Davis-BesseNPEm Resource

From: Cooper, Paula
Sent: Tuesday, July 26, 2011 8:13 AM
To: Mitch, Brian
Cc: Balsam, Briana
Subject: RE: Shapefiles for DBNPS transmission lines
Attachments: DavisBesse_2.2.5 Aquatic Resources.docx; DavisBesse_2.2.6 Terrestrial Resources.docx; DavisBesse_4.5 Aquatic Resources.docx; DavisBesse_4.6 Terrestrial Resources.docx; DavisBesse_4.11.1 Cumulative Impacts on Aquatic Resources.docx; DavisBesse_4.11.2 Cumulative Impacts on Terrestrial Resources.docx; DavisBesse_2.2.7 Protected Species.docx; DavisBesse_3.2.1_Refurbishment Impacts on Terrestrial Resources.docx; DavisBesse_3.2.2_Refurbishment Impacts on Protected Species.docx; DavisBesse_4.7 Protected Species.docx

Brian,

I've attached the current sections relating to Aquatic, Terrestrial and Protected Species. The EIS is scheduled to be published in October. Typically we take comments on the Draft SEIS, however, if time permits we will do our best to include comments you may have prior to the publishing.

The action the NRC is taking is the decision to renew or not renew the current license of the Davis-Besse Plant. The only changes proposed to the existing site are activities associated with refurbishment (steam generator replacement) – Our Chapter 3. Everything else, including the transmission lines, are existing.

If you have any questions please feel free to contact me.

Thanks!

Paula E. Cooper
Project Manager
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852-2738
Email: paula.cooper@nrc.gov
Phone: (301) 415-2323
Fax: (301) 415-2002

From: Mitch, Brian [mailto:Brian.Mitch@dnr.state.oh.us]
Sent: Tuesday, June 28, 2011 10:44 AM
To: Cooper, Paula
Cc: Balsam, Briana
Subject: RE: Shapefiles for DBNPS transmission lines

Hi Paula,

I would concur that these lists from our website would include all of the state T&E Species in those 4 counties (as of 10/1/2010) which may be in the vicinity of the Davis-Besse site and its associated transmission lines.

We also have additional information in the Ohio Biodviersity database that is not reflected in these list such as Managed Areas (Nature Preserves, MetroParks, Conservation Sites etc), Scenic Rivers and possibly some other data sets such as significant geologic features, breeding areas etc.

I do not recall if the transmissions lines are existing lines or proposed new lines. If they are proposed it would still be very helpful to do a full environmental review at ODNR which would include comments from all pertinent divisions (Geo Survey, Wildlife, Scenic Rivers, Coastal Management). This is where the shapefiles would be needed to provide site-specific comments on potential impacts.

I would like to view a draft copy of the Aquatic, Terrestrial and Endangered Species sections before publish of the SEIS. Thanks!

Brian

From: Cooper, Paula [mailto:Paula.Cooper@nrc.gov]
Sent: Thursday, June 23, 2011 1:12 PM
To: Mitch, Brian
Cc: Balsam, Briana
Subject: RE: Shapefiles for DBNPS transmission lines

Brian,

Good Afternoon. This e-mail is a continuation of NRC's initial correspondence to request ODNR's support in the preparation process of our SEIS. I apologize for the delay in my response to your requested information. I was not able to obtain a shapefile from the Applicant, and thus our Ecology staff person has approached this item in a broader fashion.

In an effort to ensure compliance with Section 7 of the Endangered Species Act, the NRC has developed a table of Federally and State protected species (attached). In lieu of the shapefile offsetting the transmission lines to gather a list of the protected species, NRC staff has developed a table capturing all known Rare Species within the counties associated with the transmission lines. This includes Lucas, Ottawa, Sandusky and Wood counties. The information was gathered using the following web pages;

Lucas County http://www.dnr.state.oh.us/LinkClick.aspx?fileticket=TqE9HB4d1Rk%3d&tabid=20404
Ottawa County http://www.dnr.state.oh.us/LinkClick.aspx?fileticket=OgZRPyIpIg8%3d&tabid=20404
Sandusky County http://www.dnr.state.oh.us/LinkClick.aspx?fileticket=1E76Np%2b8VT4%3d&tabid=20404
Wood County http://www.dnr.state.oh.us/LinkClick.aspx?fileticket=WwRAk3NBYKQ%3d&tabid=20404

Our SEIS will reflect the WebPages last accessed on March 20, 2011. Upon review, the WebPages are active and show the last update to the table occurring on October 15, 2010. Based on this information, I believe the attached tables are current and up to date.

Please accept this email as the NRCs request for concurrence on the attached table of state threatened, endangered, and species of concern that may be in the vicinity of the Davis-Besse site and its associated transmission line rights-of-way. The NRC also requests any additional information on protected species and critical habitat that may be in the vicinity of the Davis-Besse if such information is available.

The SEIS is scheduled to be published in October 2011. I will forward a copy to your office for your review. If it is preferred by ODNR, the Aquatic, Terrestrial and Endangered Species sections can be sent in advance for your comments, prior to the publishing of the Draft SEIS.

If you have any questions please feel free to contact me.

Respectfully,

Paula E. Cooper
Project Manager
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852-2738
Email: paula.cooper@nrc.gov
Phone: (301) 415-2323
Fax: (301) 415-2002

From: Cooper, Paula
Sent: Friday, December 17, 2010 9:08 AM
To: 'Mitch, Brian'
Subject: RE: Shapefiles for DBNPS transmission lines

Brian,

The licensee has requested that we not make any formal requests for information until after the new year. Under our regulations they only have 30 days to respond and they wanted to ensure they had the staff to do so.

I anticipate the RAI to go out around Jan 22nd. Response times are generally quick but can take up to the 30 days. I'll forward it immediately over once I receive the file.

Thanks,

Paula E. Cooper
Project Manager
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852-2738
Email: paula.cooper@nrc.gov
Phone: (301) 415-2323
Fax: (301) 415-2002

From: Mitch, Brian [mailto:Brian.Mitch@dnr.state.oh.us]
Sent: Friday, December 17, 2010 9:04 AM
To: Cooper, Paula
Subject: RE: Shapefiles for DBNPS transmission lines

Hi Paula,

Have you been able to obtain the shapefiles for this project yet?

Brian

From: Cooper, Paula [mailto:Paula.Cooper@nrc.gov]
Sent: Friday, December 03, 2010 3:23 PM
To: Mitch, Brian
Subject: RE: Shapefiles for DBNPS transmission lines

Hi Brian,

We have to formally request those items from the applicant. I'll keep you updated once I know when I'll expect those files.

Hope you have a good weekend as well and thank you,

Paula E. Cooper
Project Manager

U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852-2738
Email: paula.cooper@nrc.gov
Phone: (301) 415-2323
Fax: (301) 415-2002

From: Mitch, Brian [mailto:Brian.Mitch@dnr.state.oh.us]
Sent: Friday, December 03, 2010 3:16 PM
To: Cooper, Paula
Subject: RE: Shapefiles for DBNPS transmission lines

Hi Paula,

We are still awaiting shapefiles for this project. Any idea when they will be arriving?

Have a good weekend,

Brian

From: Mitch, Brian
Sent: Monday, November 29, 2010 11:34 AM
To: 'Cooper, Paula'
Subject: Shapefiles for DBNPS transmission lines

Hi Paula,

Could you please provide us with shapefiles for the DBNPS transmission lines so we can perform your request for a list of protected species within their vicinity?
Also, how far out from the lines and the power station would you like records for? A standard search has a 1 mile radius.

As far as the shapefiles, please use the NAD83 Ohio South State Plane Coordinate system (feet) projection. (Our whole database is in south, not north.) Also, our departmental spam filter deletes zip files out of emails, so do not send them zipped. The easiest way I know to describe it is to select all the files and copy and paste them directly into the email. Thanks!

Brian Mitch, Environmental Review Manager
Ohio Department of Natural Resources
Division of Engineering
Environmental Services Section
2045 Morse Rd., Building F-3
Columbus, OH 43229-6693
Office: (614) 265-6378
Fax: (614) 262-2197
brian.mitch@dnr.state.oh.us

Hearing Identifier: Davis_BesseLicenseRenewal_Saf_Public
Email Number: 3

Mail Envelope Properties (Paula.Cooper@nrc.gov20110726081300)

Subject: RE: Shapefiles for DBNPS transmission lines
Sent Date: 7/26/2011 8:13:24 AM
Received Date: 7/26/2011 8:13:00 AM
From: Cooper, Paula

Created By: Paula.Cooper@nrc.gov

Recipients:
"Balsam, Briana" <Briana.Balsam@nrc.gov>
Tracking Status: None
"Mitch, Brian" <Brian.Mitch@dnr.state.oh.us>
Tracking Status: None

Post Office:

Files	Size	Date & Time
MESSAGE	8173	7/26/2011 8:13:00 AM
DavisBesse_2.2.5 Aquatic Resources.docx	43536	
DavisBesse_2.2.6 Terrestrial Resources.docx	37453	
DavisBesse_4.5 Aquatic Resources.docx	20638	
DavisBesse_4.6 Terrestrial Resources.docx	20348	
DavisBesse_4.11.1 Cumulative Impacts on Aquatic Resources.docx	22800	
DavisBesse_4.11.2 Cumulative Impacts on Terrestrial Resources.docx	22224	
DavisBesse_2.2.7 Protected Species.docx	92718	
DavisBesse_3.2.1_Refurbishment Impacts on Terrestrial Resources.docx		23874
DavisBesse_3.2.2_Refurbishment Impacts on Protected Species.docx	19717	
DavisBesse_4.7 Protected Species.docx	27724	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

2.0 AFFECTED ENVIRONMENT

2.2.5 Aquatic Resources

Lake Erie Overview

Davis-Besse is located on the southwestern shore of Lake Erie, the shallowest of the Great Lakes. The Detroit River accounts for 80 percent of freshwater inflow to Lake Erie. Precipitation accounts for 11 percent of inflow, and the remaining 9 percent comes from tributaries that flow into the lake from Michigan, Ohio, Pennsylvania, New York, and Ontario (EPA 2004). Lake Erie discharges into Lake Ontario through the Niagara River. Lake Erie is divided into three basins: the western basin, the central basin, and the eastern basin. Davis-Besse lies along the western basin, which has a mean depth of 24.1 ft (7.4 m) and a maximum depth of 62 ft (19 m) (EPA 2004). All waters in the western basin are classified as seasonally cool water (68-80°F [20-28 °C]). Generally, Lake Erie is considered to be mesotrophic (having moderate levels of nutrients) (Tyson et al. 2009).

Because a third of the total Great Lakes population lives within the Lake Erie watershed, Lake Erie experiences the greatest impacts from residential and industrial development, agricultural production, and other human-caused stressors. Lake Erie was the first of the Great Lakes to develop problems with nutrient loading in the 1950s, which led to high levels of eutrophication and major algal blooms, oxygen depletion, and subsequent die-offs of fish and other biota (EPA, 2004). Toxic contaminants from point and non-point sources have also threatened the water quality of Lake Erie. By the late 1970s, chemical bans, more stringent water quality standards, and the development of the Great Lakes Water Quality Agreement (GLWQA) in 1972 aided in lessening the threat of accelerated eutrophication. Under the GLWQA, the U.S. and Canada must develop and implement Lakewide Management Plans (LaMPs) for lake waters and Remedial Action Plans for Areas of Concern. The Lake Erie Lakewide Management Plan Work Group completed the most recent update to the Lake Erie LaMP in 2008. The 2008 LaMP highlighted that a large load of PCB-contaminated sediments have been removed from the Ashtabula River Area of Concern, numerous habitat improvement projects have begun in the Buffalo Area of Concern, and over 400 ac (160 ha) of forest and wetland habitat has been restored in southwest Ontario (EPA 2008).

In a study of the correlation between lake productivity (eutrophication level) and species richness, Ludsin et al. (2001) found that the decrease in phosphorus levels between 1969 and 1996 as a result of various phosphorus abatement programs was likely correlated with the increased species richness in the Lake Erie central basin over the same time period. From 1969 to 1996, bottom anoxia stopped occurring in the summers; macroinvertebrate prey species, such as *Hexagenia* spp., recovered; and water clarity improved (Ludsin et al. 2001). All of these factors allowed many previously depleted fish populations to begin to recover.

Invasive species serve as another major stressor to Lake Erie and have caused drastic changes to the Lake Erie fish community over the past century. The first recorded invasive fish, the alewife (*Alosa pseudoharengus*), invaded the Great Lakes as early as 1819 (Emery 1985). As of 2008, 132 non-native invasive species have been discovered in the Lake Erie watershed, which include 23 fish, 12 mollusks, and 20 algae (EPA 2008). The International Joint Commission estimates that a new invasive species enters

the Great Lakes system every eight months (IJC 2004). In 1993, the U.S. passed regulations that required ships entering the Great Lakes to exchange their ballast water with seawater. This regulation change has not slowed the rate of aquatic invasive introductions; however, the Great Lakes system has experienced a shift to smaller, open water non-native organisms such as zooplankton and phytoplankton beginning in the 1990s and 2000s (IJC 2004).

