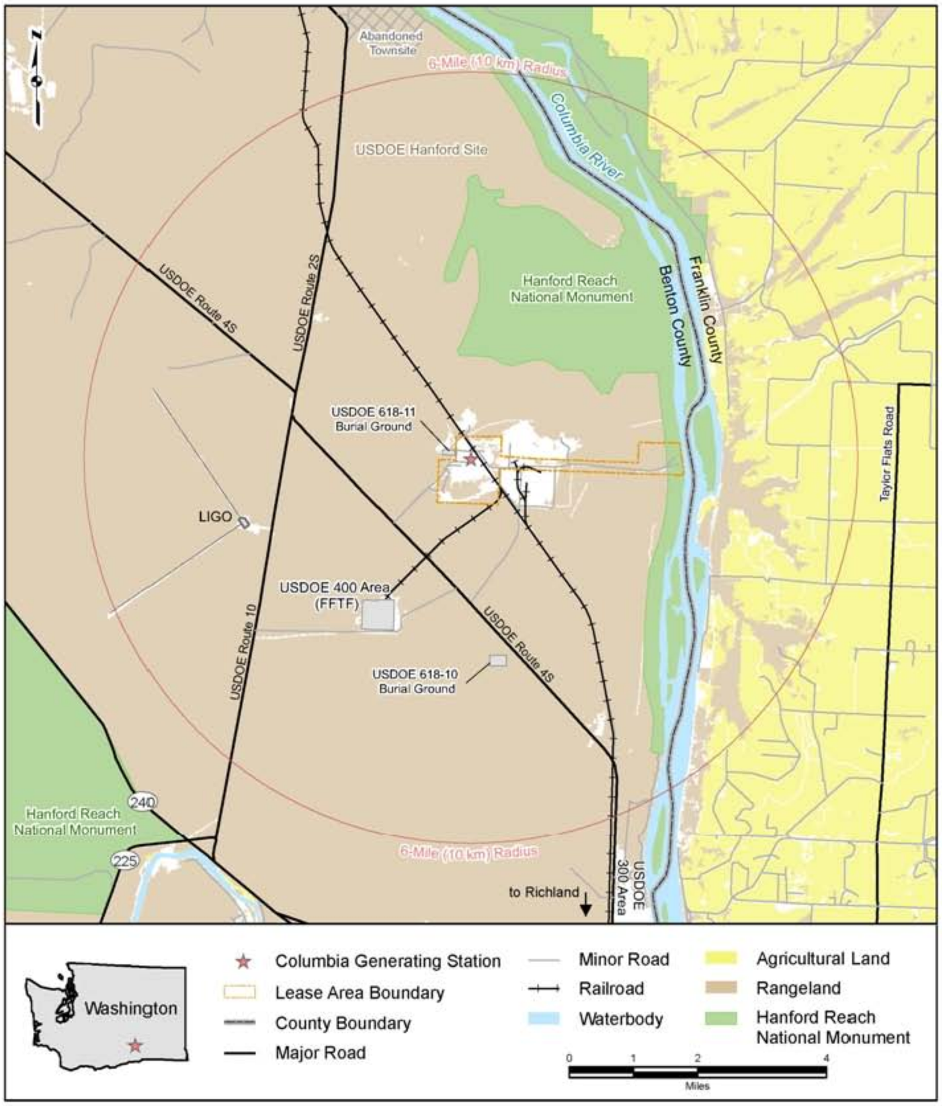

Figure D-1-2. Location of CGS, 6-mi (10-km) region

Source: (EN, 2010a)

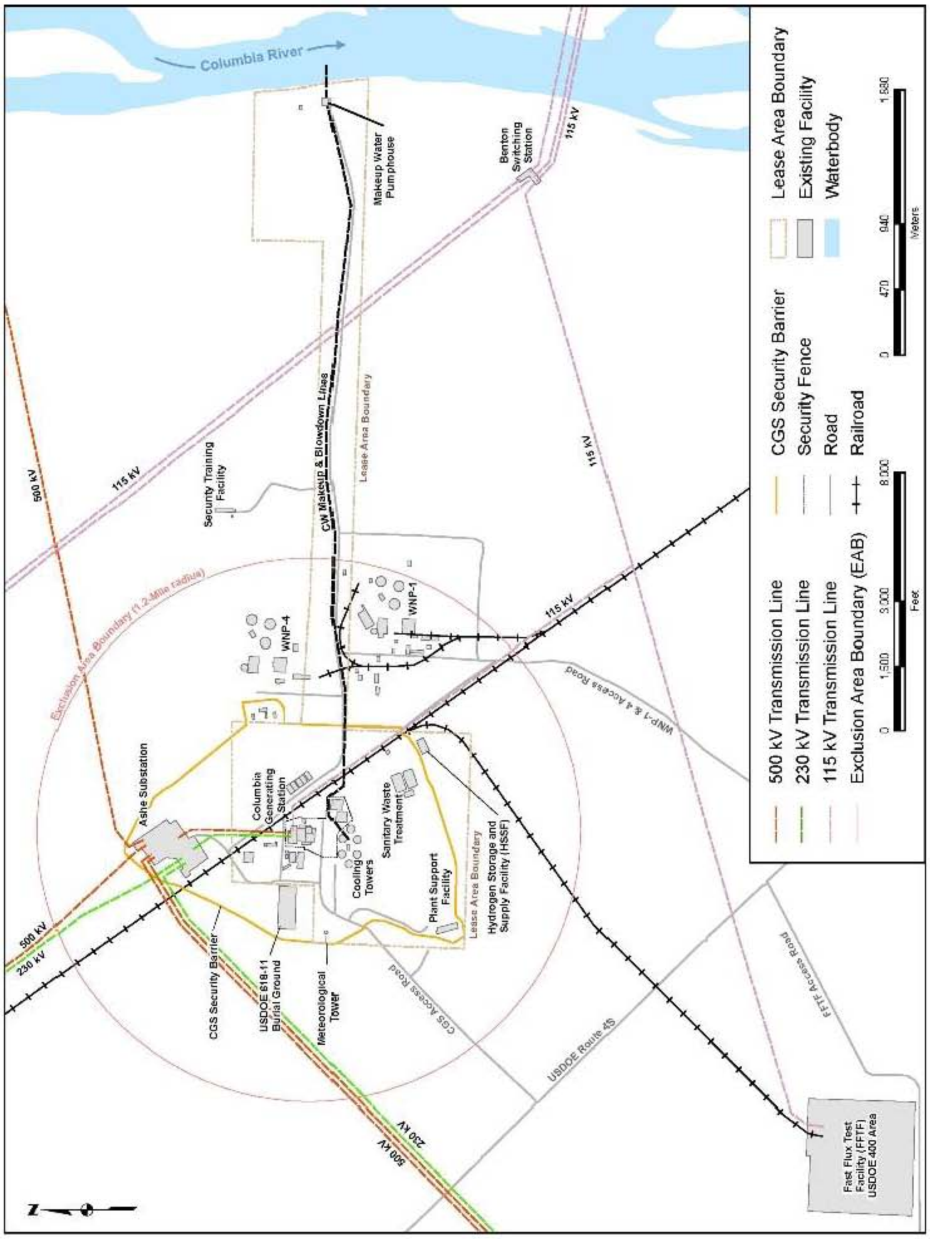

Figure D-1-3. CGS, general site layout

Source: (EN, 2010a)

Nearby industrial sites include those listed below:

- two abandoned power plant construction projects, Washington Nuclear Power (WNP)-1 and WNP-4, located about 1 mi (1.6 km) east-southeast and east-northeast of the CGS plant
- the Bonneville Power Administration's (BPA's) H.J. Ashe Substation located 0.5 mi (0.8 km) north of the plant
- the Laser Interferometer Gravitational-Wave Observatory located 3.5 mi (5.6 km) from the plant
- the Fast Flux Test Facility—a DOE facility located 2.75 mi (4.4 km) south-southwest in the Hanford 400 Area
- three radioactive waste burial grounds (DOE facilities)—618-10 located 3.5 mi (5.6 km) south and 618-11 immediately west of CGS

The Columbia River is the fourth largest North American river flowing to the sea. It is a high-volume, high-gradient river fed by snowmelt in the headwater mountain ranges of the Canadian Rockies of British Columbia (Benke and Cushing, 2005). The river travels over 1,200 mi (1900 km), draining a watershed covering approximately 262,480 square miles (mi^2) (680,000 square kilometers (km^2)) (USFWS, 2010). River flow is regulated by 14 mainstem dams. Ten of the dams are located above the CGS site (including three in British Columbia), and four are below the site. The nearest upstream dam is Priest Rapids, located at river mile (RM) 397, 45 mi (72 km) upstream of the CGS site. The nearest downstream dam is McNary, located at RM 292, 60 mi (97 km) downstream (EN, 2010). The reservoir (Lake Wallula), created by the McNary Dam, extends to about 6 mi (10 km) below the CGS site. The 51-mi (82-km) river reach, extending from Priest Rapids Dam to Lake Wallula (RM 346), is free flowing below Priest Rapids Dam. The elevation drop through this reach is approximately 70 feet (ft) (21 meters (m)). This area, termed the "Hanford Reach" is the last non-impounded, non-tidal segment of the Columbia River in the U.S. (Duncan, et al., 2007).

The flow of the Columbia River typically peaks from April–July, during spring runoff, and is lowest from September–October. The monthly flows recorded by the U.S. Geological Survey (USGS) below Priest Rapids Dam during water years 1960–2009 range from a mean of 79,300 cfs (2,250 cubic meters per second (m^3/s)) during September to a mean of 202,000 cfs (5,700 m^3/s) during June. Mean annual flows for the same period ranged from 80,650 cubic feet per second (cfs) (2,284 m^3/s) in 2001 to 165,600 cfs (4,700 m^3/s) in 1997 and averaged 117,823 cfs (3,336 m^3/s). For water years 1984–2008, coincident with the period of CGS operation, measured flows averaged 113,712 cfs (3,220 m^3/s) (USGS, 2010). BPA regulates the flow of the river to meet electrical demands and limit the impact on spawning salmon (EN, 2010). Flows vary daily and hourly as water is released from Priest Rapids Dam, causing the river stage to fluctuate in excess of 10 ft (3 m) on a daily basis. The river channel near the CGS site varies between 1,200–1,800 ft (370–550 km) wide for the low-water and normal high-water stages, respectively. River depth varies from about 25–45 ft (7.6–13.7 m) for normal high-water and flood high-water levels, and velocities vary from 3 feet per second (fps) (0.9 meters per second (m/s)) to over 11 fps (3.35 m/s), depending on the section and flow (EN, 2005).

Water-quality parameters measured by the USGS from 1996–2003 at Vernita Bridge (USGS Station No. 12472900 at RM 388), 35 mi (56 m) upstream of the CGS site, showed that water temperature ranged between 37–69 degrees Fahrenheit (3–20.5 degrees Celsius) with a median of 54 degrees Fahrenheit (12 degrees Celsius) (EN, 2010), (USGS, 2006). Dissolved oxygen (DO) ranged between 9.2–14.0 milligrams per liter (mg/L) with a median of 12.4 mg/L. The pH fluctuated between 7.4–8.2 standard units (EN, 2010), (USGS, 2006).

The only other significant hydrological feature in the site area is the Yakima River, which flows generally west to east and enters the Columbia River at RM 335 (EN, 2010). At its closest approach, the Yakima is about 8 mi (13 km) southwest of the CGS site.

For this consultation, the overall action area consists of the aquatic resources associated with the Columbia River near and downstream of the CGS site.

D-1.2.2 Cooling Water System Description and Operation

CGS is a single unit, nuclear-powered, steam electric facility that began commercial operation in December 1984. The plant is a boiling water reactor. CGS uses a single-cycle, forced-circulation cooling-water system (EN, 2010). The reactor core produces heat that boils water, producing steam for direct use in a turbine generator. A closed-cycle cooling system removes heat from the condenser and transfers it to the atmosphere through evaporation using six mechanical draft cooling towers (EN, 2010). A portion of the cooling water is lost through evaporation and drift. The evaporative losses lead to concentration of dissolved solids in the cooling water. Thus, a portion of the cooling water, so-called blowdown water, is routinely discharged back to the Columbia River and replenished with freshwater, thereby controlling the buildup of dissolved solids.

The circulating-water system pumps water from the Columbia River to replenish the water lost from evaporation, drift, and blowdown. The makeup-water pumphouse is located 3 mi (5 km) east of the CGS plant and houses three 800-horse power makeup-water pumps (Figure D-1-3). The pumps are designed to each supply 12,500 gallons per minute (gpm) (0.79 m^3/s), or half the system capacity, at the design head. Two pumps normally supply makeup water to the plant with a withdrawal capacity of 25,000 gpm (1.58 m^3/s). During normal operating periods, the average makeup-water withdrawal is about 17,000 gpm (1.1 m^3/s). The flow of the Columbia River below Priest Rapids Dam for water years 1960–2009 has an average mean annual discharge of 117,823 cfs (3,336 m^3/s) and a minimum mean annual discharge of 80,650 cfs (2,284 m^3/s) (USGS, 2010). Thus, the makeup-water withdrawal of 17,000 gpm (1.1 m^3/s) is about 0.03 percent of the average mean annual discharge and 0.05 percent of the minimum mean annual discharge of the river.

The intake system for the makeup-water pumps consists of two 36-inch (in.) (91-centimeter (cm))-diameter buried pipes that extend 900 ft (274 m) from the pumphouse into the river, about 300 ft (91 m) from the shoreline at Columbia RM 352 (Figure D-1-4 and Figure D-1-5) (WPPSS, 1980). An intake structure is located at the end of each of the pipes. The pipes make a 90-degree bend and extend slightly above the surface of the riverbed. Each of the pipes ends with an intake structure (20 ft (6 m) long) mounted above the riverbed and approximately parallel to the river flow, as shown in Figure D-1-6. Each intake structure is composed of two intake screens that are each 6.5 ft (2 m) in length (Figure D-1-7) and mounted end to end. The remaining length of the intake structure consists of two solid cones at either end of the structure. The intake screens consist of an outer and inner perforated pipe sleeve (WPPSS, 1986). The outer sleeve has a 42-in. (107-cm)-diameter sleeve with $^3/_8$-in. (9.5-millimeter (mm))-diameter holes (composing 40 percent of the surface area). The inner sleeve has a 36-in. (91-cm)-diameter sleeve with $^3/_4$-in. (19-mm)-diameter holes (composing 7 percent of the surface area). The intake screens are designed to distribute the water flow evenly along its surface.