The sea lamprey (*Petromyzon marinus*), which invaded the Great Lakes in the early 1900s, and the zebra mussel (*Dreissena polymorpha*), which was introduced to Lake Erie in the 1980s, have cause the most noticeable changes to the biological community (EPA 2004). The sea lamprey is an aggressive predator that had been attributed to the collapse of lake trout (*Salvelinus namaycush*), lake whitefish (*Coregonus clupeaformis*), and lake herring (*Coregonus artedi*) populations beginning in the 1940s and 1950s (GLFC 2000). Zebra and quagga mussels (*D. rostriformis bugensis*) easily outcompete native mussel species and have significantly altered the Lake Erie food web and nutrient and contaminant cycling (EPA, 2004). Prior to the introduction of these dreissenid mussels, amphipods, chironomids, annelids, and ephemeropterans, and unionid clams dominated Lake Erie's shallow and nearshore waters (Conroy and Culver 2005). Once zebra and quagga mussel populations became established in Lake Erie, they changed the flow of energy through the lake's food web by adding an additional level between lower (pelagic) and higher (benthic) trophic levels, which ultimately slowed the energy transfer through the lake's biological system (Conroy and Culver 2005).

As a result of the exotic species discussed above and other exotic predators, many native predators, such as the lake trout, sauger (*Sander canadensis*), and blue pike (*Sander vitreus glaucus*), have suffered population depletion or even disappeared from the lake. The lake herring, lake whitefish, and lake sturgeon (*Acipenser fulvescens*) are also species that have been severely reduced in number. Meanwhile, small, short-lived, exotic species, such as rainbow smelt (*Osmerus mordax*), white perch (*Morone americana*), and alewife, have increased in numbers and now maintain large and relatively stable populations (GLFC 2003).

In their *Twelfth Biennial Report on Great Lakes Water Quality*, the International Joint Commission (2004) focused on the Lake Erie watershed to illustrate the changes in the Lake Erie ecosystem and how these changes related to ecosystem integrity. The International Joint Commission (2004) noted that many trends in water and ecosystem quality have varied year-to-year; are not able to be linked to clear causes and effects; and are simultaneously positive and negative. For instance, the invasive zebra and quagga mussels have caused the decline of native mussel species and may be causing seasonal increases in phosphorus levels each spring (IJC 2004). However, zebra and quagga mussels have also been linked to increased water clarity, which in turn, has allowed for a dramatic increase in established rooted aquatic plant populations (IJC 2004). Table 2.2.5-1 includes a summary of the positive and negative trends identified by the International Joint Commission in their *Twelfth Biennial Report*.

Table 2.2.5-1. Positive and Negative Trends in the Lake Erie Ecosystem since the 1990s

Trend	Positive	Negative
Blue-green algae blooms		x
Burrowing mayfly recovery	x	
Cladophora shoreline accumulations		x

Diporeia decline		x
Establishment of invasive species		x
Fish and wildlife die-offs from botulism		x
Increased water clarity	x	
Lake whitefish decline (eastern basin)		x
Lake whitefish recovery (central basin)	x	
Phosphorus increase in water column		x
Phytoplankton decline in offshore waters		x
Re-establishment of rooted aquatic plant communities	x	
Walleye recovery	x	

Source: IJC, 2004

In the 1990s, burrowing mayflies (*Hexagenia* spp.) began to recolonize Lake Erie's western basin after a 40-year absence (Bridgeman et al. 2006). Mayflies are an indicator of environmental health and also an important food source for commercially valuable species such as the yellow perch (*Perca flavescens*) (Bridgeman et al. 2006). Their return indicates that the pollution and eutrophication concerns in Lake Erie are lessening.

Aquatic Invertebrates

In the 1970s, the Center for Lake Erie Research (CLEAR) studied aquatic invertebrate abundance and composition as part of monitoring to determine the effects of Davis-Besse's thermal discharge on the aquatic environment (Reutter et al. 1980). Diatoms were the most abundant phytoplankton in the Locust Point region of Lake Erie and typically peaked in the spring and fall. Species of the genera *Melosira*, *Fragillaria*, *Asterionella*, *Stephanodiscus*, and *Synedra* were the most common diatoms. Green algae (class Chlorophyceae) densities were much lower than diatom densities and must less predictable over the study period. Cyanobacteria, or blue-green algae (class Myxophyceae), generally demonstrated sudden, large mid-summer increases.

Zooplankton in Lake Erie's western basin generally consist of protozoans, rotifers, and microcrustaceans. Reutter et al. (1980) found *Brachionus*, *Keratella*, *Polyarthra*, and *Synchaeta* species to be the dominant rotifers. Rotifers generally peaked in October. Copepods were most abundant in spring and fall and were dominated by calanoid and cyclopoid forms.

In addition to phytoplankton and zooplankton, Reutter et al. (1980) described a number of benthic macroinvertebrates typical of the area. Generally, benthic macroinvertebrate populations were highest in early summer and fall. Burrowing oligochaetes and chironomid midge larvae were the dominant annelids. Freshwater mussels and fingernail clams were the dominant mollusks. Crustaceans typical of the area included the amphipod *Gammarus fasciatus*, water fleas, isopods, seed shrimp, and crayfish.

Fish

Lake Erie's fish community has changed drastically during the past century due the environmental factors already mentioned. Before 1900, lake trout highly influenced the

fish community because it was the dominant predator. Walleye (*Sander vitreus*) and burbot (*Lota lota*) were also major predators at this time. Prey species included emerald shiner (*Notropis atherinoides*), spottail shiner (*N. hudsonius*), gizzard shad (*Dorosoma cepedianum*), and cisco (*Coregonus* spp.) (Tyson et al. 2009). The lake trout was extirpated from Lake Erie in the early 1900s (Tyson et al. 2009). Between 1900 and 1950, walleye and blue pike became the major predators in the lake (Tyson et al. 2009). By the 1960s, a number of invasive species, including sea lamprey, alewife, white perch, and rainbow smelt established stable populations and began to outcompete native predators. The blue pike's population dipped and eventually became extinct by the late 1950s/early 1960s after the last reported spawning in 1954 (Niskanen 2008). The cisco, lake whitefish, and walleye populations severely declined during this time, as well. Beginning in the 1980s, the lake's fish community stabilized and only natural annual fluctuations in abundance are now observed (Tyson et al. 2009).

Of the estimated 143 fish species in Lake Erie, 19 are commercially and/or recreationally harvested. Lake Erie fisheries are unique in that they (unlike other Great Lakes fisheries) are sustained by naturally reproducing fish (Tyson et al. 2009). The lake trout is the exception to this because natural resource agencies are working together to recover the population. Overall, sport fishing yields more landings annually than commercial fishing within the lake and its tributaries. The Ohio Department of Natural Resources (ODNR) manages Lake Erie fisheries and publishes yearly status reports on yellow perch, walleye, smallmouth bass (*Micropterus dolomieu*), steelhead trout (*Oncorhynchus mykiss*), lake whitefish, bass (*Morone* spp.), and other major species. A summary of sport and commercial harvests of major species for 2008 appears in Table 2.2.5-2. In 2008, 9.6 million pounds of fish were harvested from Lake Erie and its tributaries (ODNR 2009). Commercial and sport fishing accounted for 43.4 percent and 56.6 percent of landings, respectively (ODNR 2009). Yellow perch accounted for the majority of commercial landings (36 percent of commercial landings; about 1.5 million pounds), while walleye dominated the sport harvest (69 percent of sport landings; about 3.8 million pounds) (ODNR 2009).

Table 2.2.5-2. Sport and Commercial Harvests of Major Species in Ohio Waters of Lake Erie and Its Tributaries, 2008

Scientific Name	Common Name	Sport Harvest	Commercial Harvest	Total Combined Harvest
Aplodinotus grunniens	freshwater drum	14,939	423,705	438,644
Ictalurus punctatus	channel catfish	7,014	447,232	454,246
Micropterus dolomieu	smallmouth bass	3,406	0	3,406
Morone americana	white perch	15,379	545,138	560,517
Morone chrysops	white bass	91,406	424,225	515,631
Oncorhynchus mykiss	steelhead trout	19,605	0	19,605
Perca flavescens	yellow perch	1,528,460	1,515,666	3,044,126
Sander vitreus	walleye	3,779,130	0	3,779,130
other species[a]		-	827,551	827,551
TOTAL		**5,459,339**	**4,183,517**	**9,642,856**

[a]Data is not available for sport harvest of species other than those listed. Commercial harvest of "other species" include buffalo (*Ictiobus* spp.), bullhead (*Ameiurus* spp.), burbot, carp

(family Cyprinidae), gizzard shad, goldfish (*Carassius auratus auratus*), quillback (*Carpiodes cyprinus*), suckers (family Catostomidae), and lake whitefish.

Source: ODNR 2009

Impingement Studies at Davis-Besse

In 1980, CLEAR published a report that summarized an impingement study conducted jointly by CLEAR and the Toledo Edison Company at Davis-Besse (Reutter 1981b). The impingement study ran from January 1 through December 31. Toledo Edison personnel checked the traveling screens regularly, collected impinged fish from the screens, and froze the collected fish for sampling. CLEAR identified, measured, and weighed each sample. During the study year, Reutter (1981b) estimated that 9,056 fish within 23 taxa were impinged on the Davis-Besse traveling screens. Goldfish and gizzard shad accounted for the overwhelming majority of impinged individuals during the sample year at an estimated 47.2 percent and 28.8 percent, respectively. Yellow perch, emerald shiner, and white crappie (*Pomoxis annularis*) accounted for a combined estimate of 15.3 percent. The remaining 18 taxa accounted for an estimated 8.7 percent. Table 2.2.5-3 summarizes the 23 taxa that appeared in the impingement sampling and each taxa's relative abundance.

Table 2.2.5-3. Relative Abundance of Species in Impingement Sampling, 1980

Scientific Name	Common Name	Estimated Impingement (%)
Carassius auratus auratus	goldfish	47.2
Dorosoma cepedianum	gizzard shad	28.7
Perca flavescens	yellow perch	8.3
Notropis atherinoides	emerald shiner	3.8
Pomoxis annularis	white crappie	3.3
Pomoxis nigromaculatus	black crappie	2.0
Aplodinotus grunniens	freshwater drum	2.0
Osmerus mordax	rainbow smelt	1.3
Percina caprodes	logperch darter	0.7
Percopsis omiscomaycus	trout-perch	0.6
Morone chrysops	white bass	0.5
Alosa pseudoharengus	alewife	0.3
Umbra limi	mudminnow	0.3
family Centrarchidae	unidentified sunfish	0.3
Lepomis macrochirus	bluegill	0.2
Ameiurus nebulosus	brown bull head	0.1
Notropis hudsonius	spottail shiner	0.1
Pomoxis spp.	unidentified crappie	0.1
Lepomis gibbosus	pumpkinseed sunfish	<0.1
Lepomis cyanellus	green sunfish	<0.1
Ameiurus spp.	unidentified bullhead	<0.1
family Cyprinidae	carp	<0.1
Noturus flavus	stonecat madtom	<0.1

Source: Reutter 1981b

The relative number of individuals lost to impingement correlated with lake populations for all but five species: goldfish, black bullhead (*Ameiurus melas*), brown bullhead (*A. nebulosus*), black crappie (*Pomoxis nigromaculatus*), and white crappie. These species' relative abundance was higher in impingement samples than in Lake Erie, which indicated that these species most likely use the intake canal as a permanent residence (Reutter 1981b). Reutter (1981b) also concluded that these five species also likely spawn within the intake canal due to the high proportion of impinged young-of-the-year.

Entrainment Studies at Davis-Besse

In addition to the 1980 impingement sampling conducted at Davis-Besse (Reutter 1981b), CLEAR and the Toledo Edison Company conducted entrainment sampling between April and August 1980 (Reutter 1981a). During 13 samples days, CLEAR took ~~4~~ four 3-minute bottom-to-surface tows at the intake with a 0.75-m diameter plankton net and then computed entrainment density by comparing the samples to the volume of water taken into the plant. Table 2.2.5-4 summarizes the estimated entrainment densities of eggs and larvae by taxa. Gizzard shad, freshwater drum (*Aplodinotus grunniens*), yellow perch and white bass (*Morone chrysops*) were entrained at the highest densities (Reutter 1981a). Reutter (1981a) concluded that the entrainment losses at Davis-Besse were relatively small when compared to lake-wide populations and that the loss of gizzard shad, walleye, and perch eggs and larvae accounted for a loss of fecundity of less than 0.2 percent of the number captured in sport fishery in 1980.

Table 2.2.5-4. Entrainment Densities in Entrainment Sampling, 1980

Scientific Name	Common Name	Estimated Entrainment Density (larvae/100 m^3)
Dorosoma cepedianum	gizzard shad	189.18
Aplodinotus grunniens	freshwater drum	130.67
Perca flavescens	yellow perch	91.00
Morone chrysops	white bass	23.80
Sander vitreus	walleye	2.76
Notropis hudsonius	spottail shiner	1.75
family Cyprinidae	carp	1.67
Osmerus mordax	rainbow smelt	0.97
Notropis atherinoides	emerald shiner	0.86
Percina caprodes	logperch darter	0.85
Coregonus spp.	whitefish	0.49
unidentified spp.	unidentified spp.	0.34
family Cottidae	unidentified sculpin	0.30
Cottus bairdii	mottled sculpin	0.20

Source: Reutter 1981a

Thermal Studies at Davis-Besse

From 1972 through 1979, CLEAR gathered data on the aquatic environment surrounding Davis-Besse to determine the thermal impacts of Davis-Besse's operation, which began in 1977. The results of this study are summarized in a report prepared for the ODNR (Reutter et al. 1980). CLEAR collected phytoplankton, zooplankton, benthic macroinvertebrate, fish, and icythyoplankton samples from 25 stations in Lake Erie—18 on the open lake, 2 in the intake canal, 2 in the marshes, and 3 along the shoreline—plus several control stations. The species composition and abundances observed during this study are discussed previously in this section under the heading "Aquatic Invertebrates." Reutter et al. (1980) concluded that no clear correlation existed between any aquatic populations and Davis-Besse's thermal discharge.