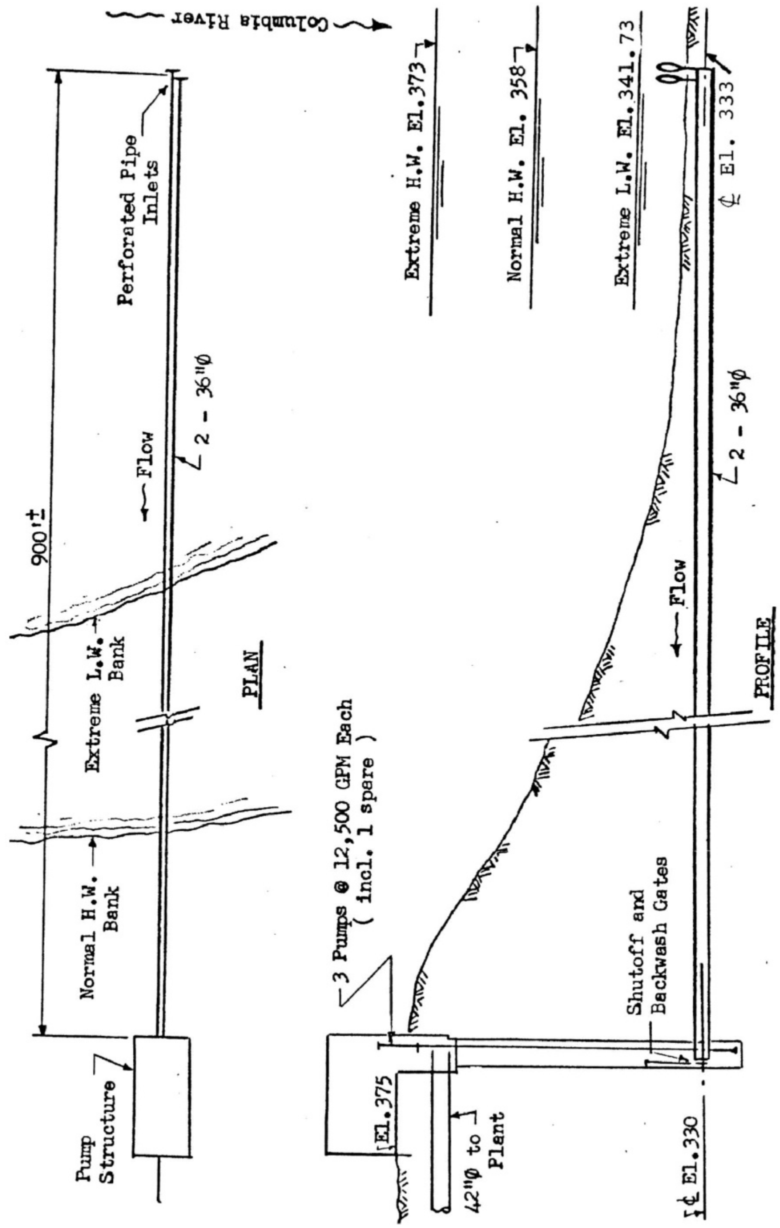

Figure D-1-4. Intake system plan and profile

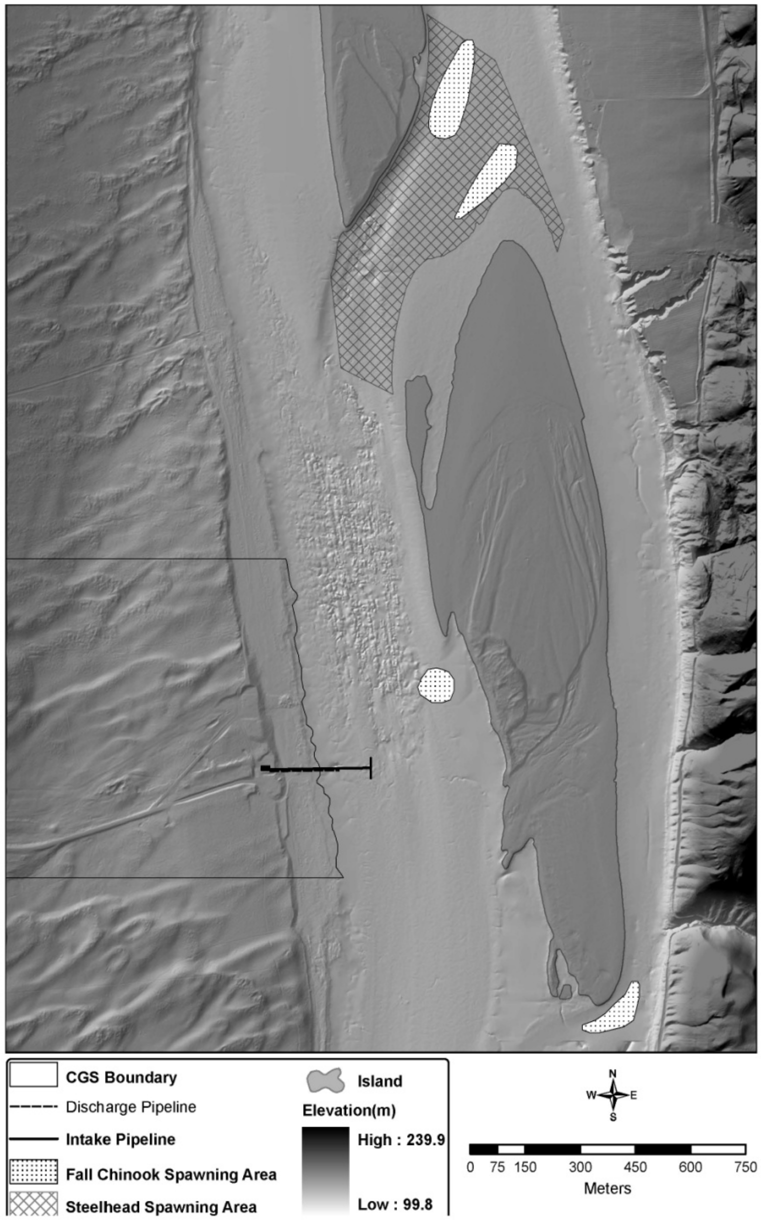

Figure D-1-5. Location of pumphouse, pipelines, intakes, and outfalls showing historical steelhead and fall Chinook salmon spawning locations

Source: (Gambhir, 2010), (Poston, et al., 2008)

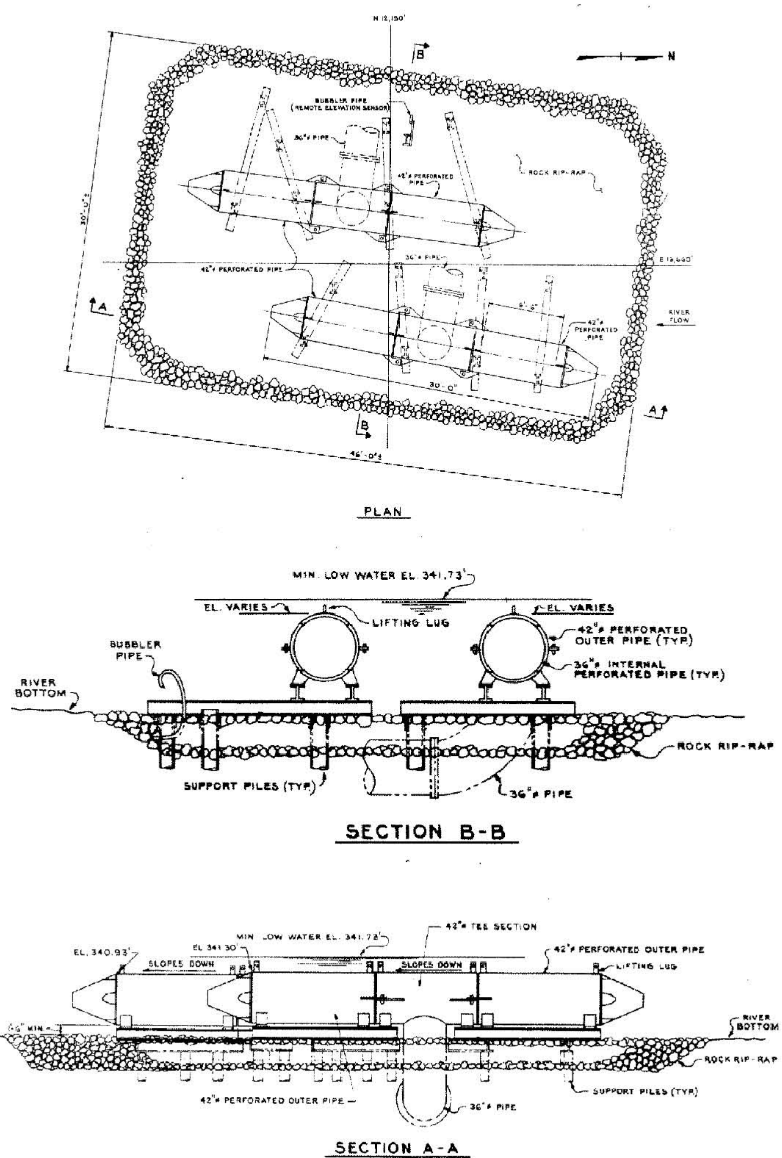

Figure D-1-6. Perforated intake plan and section

Source: (WPPSS, 1980)

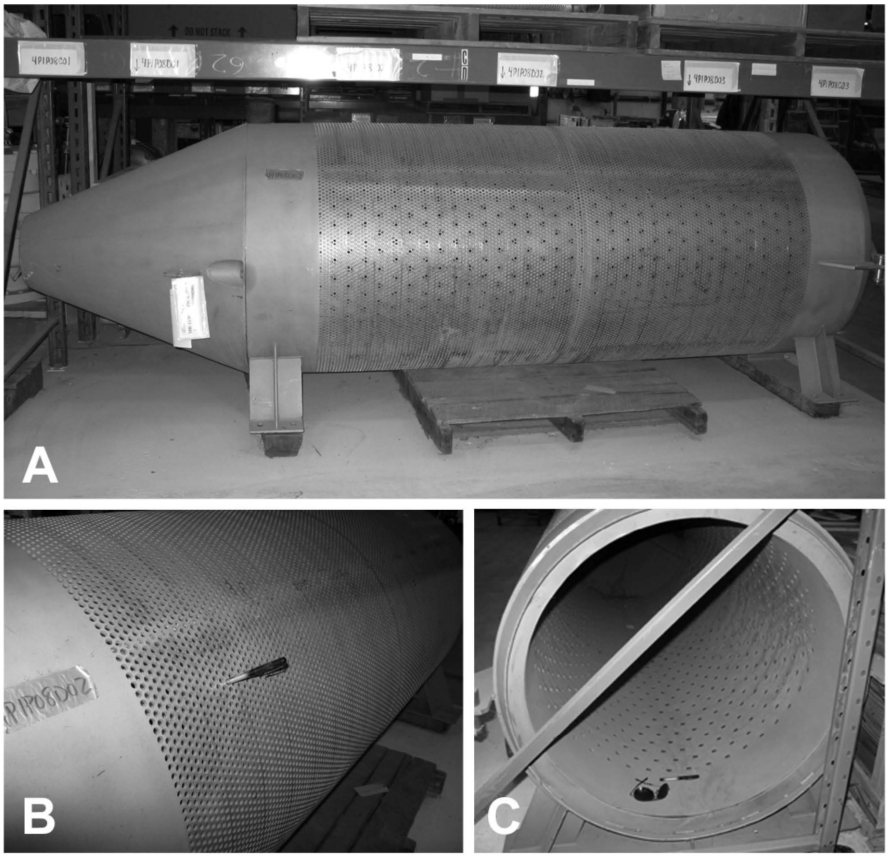

Figure D-1-7. Spare perforated pipe for the intake screen at CGS. "A" side view; "B" close up of outer sleeve; and "C" end view showing inner sleeve of perforated pipe.

The inlet velocities of the intake screens are within acceptable limits for best available technology for minimizing impacts (69 FR 41576). The velocity through the external screen openings is approximately 0.5 fps under normal operating conditions where 12,500 gpm is removed through both intake structures. The approach velocity to the intake screens under the same conditions is less than 0.2 fps (0.06 m/s) (WPPSS, 1980). This compares to river velocities measured near the perforated pipes ranging from 4–5 fps (1.2–1.5 m/s) (WPPSS, 1986).

A biocide (e.g., chlorine) is added to the water in the circulating-water system to retard biological growth. Other chemicals are added to control corrosion and scale (e.g., sulfuric acid) and fouling on the heat-transfer surfaces (NRC, 1981). On an annual basis, blowdown into the river averages about 2,000 gpm (0.1 m^3/s). Blowdown water returns to the river from the cooling towers through a line that extends out into the river next to the makeup-water pumphouse. The 18-in. (46-cm)-diameter, buried blowdown pipe extends about 175 ft (53 m) from the shoreline at low river stage. The pipe ends above the riverbed at a 15-degree angle in a rectangular slot outfall port that measures 8 in. by 32 in. (20 cm by 81 cm) and is perpendicular to the river flow (Figure D-1-8).

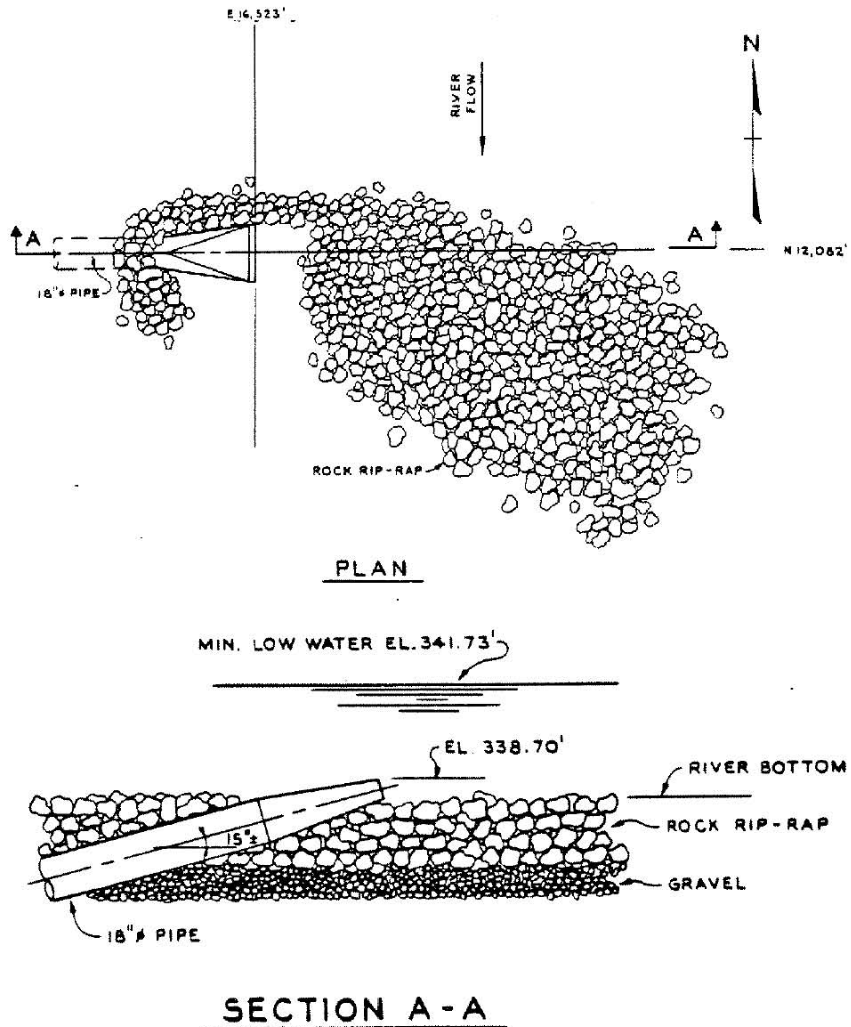

Figure D-1-8. Rectangular slot discharge

Source: (WPPSS, 1980)

The State of Washington authorizes discharge in accordance with the special and general conditions of National Pollutant Discharge Elimination System (NPDES) Permit No. WA-002515-1. Three outfalls are listed in the permit, but the Outfall 001 system is the only outfall that discharges directly to the river. In addition to the cooling-water blowdown, this outfall serves as the outfall for the condenser-cleaning effluent, the radioactive waste-treatment system effluent, and the discharge from the standby service water.

D-1.3 Endangered Species Act and Essential Fish Habitat Species Considered for Preliminary Analysis

The NRC conducted coordination and pre-consultation with the USFWS and the NMFS during a series of site visits, meetings, and phone conversations. Representatives of both services attended the CGS site audit in June 2010 and toured the project area. Specific actions that were related to the Federally-listed species, designated critical habitat, or EFH are discussed below.

D-1.3.1 Federally Listed Species and Designated Critical Habitat Near the Site

The NRC staff (staff) requested in letters dated March 22, 2010, (NRC, 2010a) and May 3, 2010, (NRC, 2010b) that the USFWS and NMFS, respectively, provide information on Federally-listed endangered or threatened species, proposed or candidate species, and designated critical habitats that may occur in the vicinity of the CGS site.

Kurz (2010), working for the USFWS, responded in an email dated November 8, 2010, and identified a single aquatic species—the bull trout (*Salvelinus confluentus*)—under its jurisdiction that is Federally-listed as threatened and has been reported in the Hanford Reach in the vicinity of the CGS facility (Table D-1-1). USFWS also indicated that critical habitat for the bull trout occurred within the action area, as previously defined.

Table D-1-1. Threatened and endangered aquatic species of the Hanford Reach of the Columbia River in the vicinity of CGS

Scientific name	Common name	Federal status[a]	Critical habitat designation
	Fish		
Oncorhynchus tshawytscha	Upper Columbia River spring Chinook salmon	FE	Critical habitat designated September 2, 2005; 70 FR 52630
Oncorhynchus mykiss	Upper Columbia River steelhead	FT	Critical habitat designated September 2, 2005; 70 FR 52630
Salvelinus confluentus	bull trout	FT	Critical habitat designated October 6, 2004; 69 FR 59995; revised October 18, 2010; 75 FR 63898

[a] Federal status listings: FE = Endangered; FT = Threatened; FC= Candidate

Source: (Kurz, 2010), (Suzumoto, 2010)

NMFS responded to the NRC's request in a letter dated June 23, 2010 (Suzumoto, 2010), and identified two Federally-listed species near the CGS site. The two species listed in Table D-1-2 are the Upper Columbia River spring Chinook salmon (*Oncorhynchus tshawytscha*) and the

Upper Columbia River steelhead (*Oncorhynchus mykiss*). Critical habitat for both species occurs within the action area.