2.0 AFFECTED ENVIRONMENT

2.2.6 Terrestrial Resources

Davis-Besse Ecoregion and Surrounding Vicinity

Davis-Besse lies in the Marblehead Drift/Limestone Plain Level IV subecoregion within the larger Huron/Erie Lake Plains Level III ecoregion. The Marblehead Drift/Limestone Plain subecoregion lies along the southern shore of Lake Erie from Ottawa National Wildlife Refuge east to Huron, Ohio. It encompasses Sandusky Bay and spreads inland to Tiffin, Ohio. Broad, flat plains with thin glacial drifts and limestone-dolomite ridges characterize the area. Historically, beech forests, elm-ash swamp forests, mixed oak forests, wetland, and fen habitats were prevalent. Today, the area has been largely converted to farmland for hay, soybeans, and corn. (EPA 2009)

The Ohio Department of Natural Resources (ODNR) characterizes the state's geographic profile by dividing it into five physiographic regions. Davis-Besse lies within the Lake Plains region, a narrow strip of land along the southern shore of Lake Erie that broadens west of Cleveland, Ohio (ODNR 2011pr). Effectively, this physiographic region covers the U.S. Environmental Protection Agency (EPA)'s Marblehead Drift/Limestone Plain subecoregion as well as the adjacent Erie Lake Plain subecoregion. ODNR (2001pr) notes that the northwestern area of the Lake Plains physiographic region (where Davis-Besse is located) was historically called the Great Black Swamp and is characterized by rich, black soils and poor drainage. The Great Black Swamp originally encompassed about 5 million ac (2 million ha) (ODNR and OEPA 1999). Between the mid-1700s and 1980s, residential and commercial development and associated wetland draining reduced the Great Black Swamp to about 483,000 ac (195,000 ha)—10 percent of its historic size (ODNR and OEPA 1999).

In the immediate vicinity of the Davis-Besse site, the majority of the undeveloped or uncultivated land is wetlands. Within Ottawa County, wetlands account for about 14 percent of the land use type (ODNR and OEPA 1999). The major wetland types present in Ottawa County as classified by ODNR and OEPA (1999) are: hydric woods, open water, shallow marsh, and shrub scrub. Originally, the majority of wetlands were naturally seasonal with some permanent wetlands lying behind barrier beaches along the Lake Erie coast (FWS 2001cp). Lakefront development and wetland draining has drastically reduced the amount of wetlands and changed the water regimes of those remaining wetland areas. The majority of remaining wetlands in the region are in Federal refuges, State management areas, and private hunting clubs and are surrounded by man-made dikes, which protect the wetlands from wave damage during high water storm events (FWS 2001cp). American elm (*Ulmus americana*), red maple (*Acer rubrum*), and black ash (*Fraxinus nigra*) make up the majority of climax vegetation (FirstEnergy 2010).

The Ottawa National Wildlife Refuge lies adjacent to and to the west of the Davis-Besse site and encompasses 4,755 ac (1,924 ha). This refuge was established in 1961 and contains two discontinuous sections: the Darby Marsh and the Navarre Marsh. The Darby Marsh contains a combined U.S. Fish and Wildlife (FWS) office and visitor's center and limited access public hiking trails. The Navarre Marsh portion is owned by FirstEnergy and leased to FWS for management as part of the wildlife refuge. The Navarre Marsh is discussed in more detail below under "Davis Besse Site." According to

the FWS (2001nwi)'s National Wetlands Inventory, the majority of the refuge consists of freshwater emergent wetland and freshwater forested/shrub wetland.

The Ottawa National Wildlife Refuge is part of a larger complex of three national wildlife refuges (Ottawa, Cedar Point, and West Sister Island) that comprise approximately 9,000 ac (3600 ha) in total. Cedar Point National Wildlife Refuge lies along the coast of Lake Erie about 15 mi (24 km) to the west of the Davis-Besse site. It was established in 1965 and comprises 2,445 ac (989 ha) of contiguous marsh—the largest stretch of contiguous marsh along Lake Erie (ONWRA 2011). West Sister Island National Wildlife Refuge lies to the north of Davis-Besse about 10 mi (16 km) offshore of Lake Erie. The 82-ac (33-m) island is home to the largest wading bird colony in the U.S. Great Lakes and was designated as part of the National Wilderness Preservation System in 1975 (ONWRA 2011). The island is 35 ft (11 m) above mean sea level at its highest point and is covered by an almost pure stand of hackberry (*Celtis* spp.) (OWL 2011). Thick mats of poison ivy (*Toxicodendron radicans*), ferns, wildflowers, and mushrooms make up the understory (FWS 2011wsi).

Birds

A vast diversity of birds inhabit and migrate through the natural habitats surrounding Davis-Besse. The Ottawa National Wildlife Refuge complex and surrounding region provides habitat for over 325 species of birds (FWS 2001cp). The National Audubon Society recognizes 600,000 ac (240,000 ha) on the Lake Erie western basin (including the Davis-Besse site and surrounding vicinity) as an Important Bird Area because it provides essential wintering, breeding, and migrating habitat for many species of birds, including the ruddy duck (*Oxyura jamaicensis*), American black duck (*Anas rubripes*), red-breasted merganser (*Mergus serrator*), ring-billed gull (*L. delawarensis*), great black-backed gull (*Larus marinus*), herring gull (*L. smithsonianus*), common tern (*Sterna hirundo*), and bald eagle (*Haliaeetus leucocephalus*) (Audubon 2011).

Though the Mississippi Flyway lies to the west of the Great Lakes, a number of major branches of the flyway follow the southwestern shore of Lake Erie. The Black Swamp Bird Observatory, located just to the west of Davis-Besse conducts long-term research projects on bird migration and breeding in the area. In 2009, the Black Swamp Bird Observatory recorded 152 species of migrating passerines, 30 species of migrating shorebirds, and 22 species of migrating raptors in Lake Erie marshes alone (BSBO 2009a, 2009b, 2009c). Table 2.2.6-1 lists the passerine, shorebird, and raptor species that the Black Swamp Bird Observatory most commonly reported as occurring during migrations in Lake Erie marshes. Note that for passerines, the bird species provided are specific to Navarre Station, which is located within Navarre Marsh on the Davis-Besse property.

The region also provides wintering habitat for dabbling ducks (subfamily Anatinae), diving ducks (subfamily Aythyinae), geese, and other waterfowl (Herndendorf 1987). Gulls (family Laridae), terns (family Sternidae), and cormorants (family Phalacrocoracidae) nest along the coast of Lake Erie and on the islands off the coast of the lake. Raptors, including the bald eagle, turkey vulture (*Cathartes aura*), osprey (*Pandion haliaetus*), American kestrel (*Falco sparverius*), and a number of hawk species, also nest in the area (Herndendorf 1987).

Table 2.2.6-1. Most Common Migrating Bird Species Near the Davis Besse Site

Passerines at the Navarre Station	
Spring Migration	**Fall Migration**

• eastern screech owl (*Megascops asio*)	• blackpoll warbler (*Dendroica striata*)
• hairy woodpecker (*Picoides villosus*)	• Swainson's thrush (*Catharus ustulatus*)
• red-headed woodpecker (*Melanerpes erythrocephalus*)	• white-throated sparrow (*Zonotrichia albicollis*)
• Gambel's white-crowned sparrow (*Zonotrichia leucophrys* ssp. *gambelii*)	• golden-crowned kinglet (*Regulus satrapa*)
• yellow palm warbler (*Dendroica palmarum* ssp. *hypochrysea*)	• hermit thrush (*Catharus guttatus*)
Shorebirds in Lake Erie Marshes	
Spring Migration	**Fall Migration**
• common snipe (*Gallinago gallinago*)	• killdeer (*Charadrius vociferous*)
• pectoral sandpiper (*Calidris melanotos*)	• short-billed dowitcher (*Limnodromus griseus*)
• American golden plover (*Pluvialis dominica*)	• least sandpiper (*Calidris minutilla*)
• lesser yellowlegs (*Tringa flavipes*)	• solitary sandpiper (*Tringa solitaria*)
• greater yellowlegs (*Tringa melanoleuca*)	• semipalmated sandpiper (*Calidris pusilla*)
Raptors in Lake Erie Marshes	
• turkey vulture (*Cathartes aura*)	• cooper's hawk (*A. cooperii*)
• red-tailed hawk (*Buteo jamaicensis*)	• bald eagle (*Haliaeetus leucocephalus*)
• sharp-shinned hawk (*Accipiter striatus*)	• northern harrier (*Circus cyaneus*)
• broad-winged hawk (*B. platypterus*)	• osprey (*Pandion haliaetus*)
• red-shouldered hawk (*B. lineatus*)	• American kestrel (*Falco sparverius*)
Sources: BSBO 2009a, 2009b, 2009c	

On West Sister Island, the FWS estimates that a colony of great blue herons (*Ardea herodias*), great egrets (*Ardea alba*), double-crested cormorants (*Phalacrocorax auritus*), and black-crowned night herons (*Nycticorax nycticorax*) totals 3,500 nesting pairs (FWS 2001cp). This colony contains the largest black-crowned night heron rookery in the Great Lakes (FWS 2001cp). Because the shores of West Sister Island do not provide any wading habitat, birds that nest on West Sister Island fly to the Lake Erie shore to feed multiple times per day.

Despite the vast array of birds that make use of habitat within the Davis-Besse region, the Ohio Audubon Society reports that a number of common species are in decline due to urban sprawl, non-native invasive species, and the expansion industrialized agriculture. The Ohio Audubon Society (2007) summarized the five most vulnerable common species in decline and their percent decline since 1967 as follows:

- green heron (*Butorides virescens*)—82 percent decline,
- red-headed woodpecker (*Melanerpes erythrocephalus*)—78 percent decline,
- eastern meadowlark (*Sturnella magna*)—75 percent decline,

- northern flicker (*Colaptes auratus*)—67 percent decline, and
- yellow-breasted chat (*Icteria virens*)—63 percent decline.

In addition to these five common species in decline, the Ohio Audubon Society (2009)'s Watch List identifies five species of birds that are the most critically imperiled birds in the U.S. and at greatest risk of regional extirpation. These five species are the red-headed woodpecker (also included above on the "most vulnerable" list), Henslow's sparrow (*Ammodramus henslowii*), prothonotary warbler (*Protonotaria citrea*), prairie warbler (*Dendroica discolor*), and cerulean warbler (*Dendroica cerulean*).

Mammals

Northwestern Ohio's mammal population is dominated by rodents, smaller predators, and deer. About 30 species in total occur in the Ottawa Refuge Complex (FWS 2001cp). Common mammals in the region include muskrat (*Ondatra zebethicus*), raccoon (*Procyon lotor*), and white-tailed deer (*Odocoileus virginianus*), all of which inhabit or use wetland habitats. Numerous muskrat houses are visible within inundated areas of Darby Marsh. Eastern cottontail (*Sylvilagus floridanus*), woodchuck (*Marmota monax*), fox squirrels (*Sciurus niger*) and striped skunk (*Mephitis mephitis*) occupy meadows, dikes, and forest edges. Small predators in the western Lake Erie marshes include long-tailed weasels (*Mustela frenata*), mink (*M. vison*), and red fox (*Vulpes fulva*). The majority of larger predators were extirpated from the area when northwestern Ohio was first settled. These include the wolverine (*Gulo gulo*), panther (*Felis concolor*), lynx (*F. lynx*), bobcat (*F. rufus*), gray wolf (*Canis lupus*), and black bear (*Ursus americanus*). (Hendendorf 1987)

Amphibians and Reptiles

A variety of amphibians and reptiles inhabit the area, including salamanders, newts, toads, and frogs. Sixteen species of turtles and snakes and one lizard (the five-lined skink [*Eumeces fasciatus*]) occur in the Ottawa Refuge Complex (FWS 2001cp). Mudpuppies (*Necturus maculosus*)—a species of aquatic salamander—inhabit wetlands and small streams with soft bottoms (Hendendorf 1987). Spotted salamanders (*Ambystoma maculatum*), tiger salamanders (*A. tigrinum*), Jefferson salamanders (*A. jeffersonianum*), and smallmouth salamanders (*A. texanum*) hatch and develop in wetlands, move to moist woodlands at adulthood, and return to wetlands annually to breed and lay eggs. The dusky salamander (*Desmognathus fuscus*) and red back salamander (*Plethodon cinereus*) inhabit the Lake Erie coast. Toads and frogs use both wetland waters, ponds, streams, and a variety of land habitats. Common species in the region include the American toad (*Bufo americanus*), spring peepers (*Pseudacris crucifer*), western chorus frog (*Pseudacris triseriata*), cricket frogs (*Acris* spp.), pickerel frog (*Rana palustris*), and northern leopard frog (R. *pipiens*). The snapping turtle (*Chelydra* spp.) is the largest reptile in western ~~lake~~Lake Erie. Members of the water and box turtle family—map turtles (*Graptemys* spp.), spotted turtle (*Clemmys guttata*), midland painted turtle (*Chrysemys picta* ssp. *marginata*), box turtles (*Terrapene* spp.), and Blanding's turtle (*Emys blandingii*)—inhabit ponds and wetlands with standing water and thick aquatic vegetation. The Lake Erie water snake is the most common snake species in the region. Gartner snakes (*Thamnophis* spp.), black rat snakes (*Elaphe obsolete*), Dekay's snakes (*Storeria dekayi*), and hog-nosed snakes (family Colubridae) also inhabit the area. (Hendendorf 1987)

Vegetation

The Lake Erie western basin has the greatest diversity of wetland plant species. The majority (over 700 of the estimated 800 vascular plant species) of vegetation in the region are grasses, reeds, aquatic plants, and other non-tree or shrub species (Bolsenga and Herdendorf 1993). Dominant wetland species include cattail (*Typha* spp.), bur reed (*Sparganium* spp.), grasses (*Echinochloa* spp., *Leersia oryzoides, Calamagrostis Canadensis*), spatterdock (*Nuphar advena*), water lily (*Nymphaea* spp.), and water smartweed (*Polygonum coccineum*) (Bolsenga and Herdendorf 1993). Within dikes, common greenbriar (*Smilax rotundifolia*), thistles, coneflower, common milkweed (*Asclepias syriaca*), asters (*Aster* spp.), river bank grape (*Vitis riparia*), and burdock (*Arctium* spp.) dominate (FirstEnergy 2010). Within swamps, riparian, and forested areas, eastern cottonwood (*Populus deltoides*), hackberry, sycamore (*Platanus occidentalis*), river bank grape, black willow (*Salix nigra*), and staghorn sumac (*Rhus typhina*) constitute the climax vegetation assemblage (FirstEnergy 2010).

A number of invasive species are present in the region, including purple loosestrife (*Lythrum salicaria*), reed canary grass (*Phalaris arundinacea*), common reed (*Phragmites australis*), and flowering rush (*Butomus umbellatus*). FirstEnergy does not manage these species on its site. However, the FWS uses a variety of techniques (hand-pulling, burning, and mowing; herbicides; and loosestrife-controlling weevils and beetles) to control invasive plants within the Ottawa National Wildlife Refuge, which includes Navarre Marsh on the Davis-Besse site (FWS 2001cp).

Davis Besse Site

The Davis-Besse site consists of 954 ac (386 ha), of which 733 ac (297 ha) is the Navarre Marsh. As previously mentioned, the FWS leases the Navarre Marsh for management as part of the Ottawa National Wildlife Refuge. The remaining 221 ac (89 ha) of the site is composed of developed areas containing facility buildings, structures, and parking lots; woodlands; low grasslands; and marginal agricultural land (FirstEnergy 2010).

The Navarre Marsh lies on the southeast end of the Davis-Besse site and is composed of freshwater marsh, swamp forest, wet meadow, and small areas of deciduous forest (FirstEnergy 2010). A beach ridge separates the Navarre Marsh from the southern shore of Lake Erie. Sandbar willow (*Salix interior*), staghorn sumac, and elderberry (*Sambucus* spp.) dominate this beach ridge (FirstEnergy 2010). A hardwood swamp—part of Navarre Marsh—lies directly behind the beach ridge. As discussed previously, the Black Swamp Bird Observatory has a research station within the Navarre Marsh where it conducts migration surveys.

Transmission Line Corridors

FirstEnergy manages approximately 1800 ac (730 ha) of transmission line corridors as part of its transmission line maintenance, the majority of which is flat agricultural land (FirstEnergy 2010). The transmission lines also traverse a combination of wetlands, forests, streams, and developed land, and the Beaver Line crosses the Toussaint and Portage Rivers to the south of the Davis-Besse site. Management of these corridors is discussed in Section 2.1.3.

4.0 ENVIRONMENTAL IMPACTS OF OPERATION

4.5 Aquatic Resources

Table 4.5-1 lists the issues related to aquatic resources applicable to Davis-Besse. No Category 2 issues are related to aquatic resources. The NRC staff did not find any new and significant information during the review of the applicant's environmental report (FENOC 2010), the site audit, the scoping process, or the evaluation of other available information. Therefore, the staff concludes that there would be no impacts related to these issues beyond those discussed in the GEIS (NRC 1996). Consistent with the GEIS, the NRC staff concludes that the impacts are SMALL, and additional site-specific mitigation measures are unlikely to be sufficiently beneficial to warrant implementation.

Table 4.5-1. Aquatic Resources Issues Identified in the GEIS

Issue	GEIS Sections	Category
For All Plants		
Accumulation of contaminants in sediments or biota	4.2.1.2.4	1
Entrainment of phytoplankton and zooplankton	4.2.2.1.1	1
Cold shock	4.2.2.1.5	1
Thermal plume barrier to migrating fish	4.2.2.1.6	1
Distribution of aquatic organisms	4.2.2.1.6	1
Premature emergence of aquatic insects	4.2.2.1.7	1
Gas supersaturation (gas bubble disease)	4.2.2.1.8	1
Low dissolved oxygen in the discharge	4.2.2.1.9	1
Losses from predation, parasitism, and disease among organisms exposed to sublethal stresses	4.2.2.1.10	1
Stimulation of nuisance organisms	4.2.2.1.11	1
For Plants with Cooling Tower-Based Heat Dissipation Systems		
Entrainment of fish and shellfish in early life stages	4.3.3	1
Impingement of fish and shellfish	4.3.3	1
Heat shock	4.3.3	1

4.0 ENVIRONMENTAL IMPACTS OF OPERATION

4.6 Terrestrial Resources

The issues related to terrestrial resources applicable to Davis-Besse are listed in Table 4.6-1. There are no Category 2 issues related to terrestrial resources. The NRC did not identify any new and significant information during the review of the applicant's ER (FENOC 2010), the staff's site audit, the scoping process, or the evaluation of other available information. Therefore, there are no impacts related to these issues beyond those discussed in the GEIS (NRC 1996). Consistent with the GEIS, the NRC staff concludes that the impacts to terrestrial resources are SMALL, and additional site-specific mitigation measures are unlikely to be sufficiently beneficial to warrant implementation.

Table 4.6-1. Terrestrial Resources Issues Identified in the GEIS

Issue	GEIS Section	Category
Cooling tower impacts on crops and ornamental vegetation	4.3.4	1
Cooling town impacts on native plants	4.3.5.1	1
Bird collisions with cooling towers	4.3.5.2	1
Power line right-of-way management (cutting herbicide application)	4.5.6.1	1
Bird collisions with power lines	4.5.6.1	1
Impacts of electromagnetic fields on flora and fauna (plants, agricultural crops, honeybees, wildlife, livestock)	4.5.6.3	1
Floodplains and wetland on power line right-of-way	4.5.7	1

4.0 ENVIRONMENTAL IMPACTS OF OPERATION

4.5.6 Cumulative Impacts on Aquatic Resources

This section addresses the direct and indirect effects of license renewal on aquatic resources when added to the aggregate effects of other past, present, and reasonably foreseeable future actions. The geographic area considered in the cumulative aquatic resources analysis includes the western basin of Lake Erie, along which the Davis-Besse site is located.

Section 2.2.5 and 2.2.7 present an overview of the condition of Lake Erie in the vicinity of Davis-Besse and the history and factors that led to its current condition.

Invasive Species

Invasive species have caused dramatic shifts in fish populations in the lake and have resulted in the extirpation of a number of species (see Section 2.2.5). Invasive species have irreversibly altered the Lake Erie ecosystem and will continue to impact Lake Erie fish and invertebrate populations in the future. Ballast water releases have introduced about thirty percent of the invasive species in the Great Lakes today (EPA 2011). The U.S. Coast Guard is in the process of developing ballast water discharge standards, which would limit the introduction of additional exotic species in the future. However, the existing exotic species in the Lake Erie system will continue to affect the ecosystem balance in the future. Zebra mussels (*Dreissena polymorpha*) and quagga mussels (*D. rostriformis bugensis*) outcompete native species. These mussels clog the intake pipes and cooling systems of power plants and make efforts to recover native mussel and clam populations difficult. The sea lamprey is attributed to the collapse of lake trout (*Salvelinus namaycush*), whitefish (*Coregonus clupeaformis*), and chub (*Couesius plumbeus*) populations, which has negatively impacted the fishing economy (GLFC 2000). The Lake Erie Lakewide Management Plan (EPA 2008) includes management objectives and measures to reduce the impact of current invasive species on the lake's ecosystem and prevent new exotic species from entering the lake.

Fishing

Fishing has been a major influence on commercially and recreationally sought fish species within Lake Erie. The ODNR manages the fishing of the 19 harvested fish species in the lake, which are discussed in Section 2.2.5. A number of native fish species have suffered population declines due to invasive species. The most acute declines have been those of the lake trout, whitefish, and chub beginning in the 1940s and 1950s (GLFC 2000). The walleye population recovered considerably in the 1980s, but has since declined. Continued fishing of these and other fish will slow the recovery of those species in decline.

Energy Development

A number of energy-producing facilities are located near Davis-Besse (see Table 4.11-1) that affect aquatic resources. Fermi Nuclear Power Plant, the Bay Shore Plant, J.R. Whiting Power Plant, and the Detroit Edison Monroe Power Plant all use Lake Erie as a source of cooling water. Though each plant's impact on aquatic populations for impingement, entrainment, and thermal discharge is individually small, the cumulative impact may result in disproportionate loss of nearshore species and those species with pelagic (buoyant) eggs, which are more likely to be swept into the intake. Proposed

energy-producing facilities, such as the proposed new unit at Fermi Nuclear Power Plant, Fremont Energy Center, and others listed in Table 4.11-1 will likely increase this cumulative impact.

Urbanization and Shoreline Development

About one-third of the Great Lakes population (11.6 million people) lives within the ~~Laker~~Lake Erie watershed (EPA 2008). Given that Lake Erie is also the smallest Great Lake, it has experienced the most dramatic effects from urbanization and shoreline development. Lake Erie was the first Great Lake to experience massive algal blooms and depleted oxygen levels characteristic of a eutrophic environment. Beginning in the 1950s, phosphorus and oxygen levels from developed and agricultural runoff became a major concern in the lake. In the 1970s, industrialization and chemical production became another stressor to the lake and resulted in an additional source of contaminants. Phosphorus levels decreased in the 1980s due to various control measures and monitoring, but began to increase again in the 1990s (EPA 2008). Filling of Lake Erie's wetland and marshes (discussed in Section 4.11.2) exacerbated the lake's nutrient imbalances. Today, a number of programs and initiatives, including the Great Lakes Water Quality Agreement, are helping to restore the integrity of the lake, but Lake Erie continues to be significantly altered by past changes in land use and continued urban development.

Climate Change

The potential cumulative effects of climate change on Lake Erie could result in a variety of changes that would affect aquatic resources. The U.S. Global Change Research Program (USGCRP) (2009) identified higher temperatures as a major concern for the Great Lakes because it will cause more evaporation, and thus, likely reduce the Great Lakes water levels. In turn, reduced amount of lake ice would form in the winter, exacerbating the evaporation (USGCRP 2009). Lower water levels could ultimately contribute to loss of species; loss of habitat, especially nearshore spawning areas; and increased concentrations of contaminants (USGCRP 2009).

Conclusion

The NRC staff examined the cumulative effects of historical conditions of Lake Erie's western basin and the impacts from invasive species, fishing, energy development, urbanization and shoreline development, and climate change. The NRC staff concludes that the SMALL aquatic impacts as a result of the proposed Davis-Besse license renewal would not contribute to the overall decline in the condition of aquatic resources. However, the NRC staff believes that the factors discussed in this section—especially invasive species and urban development—have led to LARGE cumulative impacts to Lake Erie aquatic resources.

4.0 ENVIRONMENTAL IMPACTS OF OPERATION

4.11.2 Cumulative Impacts on Terrestrial Resources

This section addresses the direct and indirect effects of license renewal on terrestrial resources when added to the aggregate effects of other past, present, and reasonably foreseeable future actions. The geographic area considered in this analysis is the Davis-Besse site and in-scope transmission line corridors.

Section 2.2.6 presents an overview of the current condition of the Davis-Besse site and in-scope transmission line corridors and the history and factors that led to its current condition. At present, the area is predominantly wetlands, much of which is managed by the FWS as part of the Ottawa National Wildlife Refuge. The 733 ac (297 ha) leased to the FWS connect other marsh areas within the Ottawa National Wildlife Refuge network and serve as vital habitat for migrating bird species and wetland-dependent wildlife.

Historical Conditions

Historically, the Great Black Swamp in northwestern Ohio covered an area about the size of the state of Connecticut. The USGS (1999) estimates that wetland drainage of Lake Erie marshes likely began in 1836, and that Ohio's swamp forests were heavily logged for a mix of birch, ash, elm, oak, cottonwood, poplar, maple, basswood, and hickory. Settlers also cleared many of the forests and filled in wetlands to create land for building houses and cultivating crops (UT undated). To fill in the wetlands, series of ditches were dug to drain the land, which caused a drastic reduction in wetland-dependent species' populations.

Protected Species

Section 2.2.7 and 4.7 discuss protected species. A number of protected species occur on the Davis-Besse site including many species of migratory birds and six species of Ohio-listed plants. Additionally, the Davis-Besse site and transmission line corridors have the potential to provide habitat for four Federally listed species (see Section 4.7), as well as other State-listed amphibians, reptiles, insects, and mammals. The Davis-Besse site and transmission line corridors as well as the network of wetlands within the Ottawa National Wildlife Refuge will continue to provide habitat for protected species. However, other factors discussed in this section, such as invasive species, habitat fragmentation, and climate change, may reduce the population sizes of some protected species and force species to compete for more limited resources in the future.