Table D-1-2. Aquatic fish species with EFH in the vicinity of the Hanford Reach of the Columbia River in the vicinity of CGS

Scientific name	Common name
Oncorhynchus tshawytscha	Upper Columbia River Chinook salmon
Oncorhynchus kisutch	coho salmon

Source: (Suzumoto, 2010)

Critical habitat is defined in the ESA as a specific geographic area that contains features that are essential for the conservation of a threatened or endangered species (USFWS, 2010a). Critical habitat may require special management and protections. It also may include an area that the species may not currently occupy but that it may need for its recovery. Federal agencies are required to consult with the USFWS or NMFS on any actions that they authorize to ensure that their actions will not destroy or adversely modify critical habitat to the point that it will no longer aid in the species' recovery.

D-1.3.2 Essential Fish Habitat Near the Site

In the letter dated June 23, 2010, the NMFS (Suzumoto, 2010) also indicated that the Columbia River in the CGS plant vicinity provides EFH features for both the Upper Columbia River Chinook and the coho salmon (currently an unlisted reintroduction effort), as listed in Table D-1-2. The EFH for the Upper Columbia River Chinook includes all three runs (spring, summer, and fall).

D-1.4 Endangered Species Act and Essential Fish Habitat Species Considered for In-Depth Analysis

The following subsections discuss the identified ESA and EFH aquatic species. Because all of the aquatic species are salmonids (family Salmonidae), a brief generic life-history of salmonids is presented first, and then, the specific differences between the listed and EFH species are described in each section.

In general, anadromous adult salmonids return from the Pacific Ocean to the Columbia River to spawn in either the mainstem or tributaries. The female lays her eggs in a nest or "redd." The eggs hatch and produce an alevin, which is the lifestage between the egg and fry. Alevins cannot swim, but they can move their tails to readjust their position. Because of the yolk sac, alevins do not need to eat. They remain in the gravel riverbed and obtain nutrition from their yolk sac. Once the alevin has absorbed its egg sac, it is called a "fry," and it is capable of swimming and needs to forage for food. When the fry are approximately 2 in. (5 cm) long, they are termed parr (for the vertical brown-green bars on their sides, parr marks, which provide camouflage) or fingerlings. The length of time that a salmon is in the fry stage varies between species. In this document, fry and fingerlings are considered young juveniles. Fish that are in a transitional stage of adapting to life in a marine environment are called smolts and are considered juvenile salmon. Smolts can be found in freshwater as they begin their migration downstream, they can be in the process of migrating, or they can be in an estuarine environment. The timing of the development of a smolt varies between, and even within, salmon species (Quinn, 2005). Juvenile salmon adapt to the saltwater before traveling to the ocean, where they remain from 6 months–5 years or more before reentering the estuaries and migrating to their natal stream or river to spawn.

D-1.4.1 Bull Trout (*Salvelinus confluentus*)

D-1.4.1.1 Life History

Bull trout are amphidromous, meaning they may return seasonally to freshwater as subadults, sometimes for several years before they spawn. However, they have also been characterized as anadromous (migrating from the sea up rivers to spawn), adfluvial (living in lakes and migrating to rivers or streams to spawn), fluvial (inhabiting a river or stream), or resident (completing their life cycle in freshwater) (Quinn, 2005). The bull trout in the mainstem of the Columbia River are considered to be fluvial and migrate between multiple core areas. There are accounts of amphidromous life-history forms that are present downstream of the Hanford Reach (between the Yakima and John Day rivers), and it is thought that bull trout in this area may still have the potential to be anadromous (USFWS, 2010b).

Bull trout differ from other salmonids based on their specific habitat requirements. They are extremely sensitive to their environment and have more specific habitat requirements than most other salmonids (75 FR 2270). These requirements include channel stability, substrate composition, cover, and temperature (Rieman and McIntyre, 1993).

Channel stability is important for bull trout because juvenile fish, including embryos and alevins, are found near the bottom of channels, where they use the substrate for cover. Rieman and McIntyre (1993) found high variation in the number of bull trout redds that occurred in areas with low channel stability and frequent winter floods. This observation confirmed findings from other studies that showed high bed load movement and low channel stability were associated with low numbers of bull trout in the Coeur d'Alene River drainage (Rieman and McIntyre, 1993).

Substrate composition and cover. Bull trout associate with complex forms of cover as well as with pools. Juveniles associate with in-channel wood, substrate, or banks that are undercut. The young-of-the-year associate with side channels, margins of streams, or other areas of low velocity. The older fish use pools and areas with large and complex debris and undercut banks (Rieman and McIntyre, 1993).

Thermal sensitivity. Bull trout are likely the most thermally sensitive species in coldwater habitats in western North America (Dunham, et al., 2003). They are rarely found in streams or rivers with summer temperatures that exceed temperatures of 59 degrees Fahrenheit (15 degrees Celsius) for extended periods of time (McPhail and Baxter, 1996). A study performed in a large plunge pool, created by the confluence of two streams located in Granite Creek in Northern Idaho, illustrated the degree of the marked preference of bull trout for cooler water. The pool had a strong side-to-side gradient of 46–59 degrees Fahrenheit (8–15 degrees Celsius). Juvenile bull trout consistently chose the coldest water available (46–48 degrees Fahrenheit (8–9 degrees Celsius)) despite the lowest-velocity water (also preferred by bull trout) being located on the side of the pool with the warmer water. Other factors—including water depth, substrate, overhanging cover, or interactions with other fish—could not account for the distribution of the bull trout in the pool (Bonneau and Scarnecchia, 1996).

Bull trout generally spawn from late August to late December, with the peak spawning in September and early October, when the water temperature drops below 48 degrees Fahrenheit

(9 degrees Celsius) (Wydoski and Whitney, 2003). Their preferred spawning location is in streams with cold, clean water and clean gravel and cobble substrates with gentle stream slopes.

Egg development appears to be dependent on water temperature (Wydoski and Whitney, 2003), and the 4–5 month incubation period that occurs during winter is longer than it is for other salmonids (USFWS, 2003). The incubation period occurs over the winter. The optimum temperature for development ranges from 36–39 degrees Fahrenheit (2–4 degrees Celsius) (McPhail and Baxter, 1996). Wydoski and Whitney (2003) reported that alevins (life stage between eggs and fry) emerging from the redds (nests) were between 0.9–1.1 in. (2–3 cm) long. Fry remained in the streambed substrate for 3 weeks before emerging and, subsequently, tended to be bottom oriented. Fry preferred the shallow edges of rivers or streams where they can use the interstitial habitat in loose gravel for cover. At other times, they were associated with shallow water in the side channels where the velocity is lower and where in-stream cover is greater. Bull trout fry feed at various locations on the bottom, on the surface, and in the water column and mostly eat aquatic insects (McPhail and Baxter, 1996).

Juvenile bull trout remain in the streams and concentrate in pools, rather than riffles or runs. These sites are strongly associated with overhead cover (McPhail and Baxter, 1996). They forage near the substrate and in the water column but not on at the surface (McPhail and Baxter, 1996). Wydoski and Whitney (2003) reported the diet of juvenile bull trout in streams in southeastern Washington as being insects such as flies, midges, stoneflies, mayflies, caddisflies, and some fish such as sculpins (Wydoski and Whitney, 2003). They are also known to ingest worms, snails, clams, leeches, earthworms, and amphibians and terrestrial insects such as beetles and moths (Wydoski and Whitney, 2003)

The bull trout diet shifts as they mature, eventually feeding exclusively on fish. The species of fish depends on their availability but may include sculpins, trout fry, whitefish, kokanee, minnow, suckers, and yellow perch (McPhail and Baxter, 1996), (Wydoski and Whitney, 2003). Bull trout in Lake Wenatchee were also seen preying on hatchery-reared sockeye salmon shortly after stocking (Wydoski and Whitney, 2003).

D-1.4.1.2 Population Trends

Bull trout are native to the Pacific Northwest. Their range—which once included northern California, western Montana, Nevada, Idaho, British Columbia, and Alberta—is thought to be shrinking, primarily at the southern end of their range (Quinn, 2005). Prior to 1978, bull trout and Dolly Varden (*Salvelinus malma*) were thought to be the same species, and, although their ranges overlap, the bull trout are found in the south and the interior regions while the Dolly Varden are coastal and found more towards the north (Quinn, 2005). The USFWS listed bull trout as threatened throughout their range in 1999 (63 FR 31647).

The decline of bull trout has been characterized as being primarily due to habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, past fisheries management practices, impoundments, dams, water diversions, and the introduction of non-native species (64 FR 58910), (75 FR 2270).

Bull trout have been documented both upstream and downstream of the Hanford Reach, including Priest Rapids reservoir (Pfeiffer, et al., 2001) and the Yakima River (McMichael and Pearsons, 2001), (Pearsons, et al., 1998). The areas of the upper Columbia River with the greatest number of bull trout are in the vicinity of tributaries with strong local populations and suitable migration corridors (Marten, 2007). This includes the lower reaches of the Methow, Entiat, and Wenatchee Rivers. There are fewer occurrences of bull trout in the Columbia River in areas with poorer habitat conditions, in tributaries that have fragmented migration corridors, or in tributaries with smaller populations of bull trout, such as in the Yakima and Walla Walla. Bull trout would possibly use the mainstem of the Columbia River to a greater degree if the habitat conditions improve and if the populations in the adjacent tributaries increase (Marten, 2007).

Gray and Dauble (1977) reported bull trout in the Hanford Reach, but the location of the collection was unclear. Pfieffer, et al. (2001) also observed bull trout during an inventory of fish in the Priest Rapids Project Area in Wanapum and Priest Rapids reservoirs between RM 398 and 453 using a variety of gear (set lines, gill nets, beach seines, minnow traps and electrofishing). Collections occurred during day, dawn, dusk, and nighttime hours, stratified by season and habitat. The sampling study captured 2 bull trout in electrofishing samples from the more than 58,000 fish sampled. One bull trout was found at RM 299 (2 mi above Priest Rapids Dam) and one at RM 430 (above Wanapum Dam). Pfieffer, et al. (2001) noted that the bull trout showed a preference for the lowest macrophyte abundance, water temperature, and surface velocity.

Furthermore, the Grant County Public Utility District indicated only a "handful" of documented observations of bull trout in the fishway observations located at Priest Rapids Dam. Results from a 2001–2003 study indicated that, of 79 bull trout tagged at Rock Island, Rocky Reach, and Wells Dams, only 9 (11 percent) were detected within the Wanapum Reservoir. Only one of these continued to migrate downstream past the Wanapum and Priest Rapid Dams (Stevenson, et al., 2003).

As reported in the biological opinion for the Priest Rapids Project license renewal, removal of fish within gatewells at Priest Rapids dam during juvenile salmonid outmigration did not result in any observed bull trout. However, three bull trout were observed during operations to remove fish from within gatewells at Wanapum Dam (1997–2003). During fish ladder maintenance at Priest Rapids Dam in 2000, one bull trout was found and released. At Wanapum Dam, a single bull trout was found in 2000 during fish ladder maintenance effort and another in 2002. The biological opinion suggests that the fish could be from the Yakima populations because the fish were found in December, they were of a smaller migratory size, and the Yakima is the closest core area (Marten, 2007). If these assumptions were correct, then they would have had to travel upstream through the Hanford Reach.

Research scientists at DOE's Hanford Site have characterized the use of the Hanford Reach by bull trout as transient (Poston, et al., 2009). USFWS (2008) indicates that the accounts of bull trout in the Hanford Reach are "anecdotal" and are "likely individuals moved downstream during the spring freshet." The presence of bull trout in the Hanford Reach and in the vicinity of CGS can be considered to be for purposes of foraging, migration, and possibly overwintering.

D-1.4.1.3 Endangered Species Act Listing History and Critical Habitat

Bull trout were listed as threatened throughout their range in 1999 (63 FR 31647).

The action area lies within the Columbia River distinct population segment (DPS). On October 18, 2010, the USFWS published a final rule that revised the critical habitat for the bull trout (75 FR 63898). Unit 22, the Mainstem Upper Columbia River Unit, extends from John Day Dam to Chief Joseph Dam (221.7 mi (357 km)) and encompasses the Hanford Reach. The core areas within the Mainstem Upper Columbia River Unit support 35 local populations of bull trout—16 populations in the Yakima River, 7 in Wenatchee River, 2 in the Entiat River, and 10 in the Methow River core areas. The populations are well distributed across the action area, although they tend to have low abundance and, in general, have a declining or slightly increasing toward stable population trend. None of the populations is considered stable or clearly increasing in size (Marten, 2007).

The Mainstem Upper Columbia River critical habitat unit (CHU) provides connectivity to the Mainstem Lower Columbia River CHUs and to 13 additional CHUs. This CHU is the main foraging, migration, and overwintering (FMO) habitat for the Entiat River core area and provides connectivity between several other core areas or CHUs. Because the Mainstem Upper Columbia River Unit is FMO habitat for other populations, the population size is not estimated separately for this CHU (USFWS, 2010b). The USFWS indicates that bull trout reside year-round in certain areas of the mainstem of the Columbia River as either subadults or adults. The USFWS (2010b) indicates that spawning adults may also use the mainstem of the Columbia River for up to 9 months.

The migratory form of the bull trout is not present in many of the populations within these core areas, and connectivity between the core areas is fragmented. The main habitat issues within these core areas are relatively high water temperature, passage barriers, and prolonged low-flow conditions (Marten, 2007).

D-1.4.2 Upper Columbia River Chinook Salmon (*Ocorhynchus tshawytscha*)

D-1.4.2.1 Life History

Chinook salmon are anadromous and migrate up streams and rivers to spawn, including the Columbia River in the Pacific Northwest.

Although the general life history of the Chinook salmon follows the stages of an anadromous salmonid, as discussed in the introduction to Section D-1.4, the entire life history of Chinook salmon varies depending on the "race" of the fish. Within this life history, there are diverse and complex patterns of behavior that allow differentiation between different groups of salmon. Although all adults return to spawn in their natal streams or rivers, different races of fish return at different times of the year. Chinook salmon are classified as spring, summer, or fall races—or runs (as will be used in this document)—depending on the time at which the adults pass the first dam (Bonneville) and begin their migration upstream. All of the fish spawn in the fall and early winter, in the order in which they entered the river (spring first, followed by summer and then winter). Genetic differences can distinguish most fish between the runs.

In the Columbia River, spring Chinook return to the river in March, migrate upstream from March through June, and spawn in early fall. Summer Chinook return to the freshwater in June, migrate from June through August, and spawn in late September through November. Fall Chinook salmon return in August, migrate upstream from August into November, and generally spawn later that fall, although they are also known to spawn as late as the following April (University of Washington, 2011), (Wydoski and Whitney, 2003).

In general, spring Chinook salmon spawn in the upper reaches of tributaries, summer Chinook spawn in the mouths and mid-portions of tributaries, and fall Chinook spawn in the mainstem. For example, summer Chinook salmon in the Methow River spawned between RM 2 and RM 42 at elevations ranging from 900–1,800 ft (274–549 m) above mean sea level (MSL). In contrast, spring Chinook spawned between RM 46 and RM 72, corresponding to elevations between

1,750–2,300 ft (530–700 m). However, some overlap of the spawning grounds has been reported with individuals of both runs spawning between RM 38 and RM 52 (elevations between 1,550–2,200 ft (470–670 m)) (Wydoski and Whitney, 2003). During the 1970s and mid-1980s, more than 80 percent of fall Chinook salmon returning to spawning regions upstream of McNary Dam, spawned in the Hanford Reach (Dauble and Watson, 1997). More recently, from 2000–2009, the escapement to the Hanford Reach dropped to an average of 40 percent (Hoffarth, 2010).