Invasive Species

Invasive species are non-native species that thrive outside of their natural range due to favorable environmental conditions and a lack of natural predators or other environmental controls. Invasive species are able to colonize and rapidly spread, threatening the success of native species populations in the process. The invasive purple loosestrife (*Lythrum salicaria*), reed canary grass (*Phalaris arundinacea*), common reed (*Phragmites australis*), and flowering rush (*Butomus umbellatus*), occur on the Davis-Besse site. Additionally, a number of non-native insect and other wildlife species occur in the region. As discussed in Section 2.2.6, the FWS maintains portions of the Ottawa National Wildlife Refuge, including Navarre Marsh on the Davis-Besse site, for invasive plant species through a variety of methods. Continued efforts to control these species will help to protect native species populations in the future. However, the

staggering number of invasive plant and pest species in Ohio—138 and 21, respectively (EFETAC 2011)—means that some invasive species that are not currently in the Davis-Besse region will likely spread to this area in the future.

Energy Development

Table 4.11-1 summarizes a number of energy development projects that are in operation now as well as those that are planned for future operation including, coal-fired plants, gas-fired plants, and one nuclear facility (Fermi Nuclear Power Plant). Coal-fired plants are a major source of air pollution in the United States because they release sulfur dioxide, nitrogen oxides, mercury, carbon dioxide, and particulates. Nitrous oxides and sulfur dioxides combine with water to form acid rain, which can lead to erosion and changes in soil pH levels. Mercury deposits onto soil and surface water, which may then be taken up by terrestrial and aquatic plant or animal species and poses the risk of bioaccumulation. Gas-fired plants also emit nitrogen oxides and carbon dioxide, but at a lower rate than coal-fired plants. Gas-fired plants can also emit methane, a greenhouse gas, if the natural gas is not burned completely. Impacts on the terrestrial environment from Fermi Nuclear Power Plant can be expected to be similar to those from Davis-Besse discussed in Section 4.6.

Urbanization and Habitat Fragmentation

As the region surrounding the Davis-Besse site becomes more developed, habitat fragmentation will increase. Species that require larger ranges, especially predators, will likely suffer reductions in their populations. In contrast, herbivores will experience less predation pressure, and their populations are likely to increase. Edge species will likely benefit from the fragmentation, while species that require interior forest or swamp habitat will likely suffer. The transmission line corridors established for Davis-Besse's transmission lines represent habitat fragmentation, though many of these corridors pass through cultivated land that has already been converted from its native habitat. Habitat fragmentation of surrounding areas may increase the value of the network of wetlands within the Ottawa National Wildlife Refuge, part of which is on the Davis-Besse site, because this land will not experience fragmentation or other human-induced impacts.

Habitat Restoration

The FWS has worked to convert a total of 6898 ac on 801 sites across northwestern Ohio to native wetlands through the FWS Private Lands Program (FWS 2011). As part of this effort, the FWS is in the process of acquiring an 800-ac parcel of farmland through a fee title adjacent to Metzger Marsh in Lucas County (GLRC 2009). The U.S. Army Corps of Engineers is developing a program to convert and restore 200 ac of Lake Erie coastal wetland habitat along Maumee Bay near Toledo (GLRC 2009). The U.S. Army Corps of Engineer's Great Lakes Habitat Restoration Database lists 32 other restoration or habitat enhancement projects within the Great Lakes region of Ohio. The cumulative effect of these programs will strengthen the overall integrity of terrestrial habitats and provide connectivity between habitat areas.

Climate Change

The U.S. Global Climate Change Research Program (USCGRP 2009) predicts that rainfall within the Midwestern states will intensify in the winter and spring, which could lead to increased runoff and erosion, especially within habitat adjacent to developed, impervious surfaces and riparian areas. In contrast, rainfall will decrease in the summer months and increased average temperatures will lead to increased evaporation rates and longer period between rainfalls (USCGRP 2009). Summer drought conditions will

likely lead to a reduced area of wetland habitat. Given the high value of wetlands in the Davis-Besse region for dozens of migrating bird species, the reduction in wetland habitat could negatively affect certain migrating bird species populations as they compete with one another for limited resources within a reduced area of land. Changing climate conditions will also cause many native wildlife species to shift their ranges~~.~~ and allow ~~Invasive~~ invasive species, especially pest insects that are now controlled by harsh winters, to become more successful colonizers and grow into larger populations (USCGRP 2009).

Conclusion

The NRC staff examined the cumulative effects of historical conditions at the Davis-Besse site, protected species, invasive species, urbanization and habitat fragmentation, and climate change. The NRC staff concludes that the SMALL terrestrial impacts as a result of the proposed Davis-Besse license renewal would not contribute to the overall decline in the condition of terrestrial resources. The NRC staff believes that the cumulative impact of the historical draining of wetlands and loss of forested swamps when added to present conditions and future impacts from urban development, habitat fragmentation, and climate change will result in loss of habitat and a decline in species diversity of MODERATE impact to the terrestrial environment.

2.0 AFFECTED ENVIRONMENT

2.2.7 Protected Species and Habitats

This section discusses species and habitats that are: (1) Federally protected under the Endangered Species Act of 1973, as amended (ESA); (2) Federally protected under the the Bald and Golden Eagles Protection Act of 1940, as amended; (3) Federally protected under the Migratory Bird Treaty Act of 1918, as amended (MBTA); and (4) State-protected species under Chapter 1518, *Endangered* Species, of the Ohio Revised Code.

No essential fish habitat exists in the vicinity of the Davis-Besse site; therefore, species protected under the Magnuson-Stevens Fishery Conservation and Management Act, as amended, are not considered in this section. Additionally, no marine waters are impacted by the proposed license renewal; therefore, species protected under the Marine Mammal Protection Act of 1972, as amended, are not considered in this section.

2.2.7.1 *Species Protected Under the Endangered Species Act*

The U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) jointly administer the ESA. The FWS manages the protection of and recovery effort for listed terrestrial and freshwater species, while the NMFS manages the protection of and recovery effort for listed marine and anadromous species. Anadromous species are fish that migrate from salt water to spawn in fresh water~~, such as salmon and shad~~. No Federally listed species under the NMFS's jurisdiction exist on the Davis-Besse site or within Lake Erie (NMFS 2010). Table 2.2.7-1 identifies Federally listed species under the FWS's jurisdiction that occur within Ottawa County, in which the Davis-Besse site is located, or within Lucas, Sandusky, or Wood Counties, through which the transmission line corridors traverse. Federally listed species appear in bolded text in the table.

Comment [BAB1]: I think including these examples may be confusing since it introduces additional species that aren't at Davis-Besse.

Table 2.2.7-1. Federally and State Protected Species

Scientific Name	Common Name	Federal Status[(a)]	State Status[(b)]	County(ies) of Occurrence[(c)]			
				Ottawa	Lucas	Sandusky	Wood
Amphibians							
Ambystoma laterale	blue-spotted salamander	-	E		x		
Birds							
Accipiter striatus	sharp-shinned hawk	-	SC		x		
Anas clypeata	northern shoveler	-	SI	x			

Scientific Name	Common Name	Federal Status[a]	State Status[b]	County(ies) of Occurrence[c]			
				Ottawa	Lucas	Sandusky	Wood
Anas crecca	green-winged teal	-	SI	x	x	x	
Anas strepera	gadwall	-	SI	x	x	x	
Aythya americana	redhead	-	SI	x	x		
Bartramia longicauda	upland sandpiper	-	T	x	x	x	x
Botaurus lentiginosus	american bittern	-	E	x	x		
Bubulcus ibis	cattle egret	-	E		x		
Casmerodius albus	great egret	-	SC		x		
Catharus guttatus	hermit thrush	-	T				
Charadrius melodus	**piping plover**	**E**	**E**	**x**	**x**	**x**	
Chlidonias niger	black tern	-	E	x	x	x	
Chondestes grammacus	lark sparrow	-	E		x		
Circus cyaneus	northern harrier	-	E				x
Cistothorus platensis	sedge wren	-	SC	x	x	x	
Dendoica magnolia	magnolia warbler	-	SI				
Dendroica kirtlandii	**Kirtland's warbler**	**E**	**E**	**x**	**x**	**x**	
Egretta thula	snowy egret	-	E		x		
Cygnus buccinator	trumpeter swan	-	E				
Empidonax minimus	least flycatcher	-	T				
Falco peregrinus	peregrine falcon	-	T		x		
Gallinago delicata	Wilson's snipe	-	SI		x		
Grus canadensis	sandhill crane	-	E				
Haliaeetus leucocephalus	bald eagle	-	T	x	x	x	x

Scientific Name	Common Name	Federal Status[a]	State Status[b]	County(ies) of Occurrence[c]			
				Ottawa	Lucas	Sandusky	Wood
Ixobrychus exilis	least bittern	-	T	x	x	x	
Lanius ludovicianus	loggerhead shrike	-	E				x
Nycticorax nycticorax	black-crowned night-heron	-	T		x		
Oporornis philadelphia	mourning warbler	-	SI				
Oxyura jamaicensis	ruddy duck	-	SI	x	x		
Pandion haliatus	osprey	-	T				
Porzana carolina	sora	-	SC	x	x	x	
Rallus elegans	king rail	-	E	x	x	x	
Rallus limicola	virginia rail	-	SC	x	x	x	x
Sphyrapicus varius	yellow-bellied sapsucker	-	E				
Sterna hirundo	common tern	-	E	x	x		
Sturnella neglecta	western meadowlark	-	SI	x		x	
Thryomanes bewickii	Bewick's wren	-	E		x		
Vermivora chrysoptera	golden-winged warbler	-	E		x		
Wilsonia canadensis	Canada warbler	-	SI				
Fish							
Acipenser fulvescens	lake sturgeon	-	E	x	x		
Aeshna canadensis	Canada darter	-	E		x		
Ammocrypta pellucida	eastern sand darter	-	SC	x			x
Corengonus artedi	cisco	-	E	x			
Corengonus clupeaformis	lake whitefish	-	SC	x			

Scientific Name	Common Name	Federal Status[a]	State Status[b]	County(ies) of Occurrence[c]			
				Ottawa	Lucas	Sandusky	Wood
Esox masquinongy	muskellunge	-	SC	x	x	x	x
Fundulus diaphanus menona	western banded killifish	-	E	x		x	x
Lepisosteus oculatus	spotted gar	-	E	x			
Lota lota	burbot	-	SC	x			
Moxostoma valenciennesi	greater redhorse	-	T		x	x	
Notropis heterolepis	blacknose shiner	-	E	x			x
Percina copelandi	channel darter	-	T	x	x		
Freshwater Mussels							
Cyclonaias tuberculata	purple wartyback	-	SC	x	x		
Epioblasma torulosa rangiana	**northern riffleshell**	**E**	**E**	**x**			
Epioblasma triquetra	snuffbox	-	E	x			
Lampsilis ovata	pocketbook	-	E	x			
Lasmigona compressa	creek heelsplitter	-	SC		x		x
Ligumia nasuta	eastern pondmussel	-	E	x	x	x	
Ligumia recta	black sandshell	-	T	x	x		
Obliquaria reflexa	threehorn wartyback	-	T	x	x	x	x
Ptychobranchus fasciolaris	kidneyshell	-	SC	x			
Truncilla donaciformis	fawnsfoot	-	T				
Truncilla truncate	deertoe	-	SC				
Uniomerus tetralasmus	pondhorn	-	T	x			
Villosa fabalis	**rayed bean**	**PE**	**E**				

Scientific Name	Common Name	Federal Status[a]	State Status[b]	County(ies) of Occurrence[c]			
				Ottawa	Lucas	Sandusky	Wood
Insects							
Aeshna canadensis	Canada darner	-	E	x	x		
Boloria selene	silver-bordered fritillary	-	T		x		
Cycnia inopinatus	unexpected cycnia moth	-	E		x		
Erynnis persius	persius dusky wing	-	E		x		
Incisalia irus	frosted elfin	-	E		x		
Ladona julia	chalk-fronted corporal	-	E		x		
Lycaeides melissa samuelis	**karner blue butterfly**	**E**	**E**		**x**		
Lycaena helloides	purplish copper	-	E		x		
Nannothemis bella	elfin skimmer	-	E		x		
Mammals							
Myotis sodalis	**Indiana bat**	**E**	**E**	**x**	**x**	**x**	**x**
Taxidea taxus	American badger	-	SC	x			
Plants							
Acorus americanus	American sweet-flag	-	P			x	
Actaea rubra	red baneberry	-	T		x		
Agalinis gattingeri	Gattinger's-foxglove	-	T		x		
Agalinis skinneriana	Skinner's-foxglove	-	E		x		x
Amelanchier sanguinea	rock serviceberry	-	P		x		x
Ammophila breviligulata	american beach grass	-	T	x	x		

Scientific Name	Common Name	Federal Status[a]	State Status[b]	County(ies) of Occurrence[c]			
				Ottawa	Lucas	Sandusky	Wood
Androsace occidentalis	western rock-jasmine	-	T		x		x
Anemone cylindrica	prairie thimbleweed	-	T	x	x		x
Arabis divaricarpa	limestone rock cress	-	E	x	x		
Arabis drummondii	Drummond's rock cress	-	E	x	x		
Arabis hirsuta var. *adpressipilis*	southern hairy rock cress	-	P	x	x		x
Arabis lyrata	lyre-leaved rock cress	-	E		x		x
Arabis missouriensis	missouri rock cress	-	E		x		
Aristida necopina	false arrow-feather	-	E		x		
Aristida purpurascens	purple triple-awned grass	-	P		x		
Artemisia campestris	beach wormwood	-	T	x	x		
Asclepias amplexicaulis	blunt-leaved milkweed	-	P		x		
Astragalus canadensis	Canada milk-vetch	-	P	x	x		
Aureolaria pedicularia var. ambigens	prairie fern-leaved false foxglove	-	E		x		x
Botrychium multifidum	leathery grape fern	-	E		x		
Botrychium simplex	least grape fern	-	E		x		
Bromus kalmii	prairie brome	-	P		x		
Cakile edentula	inland sea rocket	-	P	x	x		
Calamintha arkansana	limestone savory	-	T	x	x	x	
Calopogon tuberosus	grass-pink	-	T		x		
Campanula rotundifolia	harebell	-	T	x			

Scientific Name	Common Name	Federal Status[a]	State Status[b]	County(ies) of Occurrence[c]			
				Ottawa	Lucas	Sandusky	Wood
Carex alata	broad-winged sedge	-	P		x		
Carex albolutescens	pale straw sedge	-	P		x		
Carex alopecoidea	northern fox sedge	-	E		x		
Carex aquatilis	leafy tussock sedge	-	P	x	x		
Carex atherodes	wheat sedge	-	P	x	x		x
Carex aurea	golden-fruited sedge	-	P	x	x	x	x
Carex bebbii	Bebb's sedge	-	P	x	x		
Carex bicknellii	Bicknell's sedge	-	T		x		x
Carex brevior	tufted fescue sedge	-	T	x			
Carex cephaloidea	thin-leaved sedge	-	P	x	x		
Carex conoidea	field sedge	-	T		x		x
Carex cryptolepis	little yellow sedge	-	P		x		
Carex garberi	Garber's sedge	-	E	x			
Carex lasiocarpa	slender sedge	-	P		x		
Carex longii	Long's sedge	-	E		x		
Carex lucorum	fire sedge	-	E		x		
Carex merritt-fernaldii	Fernald's sedge	-	E		x		
Carex pseudocyperus	northern bearded sedge	-	E		x		
Carex retrorsa	reflexed bladder sedge	-	E		x		
Carex siccata	hay sedge	-	E		x		
Carex sprengelii	Sprengel's sedge	-	T	x	x		

Scientific Name	Common Name	Federal Status[a]	State Status[b]	County(ies) of Occurrence[c]			
				Ottawa	Lucas	Sandusky	Wood
Carex viridula	little green sedge	-	P	x	x	x	
Castanea dentata	american chestnut	-	P		x		
Chimaphila umbellata	pipsissewa	-	T		x		
Coeloglossum viride	long-bracted orchid	-	E		x		
Comptonia peregrina	sweet-fern	-	E		x		x
Conyza ramosissima	bushy horseweed	-	P		x	x	x
Cornus rugosa	round-leaved dogwood	-	P	x	x		
Corydalis sempervirens	rock-harlequin	-	P	x	x		
Croton glandulosus	northern croton	-	E		x		
Cyperus acuminatus	pale umbrella-sedge	-	T		x		
Cyperus diandrus	low umbrella-sedge	-	P	x	x	x	
Cyperus schweinitzii	Schweinitz's umbrella-sedge	-	T	x	x		
Descurainia pinnata	tansy mustard	-	P	x	x	x	x
Desmodium sessilifolium	sessile tick-trefoil	-	T		x		
Draba reptans	Carolina whitlow-grass	-	T	x	x		
Drosera intermedia	spathulate-leaved sundew	-	E		x		
Eleocharis compressa	flat-stemmed spike-rush	-	P	x	x		x
Eleocharis engelmannii	Engelmann's spike-rush	-	E		x		
Eleocharis geniculata	Caribbean spike-rush	-	E	x			
Eleocharis ovata	ovate spike-rush	-	E	x			

Scientific Name	Common Name	Federal Status[a]	State Status[b]	County(ies) of Occurrence[c]			
				Ottawa	Lucas	Sandusky	Wood
Eleocharis tenuis	slender spike-rush	-	T		x		
Elymus trachycaulus	bearded wheat grass	-	T	x	x		
Epilobium angustifolium	fireweed	-	E		x		
Equisetum variegatum	variegated scouring-rush	-	E	x	x		
Eryngium yuccifolium	rattlesnake-master	-	P		x		
Euphorbia polygonifolia	seaside spurge	-	P	x	x		
Euthamia remota	great lakes goldenrod	-	T		x		
Gentiana puberulenta	prairie gentian	-	E		x		x
Gentiana saponaria	soapwort gentian	-	E		x		
Gentianopsis crinita	fringed gentian	-	P		x		
Gentianopsis procera	small fringed gentian	-	P		x		
Geranium bicknellii	Bicknell's crane's-bill	-	E		x		
Gymnocarpium dryopteris	common oak fern	-	E		x		
Hedeoma hispida	rough pennyroyal	-	P	x	x	x	x
Hedyotis nigricans	narrow-leaved summer bluets	-	P	x		x	
Helianthemum bicknellii	plains frostweed	-	P		x		x
Helianthemum canadense	Canada frostweed	-	T		x		x
Hesperostipa spartea	porcupine grass	-	E		x		x
Hieracium umbellatum	Canada hawkweed	-	T		x		x
Hypericum canadense	Canada St. John's-wort	-	E		x		

Scientific Name	Common Name	Federal Status[a]	State Status[b]	County(ies) of Occurrence[c]			
				Ottawa	Lucas	Sandusky	Wood
Juncus alpinoarticulatus	alpine rush	-	P	x	x	x	
Juncus balticus	baltic rush	-	P	x		x	
Juncus diffusissimus	diffuse rush	-	T		x		
Juncus greenei	Greene's rush	-	T		x		x
Koeleria macrantha	June grass	-	E		x		
Krigia virginica	Virginia dwarf-dandelion	-	T		x		x
Lathyrus ochroleucus	yellow vetchling	-	E		x		
Lechea intermedia	round-fruited pinweed	-	P		x		
Lechea minor	thyme-leaved pinweed	-	T		x		x
Lechea pulchella	Leggett's pinweed	-	T		x		x
Lechea villosa	hairy pinweed	-	P		x		
Liatris squarrosa	scaly blazing-star	-	P		x		
Lilium philadelphicum	wood lily	-	E	x	x		x
Linaria canadensis	old-field toadflax	-	E		x		
Lipocarpha drummondii	Drummond's dwarf bulrush	-	E		x		
Lipocarpha micrantha	dwarf bulrush	-	T		x		
Lithospermum caroliniense	plains puccoon	-	T		x		x
Lupinus perennis	wild lupine	-	P		x		x
Lycopodiella subappressa	northern appressed club-moss	-	E		x		
Melampyrum lineare	cow-wheat	-	T		x		
Minuartia michauxii	rock sandwort	-	P	x	x		

Scientific Name	Common Name	Federal Status[a]	State Status[b]	County(ies) of Occurrence[c]			
				Ottawa	Lucas	Sandusky	Wood
Monarda punctata	dotted horsemint	-	E		x		x
Muhlenbergia cuspidata	plains muhlenbergia	-	E		x		
Myriophyllum sibiricum	American water-milfoil	-	T	x		x	
Nuphar variegata	bullhead-lily	-	E	x	x		
Oenothera clelandii	Cleland's evening-primrose	-	E		x		
Oenothera oakesiana	Oakes' evening-primrose	-	P	x	x		
Oenothera parviflora	small-flowered evening-primrose	-	P	x	x		
Ophioglossum pusillum	northern adder's-tongue	-	E		x		
Opuntia humifusa	common prickly pear	-	P		x		x
Packera paupercula	balsam squaw-weed	-	T	x		x	
Panicum bicknellii	Bicknell's panic grass	-	T		x		
Panicum boreale	northern panic grass	-	P		x		
Panicum commonsianum	Commons' panic grass	-	E		x		
Panicum lindheimeri	Lindheimer's panic grass	-	T		x		
Panicum meridionale	southern hairy panic grass	-	T		x		
Panicum perlongum	long-panicled panic grass	-	E		x		
Panicum philadelphicum	philadelphia panic grass	-	E	x	x		
Panicum praecocius	early panic grass	-	E		x		
Panicum spretum	narrow-headed panic grass	-	E		x		

Scientific Name	Common Name	Federal Status[a]	State Status[b]	County(ies) of Occurrence[c]			
				Ottawa	Lucas	Sandusky	Wood
Panicum tuckermanii	Tuckerman's panic grass	-	T	x	x		
Phlox latifolia	mountain phlox	-	E		x		
Phragmites australis ssp. americanus	american reed grass	-	T	x	x		
Platanthera ciliaris	yellow fringed orchid	-	T		x		
Platanthera flava	tubercled rein orchid	-	P		x		
Platanthera leucophaea	**eastern prairie fringed orchid**	**T**	**T**	**x**	**x**	**x**	
Platanthera psycodes	small purple fringed orchid	-	T		x		
Poa saltuensis ssp. *languida*	weak spear grass	-	P		x		x
Pogonia ophioglossoides	rose pogonia	-	T		x		
Polygala cruciata	cross-leaved milkwort	-	E		x		
Polygala paucifolia	gay-wings	-	E		x		
Polygala polygama	racemed milkwort	-	T		x		
Populus balsamifera	balsam poplar	-	E	x	x		
Potamogeton gramineus	grass-like pondweed	-	E		x		
Potamogeton natans	floating pondweed	-	P	x	x		
Potamogeton richardsonii	Richardson's pondweed	-	P	x			
Potamogeton zosteriformis	flat-stemmed pondweed	-	T	x			
Potentilla arguta	tall cinquefoil	-	E	x			
Potentilla palustris	marsh five-finger	-	P		x		
Potentilla paradoxa	bushy cinquefoil	-	T		x		

Scientific Name	Common Name	Federal Status[a]	State Status[b]	County(ies) of Occurrence[c]			
				Ottawa	Lucas	Sandusky	Wood
Prenanthes racemosa	prairie rattlesnake-root	-	P		x	x	x
Prunus nigra	Canada plum	-	E		x		x
Prunus pumila var. *cuneata*	sand cherry	-	E		x		
Pycnanthemum verticillatum var. *pilosum*	hairy mountain-mint	-	T		x		
Pyrola chlorantha	green-flowered wintergreen	-	E		x		
Ranunculus fascicularis	early buttercup	-	T	x	x		x
Rhexia virginica	Virginia meadow-beauty	-	P		x		
Rhynchospora recognita	tall grass-like beak-rush	-	E		x		
Rosa blanda	smooth rose	-	T	x			x
Sagittaria cuneata	wapato	-	T	x	x	x	
Sagittaria graminea	grass-leaved arrowhead	-	E		x		
Sagittaria montevidensis	southern wapato	-	P	x	x	x	
Sagittaria rigida	deer's-tongue arrowhead	-	P	x	x	x	
Salix myricoides	blue-leaved willow	-	P		x		
Salix petiolaris	slender willow	-	T		x		x
Schoenoplectus americanus	Olney's three-square	-	E		x		
Schoenoplectus smithii	Smith's bulrush	-	E	x			
Scleria pauciflora	few-flowered nut-rush	-	P		x		x
Scleria triglomerata	tall nut-rush	-	P		x		x

Scientific Name	Common Name	Federal Status[a]	State Status[b]	County(ies) of Occurrence[c]			
				Ottawa	Lucas	Sandusky	Wood
Sisyrinchium atlanticum	atlantic blue-eyed-grass	-	E		x		
Sisyrinchium montanum	northern blue-eyed-grass	-	T		x		
Sisyrinchium mucronatum	narrow-leaved blue-eyed-grass	-	E	x		x	
Sphenopholis obtusata var. *obtusata*	prairie wedge grass	-	T	x		x	x
Spiranthes lucida	shining ladies'-tresses	-	P		x		x
Spiranthes magnicamporum	great plains ladies'-tresses	-	P	x	x		x
Symphyotrichum drummondii	Drummond's aster	-	T		x		
Symphyotrichum dumosum	bushy aster	-	T		x		
Tetraneuris herbacea	**lakeside daisy**	**T**	**E**	**x**			
Tortella inclinata	curved tortella	-	E	x			
Triglochin palustris	marsh arrow-grass	-	P	x		x	
Triplasis purpurea	purple sand grass	-	P	x	x		
Ulmus thomasii	rock elm	-	P	x			x
Vernonia missurica	missouri ironweed	-	E		x		
Viola lanceolata	lance-leaved violet	-	P		x		
Viola nephrophylla	northern bog violet	-	E	x		x	
Viola pedata	birdfoot violet	-	T		x		
Xanthoria elegans	elegant sunburst lichen	-	E	x			
Xyris torta	twisted yellow-eyed-grass	-	T		x		
Zizania aquatica	wild rice	-	T	x	x		

Scientific Name	Common Name	Federal Status[a]	State Status[b]	County(ies) of Occurrence[c]			
				Ottawa	Lucas	Sandusky	Wood
Reptiles							
Clemmys guttata	spotted turtle	-	T		x		
Clonophis kirtlandii	Kirtland's snake	-	T		x		
Emydoidea blandingii	Blanding's turtle	-	SC	x	x	x	
Nerodia sipedon insularum	**Lake Erie water snake**	**T**	**E**	**x**			
Elaphe vulpina gloydi	eastern fox snake	-	SC	x	x	x	
Sistrurus catenatus	**eastern massasauga**	**C**	**E**	**x**	**x**	**x**	
Terrapene carolina	eastern box turtle	-	SC		x		
Thamnophis sirtalis	melanistic garter snake	-	SC				

[a] C= Candidate; DL = Delisted; E = Federally endangered; PE = proposed endangered; T = Federally threatened; - = No listing

[b] E = Endangered; T = Threatened; SC = Species of Concern

[c] The Davis-Besse site is located in Ottawa County, Ohio. The transmission lines associated with the Davis-Besse site traverse Ottawa County, as well as Lucas, Sandusky, and Wood Counties.