In addition to different runs, Chinook salmon have two behavioral forms that are distinguished by the time the migration to the sea occurs. Chinook salmon can be differentiated by their behavior as having either a "stream-type" or an "ocean-type" life history. The type of life history depends on when the parr become smolts and begin their migration downriver to the ocean. If the juvenile Chinook begin their migration immediately after emergence or after a few months in the river (as subyearlings, age 0), migrate gradually downstream, and reside in the estuary for a few weeks or more before they move out to the sea, then they are termed "ocean-types." However, if they begin their migration as yearlings (age 1) and rapidly move through the estuaries to the ocean, they are called "stream-types" (Quinn, 2005).

In general, the summer and fall runs of Chinook salmon migrate as subyearlings during their first spring or fall and are, thus, considered to be ocean-type, although some also migrate as fry or yearling juveniles (during their second spring) and would be considered stream-type. In Washington State, the ocean-type consist of adults—over 80 percent of which had emigrated as subyearlings, while the remaining 20 percent had emigrated as yearlings (Wydoski and Whitney, 2003). Most of the ocean-type salmon spawn in the larger rivers, such as the Columbia River mainstem.

The stream-types consist of 80–100 percent adults that emigrated as yearlings. Upper Columbia River spring Chinook salmon have a stream-type life history where the young salmon (alevins, parr, and smolts) spend 1–2 years in freshwater before making a rapid migration trip downstream to the Pacific Ocean (Wydoski and Whitney, 2003). In the Columbia River, the stream-type adults typically spawn in the small streams where the juveniles are reared (Quinn, 2005).

Adults return to their natal spawning areas and build redds in the river substrate. Chinook salmon spawn in small tributaries 7–10 ft (2–3 m) wide and in large rivers such as the Columbia (Healey, 1991). They spawn in depths as shallow as 2 in. (5 cm) to depths greater than 23 ft (7 m). Water velocities range from 0.3–5 fps (10–150 cm/s) (Healey, 1991). Quinn (2005) indicated that in the mainstem of the Columbia, Chinook salmon spawn in water as deep as 21 ft (6.5 m), with water velocities along the bottom of up to 6.6 fps (2 m/s).

Chapman, et al. (1986) examined the redds of fall Chinook salmon spawning in the Hanford Reach, specifically on the Vernita Bar, which is located 4 mi (6.5 km) downstream from Priest Rapids Dam. Water depth ranged from less than 1 in. (2.5 cm) at a flow rate of 70,000 cfs (1,982 m^3/s) to 23 ft (7 m) below the water's surface measured at a discharge of 36,000 cfs (1,020 m^3/s). Water velocities were generally greater than 2.2 fps (0.67 m/s) when measured 9 in. (23 cm) above the substrate. Some redds were in areas with velocities near 6.6 fps (2 m/s) for at least part of the day. Spawning occurred from early October to the third week of November.

A female may deposit up to 5,000 eggs (range from less than 2,000 to greater than 17,000) per redd (Healey, 1991). The depth at which eggs are buried depends partly on the water velocity. The depth of gravel or cobble over the eggs is reported to range from 4–13 in. (10–33 cm) with an average of 7.4 in. (18.8 cm) (Healey, 1991). Survival of the eggs depends on intragravel flow rates, which must equal or exceed about 24 in. per hour for good survival. Eggs hatch in approximately 2 months, depending on the water temperature.

Geist, et al. (2006) examined the variation in temperature and DO levels during the first 40 days of incubation. There were no significant differences in the survival of fall Chinook salmon at temperatures equal to or below 62 degrees Fahrenheit (16.5 degrees Celsius). However, a rapid decline in survival occurred between 62–63 degrees Fahrenheit (16.5–17 degrees Celsius) and embryo mortality increased greatly above incubation temperatures of 63 degrees Fahrenheit (17 degrees Celsius).

Upon hatching, the alevins live in the gravel for about 2–3 weeks, foraging on small invertebrates such as aquatic insect larvae and terrestrial insects (Wydoski and Whitney, 2003). In general, alevins move deeper into the gravel after hatching. Later, they start to move laterally in the gravel and, after the yolk has been absorbed, they become fry moving upward, emerging from the gravel, and orienting into the water current (Quinn, 2005).

Stream-type fry or juveniles remain in the stream or river and migrate to the ocean during their second spring (Quinn, 2005), (Wydoski and Whitney, 2003). Juveniles from the spring runs in the Columbia River are generally stream-type. They prefer a water depth of less than 3 ft (0.9 m) during the first few months (Wydoski and Whitney, 2003), although they exhibit other habitat preferences that determine their location. Preferences include water velocity, in-stream cover, and abundance of other fish species. A study of young-of the-year spring Chinook in the upper Yakima River Basin during summer and fall reported that they preferred water depths from 1.6–1.8 ft deep (49–55 cm) and a bottom velocity 0.8–0.9 fps (0.24–0.27 m/s). By spring they occupied habitats that were shallower (0.8 ft (24 cm) deep) with bottom water velocities of 1.4 fps (0.43 m/s) (Wydoski and Whitney, 2003).

In the Hanford Reach, fall Chinook remain in the area for the first few months after emergence at water depths of less than 3 ft (0.9 m). They move to deeper water when they are larger and closer to the time of their migration (Dauble, et al., 1989), (Wydoski and Whitney, 2003). In general, ocean-type juveniles orient toward the current and are able to maintain their positions during the day for velocities ranging from 0.16 to less than 0.83 fps (5–25 cm/s). They drifted downstream at velocities of 0.83–1.3 fps (25–41 cm/s) during the day and at lower velocities at night. Fall Chinook, however, maintained their position in waters with velocities up to 1.3 fps (41 cm/s), which appears to be an upper threshold for their habitat. At night, fall Chinook juveniles maintained positions near the bottom of the river where the water velocities were lower. They move upstream and downstream during both the day and the night to find food and suitable habitat (Wydoski and Whitney, 2003).

The optimal water temperature for spring Chinook salmon is 54–55 degrees Fahrenheit (12–13 degrees Celsius) (Wydoski and Whitney, 2003). The optimal temperature for fall salmon, 59–64 degrees Fahrenheit (15–18 degrees Celsius), is higher than it is for stream-type Chinook salmon. Water temperatures above 73 degrees Fahrenheit (22.7 degrees Celsius) are lethal to Chinook salmon smolts and juveniles (Wydoski and Whitney, 2003).

Early juvenile diet consists of midge larvae and zooplankton, progressing to adult caddisflies and other aquatic insect larvae and some terrestrial insects. Juveniles forage on zooplankton and macroinvertebrates as they migrate through the Columbia River Basin, and they are prey to other fish, birds, and mammals (Dauble, 2009). Passage time for a juvenile spring Chinook through the Hanford Reach lasts no more than 1 week; outmigration of the juvenile spring Chinook extends from April to the end of August (DOE, 2000). As the young-of-year migrate to the mainstem Columbia, they are surface-oriented; however, they may migrate at deeper depths in the Hanford Reach (Dauble, 2009), (Lohn, 2004).

Juvenile ocean-type Chinook salmon generally spend up to 2 months in the estuary before migrating to the ocean (Healy, 1991). In the estuaries, the smaller salmon feed on aquatic and terrestrial insects, including chironomid larvae, dipterans, cladocerans such as *Daphinia*, amphipods, and other crustaceans. As they become larger, they feed on juvenile fish such as anchovy (Engraulidae), smelt (Osmeridae), herring (Clupeidae), and stickleback (Gasterosteidae). Ocean-type fish have a longer estuarine residence than the stream-type Chinook salmon (Healey, 1991), (PFMC, 2000).

Smaller juvenile salmon in the ocean initially feed on small crustaceans, but as they grow, their diet becomes primarily larval and juvenile fish to include Pacific herring, northern anchovy, smelt, pilchard, sand lance, rockfish, and ratfish (Wydoski and Whitney, 2003). They remain in the ocean from 3–4 years (ranging from 2–8 years) while they mature. Adult Chinook salmon range throughout the North Pacific Ocean and the Bering Sea. Chinook salmon from the Columbia River drainage migrate north and west along the Pacific coast and up to the Gulf of Alaska.

The age that adult Chinook salmon return to their natal rivers to spawn varies depending on the stock. Most fish from the Columbia River streams return at age 3–4 years. However, some males return 1–2 years earlier than their counterparts. These "jack salmon" are generally smaller and can constitute a substantial part of the overall run (see Table D-1-3). Adult Chinook salmon returning from the ocean to spawn in the rivers stop feeding entirely after they pass through the estuaries (Higgs, et al., 1995) and migrate to their natal streams.

D-1.4.2.2 Population Trends

Chinook salmon are generally found in coastal rivers as far south as the San Joaquin River in California, although they are also occasionally observed in the San Luis Obispo or Carmel Rivers south of San Francisco Bay and have been reported in Baja California, Mexico (Pacific Fishery Management Council, 2000), (Wydoski and Whitney, 2003). They extend as far north as Point Hope, AK, along the Pacific coast, and from the Anadyr River south to Hokkaido, Japan (Wydoski and Whitney, 2003). In marine environments, they extend from as far south as the U.S. and Mexico border (Baja California, Mexico) throughout the North Pacific Ocean and the Bering Sea (PFMC, 2000), (Wydoski and Whitney, 2003).

The number of Chinook salmon migrating up the Columbia River started to decrease in the late 1880s as a result of commercial fishing on the lower Columbia River. Degradation and loss of habitat accelerated their decline in numbers. It was further accelerated by the installation of hydroelectric dams on the river, including Grand Coulee Dam constructed in 1941, which permanently blocked the salmon migrations past RM 597 and Chief Joseph Dam (RM 545) that was constructed downstream from Grand Coulee Dam, which also blocks anadromous fish migrations (Good, et al., 2005). The Construction of Hells Canyon Dam on the Snake River in 1967 and Dworshak Dam on the Clearwater River also blocked upstream migrations and contributed to the declining number of Chinook salmon runs overall in the Columbia River, even though these fish did not pass through the Hanford Reach.

Chinook salmon has been an important species for the Native Americans as well as other people in the Columbia River Basin. Commercial canning of salmon in the lower Columbia River peaked in the 1880s when the catch was more than 40 million pounds (lb) (18 million kilograms (kg)). By the 1890s, hatcheries were releasing salmon to replenish the declining spring runs (Dauble, 2009). From 1938–1940, the Grand Coulee Fish Maintenance Program trapped returning spring-run Chinook salmon at Rock Island Dam and either transplanted them as adults or released juveniles into selected areas within the drainages below Grand Coulee (Good, et al., 2005). This action homogenized the stocks of Chinook across the currently designated evolutionarily significant unit (ESU) for the spring run and influenced the present-day loss of genetic diversity (Lohn, 2004). Subsequent construction of numerous dams and other projects on the mainstem Columbia River also contributed to the obstacles for recovery of the Upper Columbia River spring Chinook salmon (Lohn, 2004).

Table D-1-3 provides the current returns of Chinook salmon in the Columbia River for the past 6 years. The numbers for spring and summer Chinook include only those that passed through Priest Rapids Dam and, thus, through the Hanford Reach. Table D-1-3 also shows the counts that pass through McNary Dam but not Ice Harbor. This eliminates the fish that moved up the Snake River, but it includes fish that spawn in the Yakima River and those returning to the Priest Rapids Hatchery.

Table D-1-3. Chinook population within or migrating through the Hanford Reach

	Fish counts at Priest Rapids Dam						Counts passing McNary minus the Ice Harbor counts	
Year	Spring Chinook adults	Adults plus Jacks	Summer Chinook adults	Adults plus Jacks	Fall Chinook adults	Adults plus Jacks	Fall Chinook adults	Adults plus Jacks
2005	14,148	14,663	61,227	63,125	31,289	31,641	119,360	127,966
2006	8,538	8,616	57,236	57,792	18,851	20,678	78,809	85,778
2007	6,708	7,197	30,644	31,732	22,650	27,033	43,860	62,111
2008	12,178	12,798	39,174	42,616	34,012	48,552	79,973	88,354
2009	13,469	16,379	49,417	51,534	40,723	46,552	79,720	103,010
2010	30,539	31,471	49,265	50,482	38,614	42,490	151,180	166,383

Source: (University of Washington, 2011) (Columbia River DART (Data Access in Real Time) http://www.cbr.washington.edu/dart/dart.html

Estimated returns (escapement) of adult fish to the Hanford Reach are calculated annually by the Washington Department of Fish and Wildlife. Escapement of spring Chinook to the Upper Columbia River for 2010 was 57,300 total, with 5700 wild spring Chinook. Escapement of summer Chinook was 72,300 (Washington Department of Fish and Wildlife, 2011). In 2010, the latest year to be reported, total escapement of adult fall Chinook salmon to the Hanford Reach was estimated to be 80,408 fish, and the number of redds observed was 8,817 (PNNL unpublished data). Escapement numbers may vary from fish counts as a result of tribal and sports fishing as well as adults that ascend the hydroelectric dams and then fall back, biasing the fishway escapement estimates. Biases can range from 1–38 percent for fall Chinook salmon from fallback at dams. It is less for spring and summer Chinook (Boggs, et al., 2004).

Figure D-1-9 illustrates the locations of the fall Chinook spawning areas in the Hanford Reach of the Columbia River. The number of fall-run Chinook salmon redds in the Hanford Reach is identified in Figure D-1-10 for years 1948–2009. From 1964–1982, estimated escapement of adult fall Chinook salmon to the Hanford Reach (the number of adults that survive natural mortality and harvest to reach the spawning grounds) averaged about 25,000 fish annually. In 2003, the adult Chinook escapement peaked at 89,300, and the number of redds observed also peaked at 9,465 (Hoffarth, 2010).

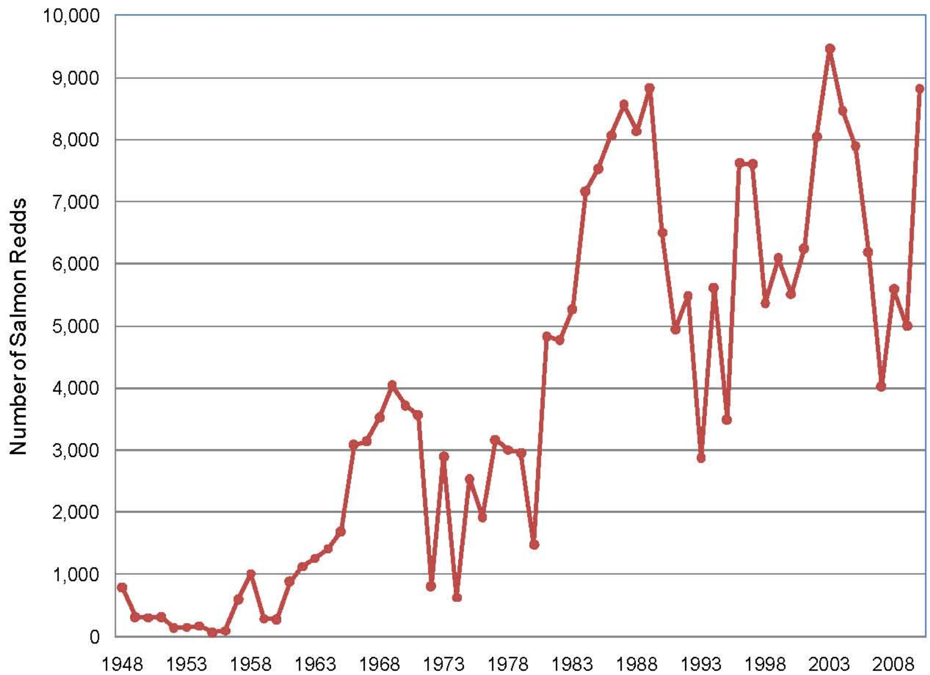

Figure D-1-9. Number of Fall Chinook Salmon Redds in the Hanford Reach of the Columbia River, 1948–2009.