Sources: FENOC 2010; FWS 2011cd, 2011esa; ODNR 2009BM, 2010JN, 2010L, 2010o, 2010s, 2010w

The ESA requires Federal agencies, in consultation with the FWS and/or the NMFS, to ensure that actions that they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction of, or adverse modification to, designated critical habitat. Eight Federally listed species and two Federal candidate species appear in bolded text in Table 2.2.7-1. These species occur in Ottawa County or in one or more counties that the transmission line corridors traverse. Of these species, the FWS (2009lr, 2010lr) has indicated that the Davis-Besse site, specifically, is known to provide or is likely to provide habitat for six of these species:

- eastern massasauga (*Sistrurus catenatus)*,
- eastern prairie fringed orchid (*Platanthera leucophaea*),
- Indiana bat (*Myotis sodalis)*,
- Lake Erie water snake (*Nerodia sipedon* ssp. *insularum*),

- lakeside daisy (*Hymenoxy acaulis* var. *glabra*), and
- piping plover (*Charadrius melodus*).

Potential habitat and occurrence of these species on or in the vicinity of the Davis-Besse site are discussed in more detail below.

No designated critical habitat exists on the Davis-Besse site or along the transmission line corridors.

Eastern Massasauga

The eastern massasauga is a candidate species under the ESA and is State-listed as endangered. The species is a medium-sized rattlesnake that inhabits wet prairies, sedge meadows, and early successional fields throughout the northeastern U.S. It is one of two Ohio-native rattlesnakes, and the ODNR has recorded it as occurring in 22 Ohio counties (ODNR 2011es). Suitable habitat for the eastern massasauga exists on the Davis-Besse site and along the transmission line corridors.

Eastern Prairie Fringed Orchid

The eastern prairie fringed orchid is a Federally and State-listed threatened species. The species is an 8- to 40-in. (20- to 100-cm)-tall perennial herb with lance-shaped leaves and a single flower spike of small white flowers. The orchid grows in mesic prairie, sage meadows, marsh edges, bogs, and other wetland habitats with full sun (FWS 2011epf). Eastern prairie fringed orchids form a mycorrhizal association with soil fungus and are pollinated by hawkmoths (FWS 2011epf). Though suitable habitat exists on and in the vicinity of the Davis-Besse site, during the NRC's site audit (NRC 2011sa), the FWS noted that it was unable to find any eastern prairie fringed orchid populations during a 2010 survey within the Ottawa National Wildlife Refuge.

Indiana Bat

The Indiana bat is a Federally and State-listed endangered species. Indiana bats appear dark brown in color, but individual hairs are tricolored, which distinguishes the Indiana bat from the little brown bat (*Myotis lucifugus*) (ODNR 2011ib). Indiana bats inhabit Ohio seasonally during the spring and summer months, during which time they rear young. Menzel et al. (2005) concluded that habitat use is highly correlated with insect abundance, which means that Indiana bats often forage in riparian areas where insect densities are highest. Menzel et al. (2005) also found that Indiana bats were more closely associated with linear landscape features (forest corridors and roads) than open areas (agricultural land, grasslands, or meadows). The Davis-Besse site includes riparian areas and may provide habitat to the species. Additionally, the transmission line corridors are linear landscape features that the Indiana bat may use as habitat as well.

FENOC (2011)'s *Environmental Best Management Practices* includes procedures for cutting trees in areas with suitable Indiana bat habitat. The procedure directs staff to cut trees between September 30 and April 1. If trees must be cut outside these months, FENOC must complete a net survey in May or June prior to cutting to ensure that the cutting will not result in disturbance of Indiana bat roosts. These specifications apply to the Davis-Besse site as well as the in-scope transmission line corridors.

Lake Erie Water Snake

The Lake Erie water snake is a Federally threatened and State-listed endangered species. The species is active between May and October and is only found on the Lake Erie islands. In a 2008 capture-mark-recapture survey, the ODNR estimated the

population to consist of 9,336 adults, which exceeds the number of adult snakes needed for the species to be deemed recovered per the Lake Erie Watersnake Recovery Plan (ODNR,2009ws; FWS 2003). Because the species is only found on Lake Erie islands, it is not likely to be present on the Davis-Besse site.

Lakeside Daisy

The lakeside daisy is a Federally threatened and State-listed endangered species. It inhabits full sun areas of dry, rocky prairie grassland that contain limestone deposits (ODNR 2011ld). Suitable habitat for this species does not exist on the Davis-Besse site. Suitable habitat may exist along the transmission line corridors, but the species is unlikely to be disturbed during regular transmission line corridor maintenance because FirstEnergy does not conduct intensive management within prairie grassland habitat as this type of habitat contains desirable, low-growing species that will not interfere with transmission lines and structures.

Piping Plover

The piping plover is a Federally and State-listed endangered species. Historically, it nested and bred on Lake Erie beaches, but piping plovers have not nested on Lake Erie since 1942, and the species is now only a migrant to the area (ODNR 2011pp). Piping plovers inhabit sandy beaches and mudflats during migration. The Davis-Besse site may provide marginal habitat for the piping plover, but occurrence of this species on or in the vicinity of the site is rare. Since 2003, the Black Swamp Bird Observatory has recorded the piping plover in only three years—one individual during fall migration in 2005, one individual during spring migration in 2007, and two individuals during fall migration in 2008 (BSBO 2005, 2007, 2008). Because all of the transmission line corridors travel inland from the site, no suitable piping plover habitat exists along the transmission line corridors.

Other Federally Listed Species

Four other Federally listed species occur within Ottawa, Lucas, Sandusky, or Wood Counties, but were not identified as occurring on the Davis-Besse site by the FWS (2009lr, 2010lr). These four species are the Kirtland's warbler (*Dendroica kirtlandii*), the karner blue butterfly (*Lycaeides Melissa samuelis*), and two freshwater mussels: the northern riffleshell (*Epioblasma torulosa rangiana*) and rayed bean (*Villosa fabalis*). Though the Kirtland's warbler may pass through Ohio during migration, the FWS (2011kw) note that the species only nests within the U.S. in Michigan's Upper and Lower Peninsula and in Wisconsin. The karner blue butterfly requires pine barrens or oak savannahs that contain wild lupine (*Lupinus perennis*) (FWS 2011kbb) and are, therefore, not likely to occur on or in the vicinity of the Davis-Besse site. The two freshwater mussel species were not identified in Lake Erie during a recent survey conducted by Crail et al. (2011), which is discussed in more detail in Section 2.2.7.4.

2.2.7.2 *Species Protected Under the Bald and Golden Eagle Protection Act*

The Bald and Golden Eagle Protection Act prohibits anyone from taking bald eagles (*Haliaeetus leucocephalus*) or golden eagles (*Aquila chrysaetos*), including their nests or eggs without an FWS-issued permit. The term "take" in the Act is defined as to "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb" (50 CFR 22.3). "Disturb" means to take action that (1) causes injury to an eagle; (2) decreases its productivity by interfering with breeding, feeding, or sheltering behavior; or (3) results in nest abandonment (50 CFR 22.3).

Bald eagles occur in Ottawa, Lucas, Sandusky, and Wood Counties. According to the ODNR, Ottawa County has one of the highest densities of bald eagle nests in Ohio (FWS 2010ms). Many bald eagle nests are located on the Davis-Besse site and along each of the four transmission line corridors. Two bald eagle nests are specifically located on the Davis-Besse site—one within Navarre Marsh and one northwest of the cooling tower near the site boundary (FWS 2010ms).

FENOC (2011)'s *Environmental Best Management Practices* includes procedures to ensure that bald eagles and their nests are not disturbed during ground disturbing activities, tree clearance, or other habitat modifications. The procedure directs FENOC staff and contractors to avoid any activities that could disturb eagles with 660 ft (200 m) of any known nest from January 1 through July 31. If activities that have the potential to disturb eagles must be conducted within these months, FENOC must coordinate with the FWS to discuss potential mitigation options that could reduce or minimize impacts to eagles. These specifications apply to the Davis-Besse site as well as the in-scope transmission line corridors.

2.2.7.3 *Species Protected Under the Migratory Bird Treaty Act*

The FWS administers the MBTA, which prohibits anyone from taking native migratory birds or their eggs, feathers, or nests. The MBTA definition of a "take" differs from that of the ESA and is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or any attempt to carry out these activities" (50 CFR 10.12). Unlike a take under the ESA, a take under the MBTA does not include habitat alteration or destruction. The MBTA protects a total of 1007 migratory bird species (75 FR 9282). Of these 1007, the FWS allows for the legal hunting of 58 species as game birds (FWS undated). Within Ohio, the ODNR manages migratory bird hunting seasons and associated hunting licenses. All Federally and State-listed bird species that appear in Table 2.2.7-1 are protected under the MBTA. Additionally, all U.S.-native bird species that belong to the families, groups, or species listed at 10 CFR 10.13 are protected under the MBTA. Section 2.2.7.4 discusses occurrences of protected bird species on and in the vicinity of the Davis-Besse site in detail.

2.2.7.4 *Species Protected by the State of Ohio*

Ohio adopted a Statewide threatened and endangered species program in 1974. The Ohio Revised Code prohibits the taking or possession of State-designated endangered wildlife or the willful uprooting, destruction, or removal of native and State-designated threatened or endangered plants from public highways, public property, or waters of the state (Ohio Rev. Code §1518.02, §1531.25).

Birds

The majority of the State-listed birds listed in Table 2.2.7-1 occur on the Davis-Besse site based on data from the Black Swamp Bird Observatory, which conducts long-term research on breeding and migration of songbirds, raptors, shorebirds, and rails.

For songbirds, Table 2.2.7-2 summarizes the number of individuals banded in 2003, 2004, 2008, and 2009 at the Black Swamp Bird Observatory's Navarre Station, which is located within Navarre Marsh (discussed in more detail Section 2.2.6) on the Davis-Besse site. According to the Black Swamp Bird Observatory's progress report data, the Davis-Besse site and surrounding area provides habitat for 8 of the 13 State-listed songbirds. State-listed species account for an average of 10.9 percent of the birds banded each season. The magnolia warbler (*Dendroica magnolia*) and hermit thrush (*Catharus guttatus*) are the most common State-listed songbirds during both the spring

and fall migration. The Canada warbler (*Wilsonia canadensis*), mourning warbler (*Oporornis philadelphia*), and least flycatcher (*Empidonax minimus*) primarily use the Davis-Besse area during spring migration, but are present in very small numbers during the fall migration as well. The golden-winged warbler (*Vermivora chrysoptera*) and yellow-bellied sapsucker (*Sphyrapicus varius*) are present, but rare, during both the spring and fall migration. The Bewick's wren (*Thryomanes bewickii*), Kirtland's warbler, lark sparrow (*Chondestes grammacus*), western meadowlark (*Sturnella neglecta*), and loggerhead shrike (*Lanius ludovicianus*) were not banded at Navarre Station or any of the other monitoring stations and were also not observed on point counts for the data years. However, one loggerhead shrike was captured in a Black Swamp Bird Observatory net at the Navarre Banding Station in 2007 (BSBO 2011ls). This event is the only known occurrence of this species in the area. The sedge wren (*Cistothorus platensis*) was not banded during any of the data years, but one individual was observed on a point count in Navarre Marsh in 2009 (BSBO 2009a).

Table 2.2.7-2. Songbirds Bandings During Annual Migration Surveys, 2003-2009

	Number of Individuals Banded							
	Spring Migration				Fall Migration			
Species	**2003**	**2004**	**2008**	**2009**	**2003**	**2004**	**2008**	**2009**
Canada warbler	90	156	106	125	2	4	9	9
golden-winged warbler	2	2	1	3	1	0	0	0
magnolia warbler	600	879	414	686	190	103	88	115
mourning warbler	126	19	88	109	6	10	5	12
hermit thrush	123	95	95	142	187	172	169	212
least flycatcher	131	39	56	108	2	7	7	2
yellow-bellied sapsucker	1	5	2	1	5	3	3	8
Total banded (State-listed species)	**1073**	**1195**	**1762**	**1174**	**393**	**299**	**281**	**358**
Total banded (all species)	**7841**	**8970**	**7822**	**10042**	**4191**	**3206**	**2790**	**3645**

Sources: BSBO 2003, 2004, 2008a, 2009a

For raptors, the Black Swamp Bird Observatory conducts annual spring surveys between late February and early May. Table 2.2.7-3 summarizes the number of birds counted by species for the available data years (2006 through 2009). The Black Swamp

Bird Observatory surveys 23 sites throughout the marshes on the southwestern shore of Lake Erie. State-listed raptor species make up an average of 9.7 percent of the observed raptors each year. Sharp-shinned hawks (*Accipiter striatus*) and bald eagles (*Haliaeetus leucocephalus*) are the most commonly observed raptors, while peregrine falcons (*Falco peregrinus*) are the least commonly observed.