Source: (Duncan, et al., 2010); unpublished data for 2010

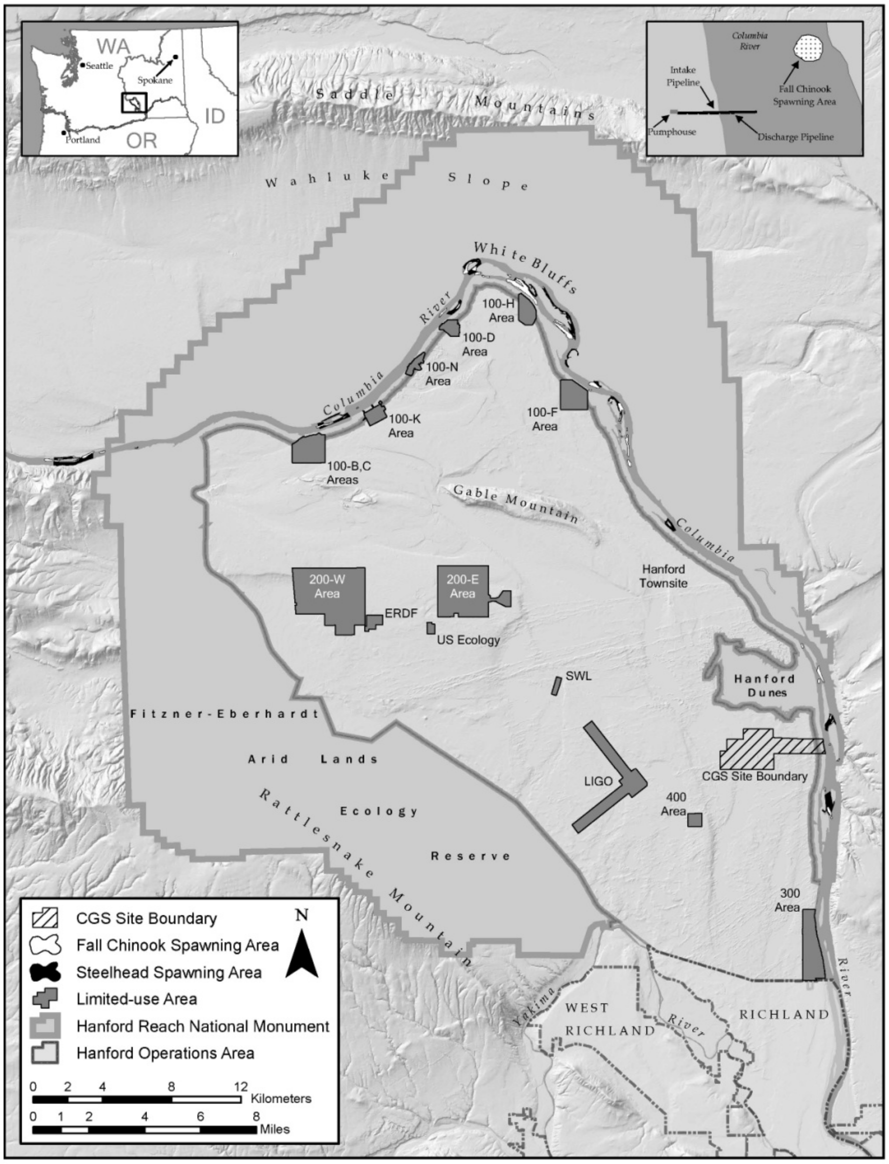

Figure D-1-10. Fall Chinook and Steelhead spawning areas in the Hanford Reach and vicinity of the CGS site

Source: (DOE, 2000), (Poston, et al., 2009)

Salmon population abundance in Pacific Northwest and Alaskan stocks appears to relate to the ocean productivity. Ocean productivity, in turn, seems to correlate with a recurring, decadal-scale pattern of ocean-atmosphere climate variability that occurs in the Northern Pacific Ocean (Good, et al., 2005). Marine productivity was not favorable for the majority of salmon populations for the two decades that began in 1977, but a shift in ocean-atmospheric conditions occurred around 1998 and the increased returns of salmon to Pacific Northwest Rivers since that time may be a result of this shift to more favorable conditions.

D-1.4.2.3 Endangered Species Act Listing History

NMFS listed the Upper Columbia River spring Chinook salmon as an endangered species in 1999 and reaffirmed this status in 2005. The main consideration for NMFS when listing the Upper Columbia River spring Chinook salmon as an endangered species was the concern that the species was at risk of becoming extinct in the foreseeable future (64 FR 14308).

On September 2, 2005, NMFS published a final rule that revised the critical habitat for the designation of critical habitat for 12 ESUs of West Coast salmon and steelhead including the spring-run Chinook salmon (70 FR 52630). NMFS designated all naturally-spawned populations of Chinook salmon in all river reaches accessible to Chinook salmon in Columbia River tributaries upstream of the Rock Island Dam and downstream of Chief Joseph Dam, excluding the Okanogan River, as being within the ESU for the species (64 FR 14308), (70 FR 37160). The ESU contains the only remaining genetic resources of those spring-run Chinook salmon that migrate into the upper Columbia River Basin, and those salmon are distinct from other stream-type Chinook salmon ESUs (64 FR 14308). Chinook salmon have characteristics specific to the location of their spawning areas and the time they spend in the river. The drainages (Wenatchee, Methow, and Entiat rivers) that support this ESU for the spring-run Chinook salmon are all above Rock Island Dam, which is upstream of CGS. Historically, the spring-run Chinook may also have used portions of the Okanogan River (Good, 2005)

NMFS has been developing a series of biological opinions to address the restoration of the species from the operation of the Federal Columbia River Power System (FCRPS). The FCRPS consists of 31 Federally-owned and operated (U.S. Army Corps of Engineers and the Bureau of Reclamation) hydro projects in the Columbia and Snake Rivers. The BPA markets and distributes the power generated by these dams and CGS (BPA, 2010). In addition, NMFS has prepared biological opinions for the relicensing of the five dams on the Columbia River that are owned and operated by public utilities, including Priest Rapids Dam, which is owned and operated by Public Utility District No. 2 of Grant County (Lohn, 2004).

The actions covered by the NMFS' biological opinions for the Upper Columbia River spring Chinook salmon range from modification of the dams to habitat improvements in areas away from the dams. NMFS characterizes the program that is responsible for implementing the biological opinion as being a "large and complicated program that is commensurate with the scale of the FCRPS and its impact on the listed species and critical habitat." The program calls for the following (NMFS, 2010):

> increasing survival rates of fish passing through the dams; managing water to improve fish survival; reducing the numbers of juvenile and adult fish consumed by fish, avian, and marine mammal predators; improving juvenile and adult fish survival by protecting and enhancing tributary and estuary habitat; implementing

safety net and conservation hatchery programs to assist recovery; and ensuring that hatchery operations do not impede recovery.

A recent review of the NMFS 2008 biological opinion for the FCRPS (NMFS, 2010) included evaluation of the status of the Upper Columbia River spring Chinook salmon and additional actions to build on the 2008 biological opinion. The evaluation of new information collected across the critical habitat for spring-run Chinook salmon indicates that the aggregate populations of the species have been stable or increasing over the last decade. These results suggest that the actions identified in the reasonable and prudent alternative may be working and are encouraging for the new Adaptive Management Implementation Plan.

D-1.4.2.4 Designated Essential Fish Habitat in the Vicinity of Columbia Generating Station

The staff has determined that EFH exists in the vicinity of CGS for all three runs of the Upper Columbia River Chinook salmon. Table D-1-4 lists the environmental requirements for all three runs of the Upper Columbia River Chinook EFH. Table D-1-5 lists the lifestages of the Upper Columbia River Chinook salmon that are present in the Hanford Reach.

Table D-1-4. Upper Columbia River Chinook Salmon EFH descriptions by life stage

Life stage	Habitat type	Temperature	Water depth	Flow	Seasonal occurrence in estuaries
		Spring run			
Eggs	Upper reaches of tributaries upstream of the Hanford Reach (Freshwater)	41–58 °F (5–4.4 °C)	0.2–23 ft (0.05–7 m)	0.3–6.6 fps (10–200 cm/s)	Not applicable
Alevins	Upper reaches of tributaries upstream of the Hanford Reach (Freshwater)	54–55 °F (12–13 °C)	0.2–23 ft (0.05–7 m)	0.3–6.6 fps (10–200 cm/s)	Not applicable
Young juveniles	Tributaries upstream of the Hanford Reach (Freshwater)	54–55 °F (12–13 °C)	3 ft (1 m)	0.8–0.9 fps (24–27 cm/s)	Not applicable
Migrating smolts	Mainstem Columbia River (Freshwater to saline estuary)	54–55 °F (12–13 °C)	midchannel–lower depths	1.4 fps (43 cm/s)	March–June
Juveniles	Mainstem Columbia River/Estuary/ocean (Estuary to seawater)	54–55 °F (12–13 °C)	variable	----	March–June
Adults	Pacific Ocean (Seawater)	41–59 °F (5–15 °C)	0–>60 fathoms (fm) (110 m) but most abundant in 30–40 fm (57–73 m)	----	Not applicable
Migrating adults	Estuary/Mainstem Columbia River/Tributaries (Seawater to freshwater)	38–56 °F (3.3–13.3 °C)	variable	3.6–22.3 fps (1.1–6.8 m/s); 8 fps (2.44 m/s)	March–May

Life stage	Habitat type	Temperature	Water depth	Flow	Seasonal occurrence in estuaries
Spawning adults	Tributaries (Freshwater)	42–57°F (5.6–13.9°C)	0.2–23 ft (0.05–7 m)	0.3–5 fps (10–150 cm/s)	Not applicable
		Summer run			
Eggs	Lower reaches of tributaries upstream of the Hanford Reach (Freshwater)	41–58 °F (5–14.4 °C)	2 in.–23 ft (0.05–7 m)	1–3.6 fps (32–109 cm/s)	Not applicable
Alevins	Lower reaches of tributaries upstream of the Hanford Reach (Freshwater)	54–55 °F (12–13 °C)	0.2–23 ft (0.05–7 m)	1–3.6 fps (32–109 cm/s)	Not applicable
Young juveniles	Tributaries upstream of the Hanford Reach (Freshwater)	54–55 °F (12–13 °C)	3 ft (1 m)	0.16–0.83 fps (5–25 cm/s)	Not applicable
Migrating smolts	Mainstem Columbia River including Hanford Reach; to estuary (Freshwater to saline estuary)	54–55 °F (12–13 °C)	midchannel–lower depths	0.16–0.83 fps (5–25 cm/s)	April–July until Aug/Sept
Juveniles	Estuary/Ocean (Saline estuary to seawater)	54–55 °F (12–13 °C)	variable	----	April–July until Aug/Sept
Adults	Ocean (Seawater)	41–59 °F (5–15 °C)	0–>60 fm (110 m) but most abundant in 30–40 fm (57–73 m)	----	Not applicable
Migrating adults	Mainstem Columbia River including Hanford Reach (Seawater to freshwater)	57–68 °F (13.9–20 °C	variable	3 fps (0.9 m/s) to over 11 fps (3.35 m/s)	June–July
Spawning adults	Lower reaches of tributaries upstream of Hanford Reach (Freshwater)	42–57 °F (5.6–13.9°C)	2 in.–23 ft (0.05–7 m)		Not applicable
		Fall run			
Eggs	Mainstem Columbia River including the Hanford Reach buried under 10 to 33 cm of gravel (Freshwater)	Below 62 °F (17 °C) 41–58 °F (5–14.4 °C)	1 in–23 ft (2.5 cm–7 m)	2.2–6.6 fps (0.67–2 m/s)	Not applicable
Alevins	Mainstem Columbia River including the Hanford Reach (Freshwater)	59–64 °F (15–18 °C)	1 in–23 ft (2.5 cm–7 m)	2.2–6.6 fps (0.67–2 m/s)	Not applicable
Young juveniles	Mainstem Columbia River including the Hanford Reach (Freshwater)	59–64 °F (15–18 °C)	Greater than 3 ft (1 m) deep	0.16–1.3 fps (5–41 cm/s)	Not applicable
Migrating smolts	Mainstem Columbia River (Freshwater to saline estuary)	54–55 °F (12–13 °C)	Greater than 3 ft (1 m) deep	0.16–1.3 fps (5–41 cm/s)	April–July until Aug/Sept

Life stage	Habitat type	Temperature	Water depth	Flow	Seasonal occurrence in estuaries
Juveniles	Estuary/Ocean (Saline estuary to seawater)	54–55 °F (12–13 °C)	variable	----	April–July until Aug/Sept
Adults	Ocean (Seawater)	41–59 °F (5–15 °C)	0–>60 fm (110 m) but most abundant in 30–40 fm (57–73 m)	----	Not applicable
Migrating adults	Mainstem Columbia River including Hanford Reach (Seawater to freshwater)	51–67°F (10.6–19.4°C)	variable	3.6–22.3 fps (1.1–6.8 m/s) 8 fps (2.44 m/s)	August–November
Spawning adults	Mainstem Columbia River including the Hanford Reach (Freshwater)	42–57°F (5.6–13.9°C)	1 in–23 ft (2.5 cm–7 m)	6.6 fps (2 m/s)	Not applicable

Sources: (Chapman, et al., 1986), (Dauble, et al., 1989), (Healy, 1991), (Levy and Slaney, 1993), (Quinn, 2005), (University of Washington, 2011), (Wydoski and Whitney, 2003)

Table D-1-5. Upper Columbia River Chinook Salmon life stages present in the Hanford Reach

Life stage	Spring run	Summer run	Fall run
Eggs			x
Alevins			x
Young juveniles			x
Migrating smolts	x	x	x
Juveniles			
Adults			
Migrating adults	x	x	x
Spawning adults			x

D-1.4.3 Upper Columbia River Steelhead (*Oncorhynchus mykiss*)

D-1.4.3.1 Life History

Steelhead are the anadromous form of rainbow trout, and both forms can coexist in the same river system. Steelhead migrate to the ocean as smolts. However, they may spend 1–7 years in freshwater before they migrate into the ocean. Most steelhead in Washington state become smolts at age 2 (70–90 percent) and the remainder at age 3 (55–100 percent). Although most steelhead make their first spawning migration after 2 years in the ocean, the stocks that originate in the Columbia River drainage mature after 1 year in the ocean (Wydoski and Whitney, 2003). There are two types of steelhead—stream-maturing, which enter the freshwater earlier in the summer to early fall and then spawn in the spring and ocean-maturing, which enter freshwater between November and April and spawn shortly thereafter. The steelhead in the upper Columbia River Basin are almost exclusively the stream-maturing type that is considered the summer run (NOAA, 2011b). The peak runs of steelhead in the upper Columbia River Basin pass Bonneville Dam between June and August and arrive in the Hanford Reach area in late summer (Wydoski and Whitney, 2003). The adult steelhead do not spawn until the following spring (March–June, possibly as late as July). Some of the adults survive and return downstream to the ocean (termed “kelts”) (FERC, 2006).

Spawning in the Hanford Reach likely occurs between February and early June, with a peak in mid-May (Mueller and Geist, 1999). Steelhead construct redds in gravel substrate for their eggs. The redds are larger than those of other salmonids. Redds are located in water depths that range from 0.7–1.34 ft deep with a water velocities of 1.8–2.3 fps. Several inches to a foot of gravel are used to cover the eggs. Incubation time is about 40 days with water temperatures of 50 degrees Fahrenheit (Wydoski and Whitney, 2003. Fry emerge from the gravel 2–3 weeks after hatching (FERC, 2006) and remain in the peripheral waters of the pools until they are large enough to maintain themselves in the current (Wydoski and Whitney, 2003). As steelhead fry emerge from the river substrate and start to feed, they are about 1-in. (2.5-cm) long and vulnerable to predation, so they seek cover. Juveniles usually remain in tributary streams for 2 years before becoming smolts and migrating to the ocean (Dauble, 2009). Depending on the temperature and productivity of the stream, it may take 1–7 years to reach smolt size (6–8 in. (15–20 cm)) (FERC, 2006), (Wydoski and Whitney, 2003). If they remain in freshwater for their entire lives, they are considered rainbow trout (Dauble, 2009). Smolt migrate downriver primarily in the late spring.

Juvenile steelhead behave differently in the Hanford Reach than they do in the slower moving reservoirs of the Columbia River. They move through the area in the vicinity of the CGS site in the deepest part of the river, although they tend to stay towards the surface when they are migrating through reservoirs. Most of the migration is at night, and the juvenile steelhead rest and feed near the shore during the day (Dauble, 2009).

Juvenile steelhead in freshwater feed on drifting mayflies, caddisflies, and chironomids as well as terrestrial insects and earthworms. Juvenile and adult steelhead in the ocean consume invertebrates such as barnacle larvae, copepods, squid, and amphipods as well as fish such as juvenile rockfish, sandlance, brown Irish lord (sculpin), and greenlings (Wydoski and Whitney, 2003)

D-1.4.3.2 Population Trends

Identification of steelhead redds is difficult because, unlike the fall Chinook salmon, they spawn primarily in the spring, and the high, turbid spring runoff obscures visibility (DOE, 2000). Aerial surveys, boat-deployed video, and digging in the gravels are methods used to confirm the existence of steelhead redds in the Hanford Reach. However, known historic areas where steelhead have prepared redds are shown in Figure D-1-10. Aerial surveys identified two regions having characteristics associated with steelhead redd characteristics, including the area upstream of the CGS intake structure between Islands 12 and 13 (RM 352) and another downstream near Island 15 (RM 349). In 2005, four redds were observed near Island 15 using a boat-deployed video camera, but no indication of spawning activity was observed; no redds were found around Islands 12 and 13 (Hanf, et al., 2006). From 2006–2008, aerial surveys did not find any evidence of steelhead spawning near the CGS intake and discharge structure (Duncan, et al., 2008), (Hanf, et al., 2006), (Hanf, et al., 2007), (Poston, et al., 2009).

Hatchery programs, including the Ringold Facility upstream of the CGS site, augment the natural spawning efforts in the mainstem Columbia River (Lohn, 2004). A total of six artificial propagation programs exist in the upper Columbia River, including in the Wenatchee, Methow, and Okanogan Rivers and near Winthrop and Omak.

Fish counts for steelhead (both hatchery and wild counts) are listed in Table D-1-6.

Table D-1-6. Fish counts for Steelhead, 2005–2010

	Steelhead (wild & hatchery)				Steelhead (wild only)		
Year	McNary	Ice Harbor	Difference	Priest Rapids	McNary	Ice Harbor	Difference
2005	224,611	156,801	67,810	12,472	58,727	35,571	23,156
2006	205,235	124,813	80,422	10,408	46,630	27,697	18,933
2007	216,631	154,739	61,892	15,183	53,064	31,675	21,389
2008	221,377	172,410	48,967	16,625	58,780	42,003	16,777
2009	408,157	328,105	80,052	39,968	10,8792	76,434	32,358
2010	262,527	206,971	55,556	26,476	89,504	58,743	30,761

Source: (University of Washington, 2011)

D-1.4.3.3 Endangered Species Act Listing History

The Upper Columbia River steelhead was listed as an endangered species on August 18, 1997 (62 FR 43937). The status was upgraded to threatened on January 5, 2006 (71 FR 834), reinstated to endangered in June 2007 based on a district court ruling (*Trout Unlimited v. Lohn*, C06-0483-JCC, 2007), and then upgraded to threatened by U.S. District Court order in June 2009. The Upper Columbia River steelhead is currently listed as threatened (74 FR 42605) by the NMFS. The listing is defined as the “Distinct Population Segment (DPS) including all naturally spawned anadromous steelhead populations below natural and manmade impassable barriers in streams in the Columbia River Basin, upstream from the Yakima River, Washington, to the U.S.-Canada border” (71 FR 834). The steelhead associated with six artificial propagation programs are also part of the listing, including the Wenatchee River, Wells Hatchery (in the Methow and Okanogan rivers), Winthrop National Fish Hatchery, Omak Creek, and the Ringold steelhead hatchery programs (71 FR 834). NMFS reports that, based on genetic evidence, hatchery stocks remain closely related to the naturally spawned populations, and they maintain the local genetic distinctiveness of populations that are within the DPS. Critical habitat for the Upper Columbia River steelhead was designated on September 2, 2005 (70 FR 52630), and final revised protective regulations were issued for this DPS on February 1, 2006 (71 FR 5178). The revised protective regulations apply take prohibitions from ESA Section 9 (a)(1) to unmarked anadromous fish with an intact adipose fin that are part of the Upper Columbia River steelhead DPS. Clipping the adipose fins of hatchery fish just prior to their release differentiates them from wild fish.

D-1.4.4 Coho Salmon (*Oncorhynchus kisutch*)

D-1.4.4.1 Life History

Coho salmon are anadromous. They have a slightly different life history than Chinook salmon, although they both spawn in freshwater and both die after spawning. The juvenile coho normally spend a year in freshwater before they become smolts and migrate to the ocean. They live in the ocean for about 18 months, although some fish return after only 5–7 months. The fish that return after less than a year in the ocean are termed jacks (precocious male coho salmon that become sexually mature 1 year earlier than the typical adult coho). Mature adults return at age 3 (Wydoski and Whitney, 2003) and enter freshwater between early August to mid-November in Washington State after spending about 18 months in the Pacific Ocean. Like the Chinook salmon, there is also a summer run of coho salmon that enter the rivers in late spring or early summer. However, unlike the Chinook, they tend to spawn at the same time no matter when they enter the freshwater (PFMC, 2000), (Wydoski and Whitney, 2003).

Coho have been described as the least particular salmonid in terms of their choice of spawning area. They spawn in mountain streams in riffles or on gravel bars in large rivers and tributaries (Sandercock, 1991). However, they tend to select gravel sites that have good circulation of oxygenated water and nearby cover (PFMC, 2000), (Sandercock, 1991). After spawning, the adults die. The alevins hatch in about 6–8 weeks (depending on the temperature of the water), and the young emerge from the gravel about 2–3 weeks after hatching (Dauble, 2009). Days to emergence are reported to range from 28 days at 51 degrees Fahrenheit (10.7 degrees Celsius) to 137 days at 36 degrees Fahrenheit (2.2 degrees Celsius) has been reported (PFMC, 2000). The young usually congregate in pools in the stream after emergence (Wydoski and Whitney, 2003). Their preferred habitat includes areas with abundant prey and different types of pools, glides, and riffles with large woody debris, undercut banks, and overhanging vegetation. They prefer temperatures in the water to be around 50–59 degrees Fahrenheit (10–15 degrees Celsius), although they can tolerate temperatures between 32–79 degrees Fahrenheit (0–26 degrees Celsius). DO levels need to be above 4 mg/L; a sustained concentration less than 2 mg/L is lethal (PFMC, 2000).

Dauble (2009) indicated that coho in the upper Columbia River remain 1–2 years before becoming smolts and are approximately 3–6 in. (8–15 cm) long when they migrate. Migration occurs between March and late June, with the peak from late April to mid-June, depending on the stock and the run (Wydoski and Whitney, 2003). Downstream migration timing for Priest Rapids Dam is April–June (FERC, 2006).

The diet of juvenile coho consists primarily of zooplankton, such as *Daphnia*, and emerging aquatic insects. In streams, coho feed on insects, mayflies, and stone flies as well as worms, fish eggs, and fish. They are also known to eat steelhead larvae. It is thought that the Columbia River coho salmon juveniles remain in the estuary for several days to weeks. In the estuary, the salmon consume large planktonic or small nektonic animals, including amphipods, insects, decapods larvae, and larval and juvenile fish. While in the ocean, juvenile coho off the coast of Oregon and Washington feed on Pacific herring and smelt during strong upwelling years or on northern anchovy and juvenile rockfish during poor upwelling years. They consume invertebrates such as crab larvae, amphipods, copepods, squid, and euphausiid shrimp (Wydoski and Whitney, 2003).

D-1.4.4.2 Population Trends

Coho are found from Monterey Bay, CA, north to Point Hope, AK. They are also found in northeast Asia from the Anadyr River south to Hokkaido, Japan. They are anadromous and were once abundant in the tributaries of the upper Columbia and Snake Rivers. Commercial harvest of coho peaked in the Columbia and Snake Rivers in 1925 and then declined. Spawning populations were observed in the Columbia River as recently as 1970, and natural migrations disappeared by the mid-1970s (Wydoski and Whitney, 2003). Factors that caused the loss of coho to the upper Columbia River include the construction and operation of hydroelectric, irrigation and splash dams (used as reservoirs to transport logs), degradation of streams, and high fishing mortality (Wydoski and Whitney, 2003). Hatcheries were built in the lower part of the river to mitigate the loss of habitat caused by dams. Building the hatcheries in the lower part of the river was meant to minimize mortality from dams. However, the salmon from these hatcheries concentrated in the lower river, which resulted in heavy fishing pressure. The wild fish also mixed with the hatchery fish and were unable to maintain themselves; thus, they were eliminated. Currently, coho salmon are being restocked into the Methow, Wenatchee, and Yakima Rivers in an effort to reestablish the runs in the mid-Columbia.

In the late 1990s, coho salmon catches in Alaska were at historically high levels, and the abundance trends were stable (PFMC, 2000). However, stocks of wild coho salmon from the Columbia River Basin above Bonneville Dam are thought to extirpated, and natural migrations disappeared in the mid-1970s (Dauble, 2009), (FERC, 2006). Hatcheries in the Methow and Wenatchee Rivers supplement the current population. Efforts are being made to reestablish runs (FERC, 2006).

Table D-1-7 shows the numbers of adult (not jack) coho that passed through the Hanford Reach and by Priest Rapids Dam from 2005–2010.

Table D-1-7. Numbers of adult (not jack) Coho that passed through the Hanford Reach and by Priest Rapids Dam, 2005–2010

Year	Adult Coho
2005	17,779
2006	11,838
2007	18,436
2008	15,867
2009	28,411
2010	12,152

Source: (University of Washington, 2011)

D-1.4.4.3 Endangered Species Act Listing History

The wild coho salmon is extinct in the upper Columbia River. The NMFS lists coho salmon as threatened for the lower Columbia River from the mouth of the river upstream to and including the Big White Salmon and Hood Rivers, downstream of the Hanford Reach. It does not have

ESA status or include critical habitat in the Hanford Reach or the upper Columbia River or critical habitat. However, the Columbia River in the vicinity of the CGS plant (the Hanford Reach) provides EFH features for the coho salmon, which is currently an unlisted reintroduction effort. The NMFS, in its letter to the NRC dated June 23, 2010 (Suzumoto, 2010), asked that the staff include the Upper Columbia River coho in consultation and assess the likely adverse effects of the project on their essential habitat.

D-1.4.4.4 Designated Essential Fish Habitat in the Vicinity of Columbia Generating Station

The staff has determined that EFH for coho salmon may exist in the vicinity of CGS. The NMFS has designated coho salmon EFH in the Columbia River in the vicinity of the CGS plant. Environmental requirements for coho salmon EFH are listed in Table D-1-8. Table D-1-9 illustrates the lifestages of the Upper Columbia River Chinook salmon that are present in the Hanford Reach.

Table D-1-8. Coho Salmon EFH descriptions by life stage

Life stage	Habitat type	Temperature	Depth	Flow	Seasonal occurrence in estuaries
Eggs	Gravel sites with good circulation of oxygenated water & nearby cover; 20% fine sediment, 0.5–4 in. (1.3–10.2 cm) gravel (Freshwater)	39–52 °F (4–11 °C)	9.8 in. (25 cm) (range 7–15.4 in. (17.8–39.1 cm)) in gravel; depth of water 6.2 in. (15.7 cm) (range 4.0–7.99 in. (10.2–20.3 cm))	0.98–1.8 fps (0.30–0.55 m/s)	Not applicable
Alevins	Remain in the redds (Freshwater)	33–51 °F (0.8–10.7 °C)	May move downward in redds 2–8 in. (5–20 cm); depends on size of gravel spaces	0.98–1.8 fps (0.30–0.55 m/s)	Not applicable
Young juveniles	Pools, glides, and riffles with large woody debris, undercut banks, & overhanging vegetation (Freshwater)	Preferred 54–57 °F (12–14 °C) (can tolerate 32–77 °F (0–25 °C)	Summer—10–11 in. (25–28 cm) deep; by December 17.7-in. (45-cm) depth	0.3–<1 fps (9–<30 cm/s) <1.5 fps (47 cm/s)	Not applicable
Migrating smolts (juveniles)	Mainstem of river to estuary (Freshwater to saline)	41–56 °F (5–13.3 °C) (Alaska)	Surface oriented	<8 fps (2.44 m/s)	April–July
Adults	Ocean—normally stay south of Vancouver Island (Saltwater)	Highest minimum ocean temperatures 41–43 °F (5–5.9 °C); not generally found in water cooler than 7 °C	Up to 100 ft (30 m)	Ocean	Not applicable
Migrating adults	Estuary/River (saltwater to freshwater)	Variable	Variable	<8 fps (2.44 m/s)	August–November

Life stage	Habitat type	Temperature	Depth	Flow	Seasonal occurrence in estuaries
Spawning adults	Mountain streams in riffles or gravel bars in large rivers & tributaries (Freshwater)	45–60 °F (7.2–15.6 °C)	Minimum depth 7 in. (18 cm)	1 fps (31 cm/s)	Not applicable

Source: (Laufle, et al., 1986), (Lestelle, 2007), (PFMC, 2000), (Sandercock, 1991), (University of Washington, 2011), (Wydoski and Whitney, 2003)

Table D-1-9. Coho life stages currently present in the Hanford Reach

Life stages	Present in Hanford Reach
Eggs	
Alevins	
Young juveniles	
Migrating smolts	x
Juveniles	
Adults	
Migrating adults	x
Spawning adults	

D-1.5 Endangered Species Act Effects Analysis

D-1.5.1 Bull Trout

The USFWS considers the Hanford Reach of the mainstem Columbia River to be a potential migratory corridor for bull trout (USFWS, 2010b). Migratory corridors are important for bull trout. According to Rieman and McIntyre (1993), migratory corridors allow salmonids to stray and interbreed with individuals in non-natal streams. Migration is also important for the reestablishment of populations following catastrophic events that decimate the population.

However, observation of bull trout in the Hanford Reach is rare, and it is likely that they seldom use this migratory corridor. Resource scientists at DOE's Hanford Site have characterized the use of the Hanford Reach by bull trout as transient (Poston, et al., 2009). USFWS (2008) indicated that the accounts of bull trout in the Hanford Reach are "anecdotal," and it is "likely individuals moved downstream during the spring freshet."

Furthermore, the habitat and water temperatures in the Hanford Reach are not ideal for spawning, and there are no reports of spawning activity by bull trout in the vicinity of CGS (Dauble, 2009), (Marten, 2007). Variation in the size of the river channel as a result of changing flows from Priest Rapids Dam and the lack of cover also make it unlikely that the bull trout are spawning in the Hanford Reach. The temperature range in the Hanford Reach exceeds the maximum temperature for the bull trout spawning. Data from previous years (WPPSS, 1986) show that the temperature of the river is above 59 degrees Fahrenheit (15 degrees Celsius) from the end of June or July until at least the middle of October. During these periods, the bull trout are unlikely to even be present in the Hanford Reach.

The lack of spawning in the Hanford Reach means that there is no potential for young bull trout or bull trout eggs to be entrained or impinged at the CGS site. Furthermore, entrainment studies conducted in 1979–1980 and 1985 did not collect any life stage of fish (EN, 2010), (WPPSS, 1986). Impingement studies conducted over the same period did not observe any fish impinged on the intake screens (EN, 2010), (WPPSS, 1986). Healthy adult bull trout that commonly inhabit rivers with water velocities above 4 fps (1.2 m/s) would not be susceptible to impingement with a through-screen velocity of 0.5 fps (15 cm/s).

As discussed previously, bull trout actively select cooler water, so there would be little potential for them to be affected by the thermal or chemical discharge from the CGS plant. The thermal effluent from the blowdown discharge during the spring is a long, narrow plume, comprising approximately 1 percent of the width of the river, and bull trout would likely avoid it while migrating or foraging.

Because this stretch of the river is not spawning or rearing habitat for bull trout, and because bull trout are so rare in this area, the staff has determined that the continued operation of CGS will have no effect on the bull trout.

D-1.5.2 Upper Columbia River Chinook Salmon

The endangered Upper Columbia River spring Chinook salmon are found in the vicinity of the intake and discharge systems for CGS as they migrate through the Hanford Reach as adults or as juveniles as they migrate downstream. As a result, there is a potential for the continued operation of the CGS plant during the renewal period to affect the Upper Columbia River spring Chinook.

As discussed in Section D-1.4.2.1, Upper Columbia River spring Chinook salmon do not spawn in the Hanford Reach. Adults start returning from the ocean in early spring and pass through the Hanford Reach while migrating to upstream spawning grounds in the Wenatchee, Entiat, Methow, and Okanogan river basins (70 FR 52630), (Lohn, 2004). Juveniles pass through the Hanford Reach while migrating downstream toward the ocean after spending 1–2 years in the upper tributaries (Wydoski and Whitney, 2003). The travel time for a juvenile through the Hanford Reach is generally less than 1 week; outmigration of the juvenile spring Chinook extends from April to the end of August (DOE, 2000).

Young-of the-year spring Chinook in the upper Yakima River Basin preferred water depths from 1.6–1.8 ft deep (49–55 cm), with bottom velocities of 0.8–0.9 fps (0.24–0.27 m/s). By spring they occupied habitats that were shallower (0.8 ft deep (24 cm)) with a bottom water velocity of 1.4 fps (0.43 m/s) (Wydoski and Whitney, 2003).

Entrainment studies conducted in 1979–1980 and 1985 did not collect any life stage of fish (EN, 2010), (WPPSS 1986). Impingement studies conducted over the same period did not observe any fish impinged on the intake screens (EN, 2010), (WPPSS 1986). Furthermore, juvenile spring Chinook are too large to be entrained in an intake with openings of $^{3}/_{8}$-in. (9.5 mm)-diameter holes. In addition, juvenile spring Chinook occupying habitats with a water velocity of 1.4 fps (0.43 m/s) are easily able to avoid impingement in an intake with a through-screen velocity of 0.5 fps (15 cm/s). Healthy migrating adult Chinook are also able to avoid impingement. Migrating Chinook salmon would also be able to avoid the narrow thermal plume, comprising approximately 1 percent of the width of the river. During thermal drift studies in 1985, juvenile fall Chinook floated in cages through the thermal and chemical effluent of the blowdown discharge had no measurable impacts from the exposure to the heated water and blowdown chemicals (WPPSS, 1986).

Because no fish, including spring Chinook, were collected during entrainment and impingement studies, and because thermal drift studies of fall Chinook and steelhead had no measurable impact on the fish, the staff determines that the continued operation of CGS may affect, but is not likely to adversely affect, the Upper Columbia River Chinook salmon.

D-1.5.3 Upper Columbia River Steelhead

Upper Columbia River steelhead have been observed spawning in the Hanford Reach and in the vicinity of the intake and discharge structures for the CGS plant in the past. The most recent confirmed observations of active steelhead redds were in 2003, below the CGS intake. From 2006–2009, the aerial surveys did not find any evidence of steelhead spawning near the CGS intake and discharge structure or in the Hanford Reach (Hanf, et al., 2007), (Poston, et al., 2008), (Poston, et al., 2010). Considering the distance upstream of previously observed redds, it is unlikely that steelhead eggs would travel to the intake structure. Steelhead redds that may, in the future, be located near the intake and discharge structures could experience entrainment of eggs that do not settle within the redd. However, eggs that do not settle are already lost from the population due to predation or other causes.

Larval steelhead from upstream redds are also vulnerable to entrainment. Upon hatching, the alevin remain in the gravel for 2–3 weeks or in the vicinity of the redd until they are able to maintain themselves in the current. Once they are able to maintain themselves in the river current, they are able to avoid the 0.5-fps (0.15 m/s) through-screen intake velocity.

Entrainment studies conducted in 1979–1980 and 1985 did not collect any life stage of fish (EN, 2010), (WPPSS, 1986). Impingement studies conducted over the same period did not observe any fish impinged on the intake screens (EN, 2010), (WPPSS, 1986).

As observed by divers in 1985, the support and riprap around the intake structure provides shelter for fish species that consume other fish (WPPSS, 1986); thus, indirectly, the intake structure might affect the survival of the fry.

Adults and juveniles can avoid the influence of the intake and discharge structures. Juvenile steelhead that migrate through the Hanford Reach do so in the deepest part of the river and stay near the river bottom (Dauble, 2009).

As mentioned previously during thermal drift studies in 1985, juvenile steelhead floated in cages through the thermal and chemical effluent of the blowdown discharge had no measurable impacts from the exposure to the heated water and blowdown chemicals (WPPSS, 1986).

D-1.6 Potential Adverse Effects to EFH

The provisions of the MSA define an "adverse effect" to EFH as the following (50 CFR 600.810):

> *Adverse effect* means any impact that reduces quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

For the purposes of conducting NEPA reviews, the staff published the "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" or "GEIS" (NRC, 1996), which identifies 13 impacts on aquatic resources as either "Category 1" or "Category 2." Category 1 issues are generic in that they are similar at all nuclear plants and have one impact level (SMALL, MODERATE, or LARGE) for all nuclear plants, and mitigation measures for Category 1 issues are not likely to be sufficiently beneficial to warrant implementation. Category 2 issues vary from site to site and must be evaluated on a site-specific basis. Table D-1-10 lists the aquatic resource issues identified in the GEIS.

Table D-1-10. Aquatic resource issues identified in the GEIS

Issues	Category	Impact level
For All Plants[a]		
Accumulation of contaminants in sediments or biota	1	SMALL
Entrainment of phytoplankton & zooplankton	1	SMALL
Cold shock	1	SMALL
Thermal plume barrier to migrating fish	1	SMALL
Distribution of aquatic organisms	1	SMALL
Premature emergence of aquatic insects	1	SMALL
Gas supersaturation (gas bubble disease)	1	SMALL
Low DO in the discharge	1	SMALL
Losses from parasitism, predation, & disease among organisms exposed to sublethal stresses	1	SMALL
Stimulation of nuisance organisms	1	SMALL
For plants with cooling-tower-based heat-dissipation systems[a]		
Entrainment of fish & shellfish in early life stages	1	SMALL
Impingement of fish & shellfish	1	SMALL
Heat shock	1	SMALL
For plants with once-through heat-dissipation systems[b]		
Impingement of fish & shellfish	2	SMALL, MODERATE, or LARGE
Entrainment of fish & shellfish in early life stages	2	SMALL, MODERATE, or LARGE
Heat shock	2	SMALL, MODERATE, or LARGE

[a] Applicable to CGS

[b] Not applicable to CGS because CGS has a closed-cycle cooling system

Source: (NRC, 1996)

The GEIS classifies all impacts levels for aquatic resources as "SMALL" except impingement, entrainment, and heat shock. "SMALL" is defined as "having environmental effects that are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource" (10 CFR Part 51, App. B, Table B-1). The staff believes that the impacts concluded to be "SMALL" will also be small for EFH. Therefore, this EFH Assessment focuses on the potential adverse effects of impingement, entrainment, and heat shock on EFH.

- **Impingement** occurs when aquatic organisms are pinned against intake screens or other parts of the cooling-water-system intake structure.
- **Entrainment** occurs when aquatic organisms (usually eggs, larvae, and other small organisms) are drawn into the cooling-water system and are subjected the thermal, physical, and chemical stress.
- **Heat shock** is acute thermal stress caused by exposure to a sudden elevation of water temperature that adversely affects the metabolism and behavior of fish and other aquatic organisms. In addition to heat shock, increased water temperatures at the discharge can also reduce the available habitat for fish species if the discharged water is higher than the environmental preferences of a particular species. This issue is discussed together with heat shock.

In addition to impingement, entrainment, and heat shock, the staff assessed the impacts on EFH species' food (forage species) in the form of displacement or loss of forage species and loss of forage species habitat. The staff also assessed cumulative impacts on EFH species or their habitat resulting from the past, present, and reasonably foreseeable future projects in the vicinity of CGS.

In summary, the staff has identified the following potential adverse effects on EFH as a result of the proposed license renewal of CGS:

- loss of habitat
- impingement
- entrainment
- thermal effects (heat shock and loss of habitat)
- loss of forage species.

The following sections address each of these issues for each of the three species identified for in-depth analysis in Section D-1.3.2. Section D-1.7 discusses cumulative effects.

D-1.6.1 Upper Columbia River Chinook Salmon

As discussed in Section D-1.4.2, the NMFS has designated EFH for Upper Columbia River Chinook salmon migrating smolts and migrating adults (spring and summer runs) as well as EFH for all life stages (fall runs) within the vicinity of CGS. The potential effects on this species' EFH as a result of the proposed action are considered in the following sections.

D-1.6.1.1 Loss of Habitat

The spring and summer runs of Upper Columbia River Chinook use the stretch of the river along the Hanford Reach as migratory and foraging habitat for the juveniles and as migratory habitat for the adults that rarely feed during their upstream migration. The fall run uses the Hanford Reach as spawning and nursery habitat. However, the removal of approximately 0.03 percent of the average mean annual discharge past the site, or 0.05 percent of the minimum mean annual discharge past the site, does not significantly alter the amount of habitat available to the Upper Columbia River Chinook salmon.

D-1.6.1.2 Impingement

Spring-run Chinook life stages are not susceptible to impingement, as discussed in Section D-1.5.2. Each individual juvenile spring Chinook salmon is only present in the Reach for a short time (approximately 1 week) and is accustomed to living in flows greater than that encountered near the intake 0.2–0.5 fps (0.06–0.15 m/s). Juvenile summer-run Chinook are also migrating through the site, but they move downriver more slowly than the juvenile spring-run Chinook. However, they are also are able to maintain themselves in flows that are faster than the intake flow velocities and, thus, are not susceptible to impingement. In general, ocean-type juveniles orient toward the current and are able to maintain their positions during the day for velocities that range from 0.16 to less than 0.83 fps (5–25 cm/s). They drift downstream at velocities of 0.83–1.3 fps (25–41 cm/s) during the day and at lower velocities at night (Wydoski and Whitney, 2003).

In the Hanford Reach, the fall Chinook remain in the area for the first few months after emergence generally at water depths of less than 3 ft (0.9 m). They move to deeper water when they are larger and closer to the time of their migration (Wydoski and Whitney, 2003). Fall Chinook in the Hanford Reach are reported to be able to maintain their position in waters with velocities up to 1.3 fps (41 cm/s); thus, they are not susceptible to the approach velocity of an intake of less than 0.2 fps (0.06 m/s) (WPPSS, 1980) or a through-screen velocity of less than 0.5 fps (0.15 m/s). Studies conducted in 1978, 1979, and 1985 looked for—but did not find—any fish or debris impinged on the screens (EN, 2010), (WPPSS, 1986). However, the 1985 study did find that fish were using the intake support system for cover and resting, including largescale suckers (*Catostomus macrocheilus*), mountain whitefish (*Prosopium williamsoni*), sculpins (*Cottus* spp.), Northern pikeminnow (*Ptychocheilus oregonensis*), bass (*Micropterus* spp.), redside shiner (*Richardsonius balteatus*), and American shad (*Alosa sapidissima*) (WPPSS, 1986). During one of the observation periods for impingement in 1985, samples of juvenile Chinook were collected, showing that anadromous species were in the area of the intake screens but were not being affected by the water withdrawal (WPPSS, 1986).

D-1.6.1.3 Entrainment

Spring-run Chinook salmon life stages are not susceptible to entrainment. Juvenile spring Chinook migrating through the Hanford Reach are too large to be entrained through the $^{3}/_{8}$-in. (9.5-mm) holes in the intake structure screen. Summer-run Chinook salmon life stages that pass thorough the Hanford Reach are also not susceptible to entrainment.

Fall-run Chinook salmon spawn in the Hanford Reach and, therefore, need to be considered further to determine the potential for entrainment of the eggs and alevins or smolts that occur upstream of the intake. As discussed in Section D-1.4.2, the adult salmon lay their eggs in redds in gravel with an approximate 4–13 in. (10–33 cm), averaging 7.4 in. (18.8 cm) of gravel covering the eggs (Healey, 1991). The eggs in the redds are not susceptible to entrainment unless disturbed. Although some eggs are lost during spawning, these eggs will not survive even in the absence of entrainment.

Upon hatching, the alevins live in the gravel for about 2–3 weeks and, in general, move deeper into the gravel after hatching (Quinn, 2005). Because the alevins remain close to the redds, they would not be susceptible to entrainment. Young juveniles can maintain their position in the current and would not be susceptible to entrainment by the intake, which has a slower approach velocity then the current.

No fish, fish eggs, or larvae were collected during entrainment studies completed in 1979–1980 and 1985. In the 1985 study, beach seine samples collected juvenile Chinook salmon (averaging 43 mm in length), confirming their presence in the area (EN, 2010), (WPPSS, 1986).

D-1.6.1.4 Thermal Effects

Migrating Chinook salmon would also be able to avoid the thermal plume that forms a long, narrow plume, approximately 1 percent of the width of the river. During thermal drift studies in 1985, juvenile fall Chinook floated in cages through the thermal effluent of the blowdown discharge had no measurable impacts from the exposure to the heated water (WPPSS, 1986).

D-1.6.1.5 Loss of Forage Species

As mentioned previously, adult Chinook salmon do not feed during upstream spawning migration. However, the smolts descending downstream do feed. The juveniles forage on aquatic insects (Dauble, 2009). The movement of a juvenile through the Hanford Reach lasts no more than 1 week; outmigration of the juvenile spring Chinook extends from April to the end of August (DOE, 2000). Fall Chinook salmon juveniles spend more time in the Hanford Reach than the spring or summer Chinook. They feed on midege larva and zooplankton, progressing to caddisfly larvae and other aquatic insect larvae and some terrestrial insects (Dauble, 2009). The loss of food as a function of the water withdrawn is likely less than the 0.03 percent of the average mean annual discharge because the water for the CGS plant is drawn from the bottom of the river, rather than from the more productive shallower areas of the river

D-1.6.2 Coho Salmon

As discussed in Section 4.4, the NMFS has designated EFH for coho salmon, which is currently an unlisted reintroduction effort. Currently, coho are being stocked in the Wentachee and Methow Rivers in an effort to supplement the current population and reestablish the runs. Migrating adults rarely feed as they pass through the Reach. Migrating smolts do feed, most likely on insects, mayflies, and stoneflies as well as worms, fish eggs, and fish.

D-1.6.2.1 Loss of Habitat

The coho salmon use the stretch of the river along the Hanford Reach as migratory and feeding habitat for the juveniles and as migratory habitat for the adults that rarely feed during their upstream migration. The continued operation of the CGS facility will affect the habitat primarily through the removal of approximately 0.03 percent of the average mean annual discharge past the site or 0.05 percent of the minimum mean annual discharge past the site. This does not significantly alter the amount of habitat available to the coho salmon.

D-1.6.2.2 Impingement

Migrating coho smolts are too large to be impinged at the intake structure, and they are used to swimming in currents that have a higher velocity than the intake velocity. Healthy adult coho are not susceptible to impingement.

D-1.6.2.3 Entrainment

Migrating coho smolts and adult coho salmon are not susceptible to entrainment.

D-1.6.2.4 Thermal Effects

Migrating coho salmon would also be able to avoid the thermal plume that forms a long, narrow plume, approximately 1 percent of the width of the river. Migration of coho smolts occurs during the spring when the water temperature is coldest and the water velocities are the highest. In addition, thermal studies in 1985—on other salmonids that floated through the thermal effluent—indicated that the blowdown discharge had no measurable impacts from the exposure to the heated water (WPPSS, 1986).

D-1.6.2.5 Loss of Forage Species

The diet of juvenile coho consists primarily of zooplankton, such as *Daphnia*, and emerging aquatic insects. In streams, the coho feed on insects, mayflies, and stone flies as well as worms, fish eggs, and fish. They are also known to eat steelhead larvae (Wydoski and Whitney, 2003). The loss of food as a function of the water withdrawn is likely less than the 0.03 percent of the average mean annual discharge because the water for the CGS plant is drawn from the bottom of the river rather than from the more productive shallower areas of the river.

D-1.7 Endangered Species Act and Essential Fish Habitat Cumulative Effects Analysis

The irreversible changes to aquatic life in the Columbia River started with the completion of the first hydropower project, Rock Island Dam, in 1933. Specific alterations are documented with the completion of other dams in the Columbia River basin. Hydropower has been a significant contributor to the decline of native anadromous species, including the Upper Columbia River spring Chinook salmon (Dauble, 2009), (Dauble and Watson, 1997), (Wydoski and Whitney, 2003).

The upper Columbia River migratory salmonids are subjected to passage mortalities from four lower Columbia River Federal dam projects and a variety of Mid-Columbia River Public Utility District dam projects (seven mainstem dams for the Wenatchee River; eight dams for the Methow, and nine for the Okanagan River). Hydropower projects affect passage mortality during upstream and downstream migrations, cause river fluctuations associated with upstream dam operations that affect habitat and spawning success, create migratory blocks, and increase fishing pressure. Fall Chinook and steelhead that spawn in the Hanford Reach are affected by the fluctuations of Priest Rapids Dam. This primarily affects the juvenile fall Chinook that use the shallow, low-velocity nearshore areas for rearing, feeding, cover, and protection from predators. Because fall Chinook spawn in the late fall, the river level fluctuations in the winter have resulted in the desiccation of redds. In addition, fluctuations in water level can strand juvenile Chinook salmon on either gently sloped shorelines, gravel bars, or in shallow depressions created by receding water (Anglin, et al., 2006), (Geist, 1999), (Nugent, et al., 2002), (Wagner, 1995). Juvenile fall Chinook salmon loss estimates due to water fluctuations ranged from 45,000–1,630,000 fish a year from 1999–2003 for an 8.7 mi (14 km) section of the Hanford Reach (Anglin, et al., 2006), (Nugent, et al., 2002).

River fluctuations are now intentionally managed at Priest Rapids Dam during the fall-run Chinook spawning season in order to confine the spawning activity to lower river elevations by discouraging the salmon from spawning in areas that are exposed at low river flow in the winter. Although water management efforts at Priest Rapids Dam are improving fall Chinook salmon spawning and rearing survival, there are still concerns relating to the affects of frequent water level alterations on migration and habitat displacement.

The construction and operation of nine nuclear reactors on the Hanford Site from 1943–1987 influenced the aquatic environment of the Hanford Reach. Cofferdams restricted water flow during the placement of shoreline intake structures and discharge lines within the river. The operation of the Hanford Site led to the release of more than 60 radionuclides, numerous process chemicals, and waste heat into the Hanford Reach (Becker, 1990), (Duncan, et al., 2007). The overall impact on the aquatic resources from the operation of the Hanford Site has yet to be determined and drives ongoing cleanup activities as well as a natural resource damage assessment (Poston, et al., 2009).

The seasonal and daily water fluctuations associated with the operation of Priest Rapids Dam also may affect exposure of aquatic life to environmental contaminants from the Hanford Site. Groundwater transports contaminants from the Hanford Site to the Columbia River. High river stages can retard groundwater transport and concentrate the contaminants in the riverbank at low river stage. The benthic organisms in the river are the first receptors of contaminated groundwater. Groundwater plumes from the Hanford Site that are close to or flowing into the river include chemicals and radionuclides such as chromium, nitrate, strontium-90, tritium, and uranium. Concentrations of the chemical contaminants in the river are below ambient-water quality criteria for the protection of aquatic species. Although small amounts of radioactive materials are detectable in the Columbia River water and sediment samples downstream from the Hanford Site, the amounts are far below Federal and State limits. Other sources that may contribute to the cumulative effect of chemical contaminant exposure to aquatic resources in the Hanford Reach include high concentrations of nitrate in the groundwater across from the Hanford Site, agricultural returns flowing into the river, and upstream mining activities. DOE's monitoring and remediation programs are addressing the risk to aquatic species in the Hanford Reach from the influence of contaminated groundwater (DOE, 2009), (Duncan, et al., 2007), (Miley, et al., 2007), (Poston, et al., 2009).

Another regional concern is the withdrawal of Columbia River water. Permitting by resource agencies limits the total consumptive loss and balances the need of multiple water users (EN, 2010). While the relatively few water withdrawal systems within 20 mi (32 km) are primarily for municipal use, the number of permitted withdrawals is considerable. Direct impacts on aquatic biota can occur from the intake structures (e.g., entrainment and impingement), and oversight by resource agencies and use of best available technologies that consider protection of aquatic life (e.g., screen systems and fish diversions) may minimize the effects on aquatic life. Indirect impacts on aquatic biota from consumptive water loss in the area of interest range from contributions to extreme seasonal water-level fluctuations to the loss of habitat or fish passage, water quality, and water temperature.

Development also contributes to cumulative effects on aquatic life due to decreases in water quality and available habitat. The increase in urbanization within the Columbia River Basin may lead to changes in water quality from point and non-point contaminant discharges. Water temperatures in the tributaries of the Columbia River can increase because of changes to shorelines and removal of shade structures (USFWS 2007). The recovery programs for Federally-listed species (e.g., Upper Columbia River steelhead) may affect some of these changes by enhancing fish habitat (NMFS, 2010). Resource agencies can address and minimize impacts through monitoring and permitting programs, such as the Washington State Department of Transportation's Fish Passage Program, to minimize impacts from highway crossings (WSDOT, 2010).

Pressures from recreational and commercial fishing within the Columbia River Basin contribute to the cumulative effects on the aquatic resources in the vicinity of CGS. Historically, the fitness of some species has declined (e.g., Upper Columbia River spring Chinook salmon) because of the mismanagement of some hatchery programs. Release of fish that are not genetically diverse and have behaviors that may result in increased predation are some of the issues of past hatchery practices that are currently being addressed by new programs (NMFS, 2010). Predation by pinnipeds (seals and sea lions) on adult salmon migrating upstream and smolts migrating downstream can also be substantial (Marten, 2007).

Potential cumulative effects of climate change on the aquatic species of the Columbia River could result from changes in river water flow. Climate changes may include warmer temperatures with more winter rainfall, less snowpack, and lower summer stream flows. These conditions can affect the balance of all aquatic resources in the Columbia River Basin. For the salmonids, redds could be damaged by higher winter stream flows. Less snowpack and lower summer stream flows could prevent salmonid migration into or out of smaller tributaries, and warmer waters could limit the distribution of some species. Conditions in the ocean could also be less favorable for adult salmonids from the Columbia River Basin. Climate change would lead to unfavorable conditions for Federally- and State-listed species as well as other resident aquatic species in the vicinity of CGS (Karl, et al., 2009).

D-1.8 Endangered Species Act Conclusions and Determination of Effects

D-1.8.1 Bull Trout

The staff concludes that CGS will have no effect on the threatened bull trout because this stretch of the river is not spawning or rearing habitat for bull trout and because bull trout are not common in the Hanford Reach.

D-1.8.2 Upper Columbia River Spring Chinook Salmon

The staff concludes that CGS may affect, but is not likely to adversely affect, the endangered Upper Columbia River spring Chinook salmon. No fish, including spring Chinook, were collected during entrainment and impingement studies, and thermal drift studies of fall Chinook and steelhead had no measurable impact on the fish.

D-1.8.3 Upper Columbia River Steelhead

The staff concludes that CGS may affect, but is not likely to adversely affect, the threatened Upper Columbia River steelhead. No fish, including steelhead, were collected during entrainment and impingement studies, and thermal drift studies of steelhead had no measurable impact on the fish.

D-1.9 Essential Fish Habitat Conservation Measures and Conclusions

D-1.9.1 Conservation Measures

Closed-cycle cooling systems, such as the one already operating at CGS, are the most reasonable way to mitigate the number of aquatic organisms entrained and impinged in the facility's cooling system. Entrainment studies performed in 1979–1980 and 1985 indicated that no fish, fish eggs, or larvae were collected, even though beach seine samples in 1985 indicated that juvenile salmon (averaging 43 mm in length) were present in the area. In addition, thermal and chemical drift studies showed no effect on the two species of salmonids that were tested

(EN, 2010), (WPPSS, 1986). The thermal plume encompasses approximately 1 percent of the width of the river and would be easily avoidable for migrating and residential salmonids.

D-1.9.2 Upper Columbia River Chinook Salmon

The staff concludes that CGS will have a minimal adverse effect on Upper Columbia River Chinook salmon EFH. The operation of CGS will result in the removal of approximately 0.03 percent of the average mean annual discharge past the site, or 0.05 percent of the minimum mean annual discharge past the site, and an even smaller fraction of the forage for the smolts or juvenile Chinook salmon.

D-1.9.3 Coho Salmon

The staff concludes that CGS will have a minimal adverse effect on coho salmon EFH. The operation of CGS will result in the removal of approximately 0.03 percent of the average mean annual discharge past the site, or 0.05 percent of the minimum mean annual discharge past the site, and an even smaller fraction of the forage for the coho smolts that are migrating downstream.

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NRR-PMDAPEm Resource

From: Logan, Dennis
Sent: Wednesday, September 28, 2011 5:29 PM
To: luke.gauthier@fws.gov
Cc: Imboden, Andy; Doyle, Daniel; Balsam, Briana; Krieg, Rebekah; NRR-PMDA-ECapture Resource
Subject: Revised biological assessment conclusion for bull trout in Columbia Generating Station Section 7 consultation with FWS. NRC Docket 050-00397

Dear Mr. Gauthier:

The NRC staff's August 2011 biological assessment concluded that the continued operation of the Columbia Generating Station (CGS) would have **no effect** on the **bull trout** (*Salvelinus confluentus*). After further consideration, however, the NRC staff has revised its conclusion and now believes that operation of the CGS is **not likely to adversely affect** bull trout. The following discussion summarizes the findings of the biological assessment and presents the justification for the revised conclusion.

Proposed Action

The NRC's Federal action is the decision whether to renew the CGS operating license for an additional 20 years.

CGS Water Withdrawal and Discharge Summary

In generating electricity, CGS produces heat, which is transferred to the atmosphere through evaporation using six mechanical draft cooling towers. CGS also routinely discharges a portion of cooling water to the Columbia River. The total water losses are replaced by withdrawal from the Columbia River (replacement water is called make-up water). During normal operating periods, the average makeup-water withdrawal is about 17,000 gpm (1.1 m^3/s). The plant withdraws water about 300 ft (91 m) from the shoreline through two intake screens that have an outer and inner perforated pipe sleeve to exclude adult fish. The outer sleeve has a 42-in. (107-cm) -diameter sleeve with 3/8-in. (9.5-mm)-diameter holes (composing 40 percent of the surface area). The inner sleeve has a 36-in. (91-cm)-diameter sleeve with 3/4-in. (19-mm)-diameter holes (composing 7 percent of the surface area). For the discharge, the State of Washington authorizes discharge in accordance with the special and general conditions of National Pollutant Discharge Elimination System Permit No. WA-002515-1.

Assessment of Impacts to Bull Trout

The FWS listed bull trout as threatened throughout their range in 1999. The CGS's action is the Hanford Reach, which lies within the Columbia River Distinct Population segment of bull trout. The FWS considers the Hanford Reach of the mainstem Columbia River to be a potential migratory corridor for bull trout. The Mainstem Upper Columbia River critical habitat unit (CHU) provides connectivity to the Mainstem Lower Columbia River CHUs and to 13 additional CHUs. This critical habitat is the main foraging, migration, and overwintering (FMO) habitat for the Entiat River core area and provides connectivity between several other core areas or critical habitat units. The FWS's Bull Trout Final Critical Habitat Justification indicates that bull trout reside year-round in certain areas of the mainstem of the Columbia River as either sub-adults or adults and that spawning adults may also use the mainstem of the Columbia River for up to 9 months.

Observation of bull trout in the Hanford Reach is rare, and the species may seldom use this migratory corridor. Resource scientists at DOE's Hanford Site have characterized the use of the Hanford Reach by bull trout as transient. The FWS Bull Trout Final Critical Habitat Justification indicated that the accounts of bull trout in the Hanford Reach are "anecdotal" and are "likely individuals moved downstream during the spring freshet. Furthermore, the habitat and water temperatures in the Hanford Reach are not ideal for spawning, and the NRC did not identify any reports of spawning activity by bull trout in the vicinity of the CGS during its review for the proposed CGS license renewal.

The lack of spawning in the Hanford Reach means that there is no potential for young bull trout or bull trout eggs to be entrained or impinged at the CGS site. Furthermore, entrainment studies conducted in 1979–1980 and 1985 did not collect any life stage of bull trout. Impingement studies conducted over the same period did not observe any fish impinged on the intake screens. Healthy adult bull trout that commonly inhabit rivers with water velocities above 4 fps (1.2 m/s) would not be susceptible to impingement with a through-screen velocity of 0.5 fps (15 cm/s).

Regarding the heated effluent, bull trout actively select for cooler water, thus there would be little potential for them to be affected by the thermal or chemical discharge from the CGS plant. The thermal effluent from the blowdown discharge during the spring is a long, narrow plume, comprising approximately one percent of the width of the river, and bull trout would likely avoid it while migrating or foraging.

Conclusion

Because the Hanford Reach of the river is neither spawning nor rearing habitat for bull trout and because bull trout are so rare in this area, the NRC staff's biological assessment concluded that the continued operation of CGS would have no effect on the bull trout. After further consideration, however, the NRC staff now believes that because the of the age of entrainment and impingement studies and the consideration that lack of bull trout in those samples would not absolutely preclude a take of bull trout in the future, its conclusion should be more protective and conservative. Therefore, the NRC staff revises its conclusion and now believes that operation of the CGS is **not likely to adversely affect** bull trout.

Please contact me if you have any further questions,

Sincerely,

Dennis Logan, Ph.D.
Ecologist
U.S. Nuclear Regulatory Commission
One White Flint North, Mail Stop O-11F1
11555 Rockville Pike
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Subject: Revised biological assessment conclusion for bull trout in Columbia Generating Station Section 7 consultation with FWS. NRC Docket 050-00397
Sent Date: 9/28/2011 5:28:54 PM
Received Date: 9/28/2011 5:29:00 PM
From: Logan, Dennis

Created By: Dennis.Logan@nrc.gov

Recipients:
"Imboden, Andy" <Andy.Imboden@nrc.gov>
Tracking Status: None
"Doyle, Daniel" <Daniel.Doyle@nrc.gov>
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FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office

Central Washington Field Office
215 Melody Lane, Suite 119
Wenatchee, Washington 98801

October 5, 2011

In Reply Refer To:
USFWS Reference: 01E00000-2012-0004
Hydrologic Unit Codes: 17-07-01-01-01
RE: NRC-2010-0029

9/1/2011
76FR54502
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USNRC

David J. Wrona, Chief
Division of License Renewal
Office of Nuclear Reactor Regulation

Dear Mr. Wrona:

This responds to your request for informal consultation on the Columbia Generating Station (CGS) License Renewal (Project), located in Benton County, Washington. Your August 23, 2011 cover letter and Biological Assessment (BA) were received in the U.S. Fish and Wildlife Service's (Service) Central Washington Field Office on August 31, 2011. Supplemental information and revisions to the original effects determination were received on September 29, 2011.

The U.S. Nuclear Regulatory Commission (NRC) has requested Service concurrence with the determination of "may affect, not likely to adversely affect" the bull trout (*Salvelinus confluentus*) in accordance with section 7(a)(2) of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq.*). Effects to other listed or proposed species, or their habitats, are not anticipated to occur.

The NRC is proposing to extend the current license for an additional 20 years. During normal operating periods, CGS withdraws about 17,000 gpm from the mainstem Columbia River. The pipe used to extract river water includes two intake screens and perforated pipe screens to exclude migrating adult bull trout. The pipe extends 300ft from the shoeline, which reduces impacts to near shore fish communities. For a complete description of the proposed license extension and conservation measures, please refer to the Project BA.

The Project BA describes effects that are either extremely unlikely to occur and/or are very small in scale. The Service agrees that the proposed license renewal will result in discountable and insignificant effects to individuals of listed species. Therefore, the Service concurs with your determinations of "may affect, not likely to adversely affect" for the bull trout, based on the

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Add= D. Doyle (dxd)
S. Freeman (SXF1)

information included in the BA. Our concurrence is conditioned on the nuclear plants normal operation as described in the BA.

This concludes informal consultation pursuant to the implementing regulations of the Endangered Species Act, 50 C.F.R. § 402.13. This Project should be reanalyzed if new information reveals effects of the action that may affect listed or proposed species or designated or proposed critical habitat in a manner or to an extent not considered in this consultation; if the action is subsequently modified in a manner that causes an effect to a listed or proposed species or designated or proposed critical habitat that was not considered in this consultation; and/or, if a new species is listed or critical habitat is designated that may be affected by this Project. If a bull trout is impacted or harmed via harassment, disturbance, or capture during sampling activities, it will trigger a re-initiation of consultation.

Thank you for your assistance in the conservation of listed species. If you have any questions or comments regarding this letter, please contact Luke Gauthier at the Central Washington Field Office in Wenatchee at (509) 665-3508, extension 24, or via e-mail at luke_gauthier@fws.gov.

Sincerely,

FOR

Ken S. Berg, Manager
Washington Fish and Wildlife Office

cc: Dennis Logan, USNRC, Dennis.Logan@nrc.gov, 301-415-0490
Dan Doyle, USNRC, Dan.Doyle@nrc.gov, 301-415-3748