Table 2.2.7-3. Spring Raptor Survey Counts in the Lake Erie Marsh Region, 2006-2009

	Number of Individuals Observed			
Species	**2006**	**2007**	**2008**	**2009**
sharp-shinned hawk	245	492	389	467
northern harrier	95	122	167	61
peregrine falcon	10	8	3	4
bald eagle	247	181	371	153
osprey	12	14	29	31
Total count (State-listed species)	364	817	959	716
Total count (all species)	4339	8645	8760	7184

Sources: BSBO 2007r, 2008r, 2009r

For ducks, swans, and shorebirds, the Black Swamp Bird Observatory conducts annual spring surveys in Navarre Marsh that captures species presence or absence on each day during the spring migration period (generally from early April through early June). Table 2.2.7-4 summarizes whether each species was observed in the survey for the years 2006 through 2011. Six of the 18 species were consistently observed each survey year: the great egret (*Ardea alba*), black-crowned night-heron (*Nycticorax nycticorax*), trumpeter swan (*Cygnus buccinator*), Virginia rail (*Rallus limicola*), sora (*Porzana carolina*), and common tern (*Sterna hirundo*). The least bittern (*Ixobrychus exilis*), northern shoveler (*Anas clypeata*), and ruddy duck (*Oxyura jamaicensis*) were observed during the majority of the survey years (four out of the six years). The remaining species listed in Table 2.2.7-4 are relatively rare in the area and were observed less than half of the survey years. The cattle egret, king rail, black tern, piping plover, and upland sandpiper were not observed during the annual spring surveys. However, as discussed previously, the piping plover is known to seasonally occur in the area based on the Black Swamp Bird Observatory's spring and fall banding program. Though not recorded in the annual spring surveys, the upland sandpiper has been recorded during the Black Swamp Bird Observatory's shorebird migration and habitat use surveys in 2003, 2007, and 2009.

Table 2.2.7-4. Ducks, Swans, and Shorebirds Observed in Annual Spring Surveys at Navarre Marsh, 2006-2010

	Species Observed During Survey Year (Y/N)

Species	2006	2007	2008	2009	2010	2011
great egret	Y	Y	Y	Y	Y	Y
snowy egret	Y	N	Y	N	N	N
black-crowned night-heron	Y	Y	Y	Y	Y	Y
least bittern	N	Y	Y	Y	N	Y
American bittern	N	Y	Y	N	N	Y
trumpeter swan	Y	Y	Y	Y	Y	Y
green-winged teal	N	N	Y	Y	N	Y
northern shoveler	N	Y	Y	Y	N	Y
redhead	N	N	N	Y	Y	Y
ruddy duck	N	N	Y	Y	Y	Y
sandhill crane	N	N	N	Y	N	Y
Virginia rail	Y	Y	Y	Y	Y	Y
sora	Y	Y	Y	Y	Y	Y
Wilson's snipe	N	N	N	Y	N	N
common tern	Y	Y	Y	Y	Y	Y

Sources: BSBO 2006nm, 2007nm, 2008nma, 2008nmb, 2009nm, 2010nm, 2011nm

Plants

The ODNR (2010BM) identified one Ohio-listed plant species as occurring onsite—the Canada milk-vetch (*Astragalus canadensis*). The Canada milk-vetch inhabits moist prairies, open woodlands, roadsides, and streambanks. Because this species occurs in a wide variety of habitats, it may occur on both the developed and undeveloped portions of the Davis-Besse site. However, the ODNR (2010BM) last recorded the Canada milk-vetch on the Davis-Besse site in 1979, and FENOC did not specifically note the occurrence of this species on the site in their ER. Therefore, it is unknown whether the species still occurs on the Davis-Besse site.

The ODNR (2010BM) noted six additional Ohio-listed plant species that are known to occur along the Davis Besse site perimeter or just outside of the site. The six species and their habitats are:

- Schweinitz's umbrella-sedge (*Cyperus schweinitzii*)—sandy shores, beaches, and barrens,
- inland sea rocket (*Cakile edentula*)—sandy beaches above the high tide line,
- purple sand grass (*Triplasis purpurea*)—sand dunes,
- seaside spurge (*Euphorbia polygonifolia*)—sand dunes,
- deer's-tongue arrowhead (*Sagittaria rigida*)—swamps and shallow water, and
- American sweet-flag (*Acorus americanus*)—emergent wetlands.

ODNR (2010BM) has recorded three of these species—Schweinitz's umbrella-sedge, purple sand grass, and deer's-tongue arrowhead—as occurring in the vicinity of the Davis-Besse site as recently as 2009. The inland sea rocket was last recorded in 1997, the sea side spurge in 1990, and the American sweet-flag in 1971 (ODNR 2010BM). Due to these species' habitat requirements, if they occur on the Davis-Besse site, all six of these plants would be restricted to the Lake Erie shoreline and Navarre Marsh. None of these species are likely to occur on the developed portion of the Davis Besse site.

Fish and Freshwater Mussels

Twelve State-listed fish species potentially occur within the vicinity of Davis-Besse. However, none of these species were identified by the ODNR (2010BM) as occurring on or in the immediate vicinity of the Davis-Besse site.

Five Ohio-listed mussel species have been recorded as occurring in Lake Erie near the portion of the shoreline adjacent to the Davis-Besse site (ODNR 2010BM). These species are:

- purple wartyback (*Cyclonaias tuberculata*),
- fawnsfoot (*Truncilla donaciformis*),
- eastern pondmussel (*Ligumia nasuta*),
- black sandshell (*Ligumia recta*), and
- deertoe (*Truncilla truncata*).

However, the ODNR (2010BM) has not recorded any of these species as occurring in this area since the late-1960s to late-1970s. The lack of recorded native mussel occurrences likely coincides with the introduction of the Eurasian dreissenid mussels—the zebra (*Dreissena polymorpha*) and quagga (*Dreissena rostriformis bugensis*) mussels—to Lake Erie in the 1980s.

Between 2007 and 2009, Crail et al. (2011) surveyed numerous sites along the Lake Erie coast and within associated coastal marshes for native mussel species. Toussaint River, which lies near the southern boundary of the Davis-Besse site, was one of the surveyed sites. Crail et al. (2011) found live mussels of eight species at the Toussaint River site, none of which were any of the five State-listed species above. However, Crail et al. (2011) identified three State-listed species at other sites northeast of the Davis-Besse site: live eastern pondmussel and deertoe individuals in Bayshore; fresh dead deertoe individuals at the Mamee Bay site; and fresh dead fawnsfoot individuals at Luna Pier. Crail et al. (2011)'s survey indicates that though these mussel species may no longer occur in the immediate vicinity of Davis-Besse, at least three of the State-listed species continue to occur within Lake Erie's western basin.

Amphibians and Reptiles

The ODNR (2010NM) identified three Ohio-listed reptiles as having known occurrences on the Davis-Besse site: the Blanding's turtle (*Emydoidea blandingii*), the eastern fox snake (*Elaphe vulpina gloydi*), and the melanistic garter snake (*Thamnophis sirtalis*). The Blanding's turtle is a semi-aquatic turtle that occurs in coves, bays, ponds, and shallow marsh waters. The eastern fox snake is found in freshwater marshes along Lake Erie and Lake Huron, exclusively. The melanistic garter snake occurs in a wide variety of habitats, including forests, fields, prairies, streams, wetlands, meadows, and ponds. All three of these species are likely to inhabit Navarre Marsh on the Davis-Besse site.

Insects

The ODNR (2010NM) did not identify the occurrence of any State-listed insects on or in the vicinity of the Davis-Besse site. The Black Swamp Bird Observatory conducts annual butterfly surveys within Navarre Marsh and other areas with the Ottawa National Wildlife Refuge. According to survey results from 2006 through 2009, the Black Swamp Bird Observatory did not observe any State-listed butterfly species during their surveys (BSBO 2006bf, 2007bf, 2008bf, 2009bf). However, Navarre Marsh and the grasslands on the site are likely to provide suitable habitat for the silver-bordered fritillary (*Boloria selene*) and the purplish copper (*Lycaena helloides*) butterflies as well as the dragonfly, elfin skimmer (*Nannothemis bella*).

The unexpected cycnia moth (*Cycnia inopinatus*) requires dry prairie or coastal sand scrub, which is not present in the Davis-Besse area. The chalk-fronted corporal (*Ladona julia*) and Canada darner (*Aeshna canadensis*)—both dragonflies—are most common in wooded areas. These two species may occur, but are not likely to occur, in the vicinity of the Davis-Besse site. The persius dusky wing (*Erynnis persius*) butterfly specifically requires pine barrons or oak savannahs, and the frosted elfin (*Incisalia irus*) butterfly specifically requires oak savannahs in proximity to lupine (*Lupinus* spp.); therefore, neither of these species is likely to be present in the area.

Mammals

The two State-listed mammal species that have the potential to occur on or in the vicinity of the Davis-Besse site are the Indiana bat, which is discussed in Section 2.2.7.1, and the American badger (*Taxidea taxus*), which is an Ohio species of concern. Badgers inhabit fields and grasslands. They are nocturnal and secretive, which makes determining an accurate population estimate difficult (ODNR, 2011ab). In their letters to FENOC, ODNR did not identify either the Indiana bat or the American badger as occurring on the Davis-Besse site (ODNR 2009BM, 2010JN).

3.0 ENVIRONMENTAL IMPACTS OF REFURBISHMENT

3.2.1 Terrestrial Resources

FENOC's planned refurbishment activities (discussed in Section 3.1.1) will require FENOC to construct several new buildings and designate areas for decontamination and building material and supplies lay down. The descriptions of terrestrial resources in Section 2.2.6 and protected species and habitats in Section 2.2.7 serve as the basis for the assessment of refurbishment impacts to terrestrial resources contained in this section. The information concerning refurbishment activity timing and logistics was drawn from FENOC (2010)'s ER.

Onsite Impacts

FENOC plans to complete all refurbishment activities during an extended refueling outage in the spring of 2014, which would last approximately 70 days. During the refurbishment period, FENOC would construct temporary and permanent buildings, move heavy equipment and machinery, and create lay down areas on previously disturbed areas within the owner-controlled area of the Davis-Besse site. FENOC estimates that total land disturbance would be less than 10 ac (4 ha).

FENOC plans to construct the following refurbishment-related buildings and facilities:

(1) a 12,000-ft^2 (1,100-m^2) permanent storage facility to store the current reactor vessel head, the original steam generations, and the Reactor Coolant System hot legs,

(2) a permanent multi-story office building to support the extra personnel required for refurbishment activities, and

(3) various temporary facilities totaling 80,000 ft^2 (7,400 m^2) including tents and portable trailers for fabrication and assembly activities, mock-up activities, weld testing, decontamination, warehouse storage, and lay down areas.

Additionally, FENOC may opt to construct a concrete pad to serve as a base for the temporary buildings described above. If FENOC constructs a concrete pad, the pad would remain on the site as a permanent structure following the completion of refurbishment activities.

All land that would be disturbed for construction and other refurbishment-related activities is previously disturbed and currently maintained as (1) parking lots or other paved surface or as (2) landscaped areas that are regularly mowed. Because of this, no terrestrial habitat would be affected by refurbishment. Some sediment transport or erosion may occur during construction. Some wildlife in neighboring marsh and grassland habitat would likely avoid habitat margins during the refurbishment period due to increased noise and lighting, which would reduce the available habitat for those species. Edges species would be affected more than interior species. Because refurbishment is planned for the spring, construction activities could affect the nesting behavior or certain bird species. However, these impacts would be short term because the refurbishment period will only last for about 70 days. Additionally, all nesting birds would benefit from the protective measures that FENOC follows regarding the bald eagle (*Haliaeetus leucocephalus*) and its nesting season (discussed below under "Protected Species and Habitats").

Onsite impacts to terrestrial resources would be SMALL. The protective measures in place for bald eagles (discussed below) would benefit all wildlife in the immediate area. Increased noise and lighting may reduce habitat usage for a short period of time, but no undisturbed land would be immediately impacted; therefore, refurbishment would not result in the long term conversion or loss of habitat or noticeably alter the behavior of any wildlife populations.

Offsite Impacts

Babcock and Wilcox Canada, Ltd., will transport and deliver the steam generators to the Davis-Besse site via railroad. FENOC noted in their ER that physical modifications to the rail lines may be necessary to safely transport the new steam generators to the site. If rail lines need to be widened or improved, this would likely be contained within the established rail line right-of-way. However, depending on the surrounding habitat, construction activities could lead to loss of habitat, erosion, and altered wildlife behavior. Edge species and nesting birds would be affected more than interior species. Because the extent of offsite impacts is unknown at this stage, the impacts could range from SMALL to MODERATE.

Protected Species and Habitats

As discussed in Section 2.2.7, the FWS identified two bald eagle nests that are located on the Davis-Besse site—one within Navarre Marsh and one northwest of the cooling tower near the site boundary (FWS 2010ms). FENOC (2011)'s *Environmental Best Management Practices* specify that no ground disturbing activity, tree clearing, or habitat modification occur within 660 ft (200 m) of any bald eagle nest between January 1 and July 31. If activities are planned during this timeframe, FENOC's procedures require them to coordinate with the FWS prior to taking action (FENOC 2011). Additionally, the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §668-668c), prohibits the taking of eagles without an FWS-issued eagle permit. Taking includes any action or activity that decreases an eagle's productivity by interfering with breeding, feeding, or sheltering behavior or any activity that results in an eagle abandoning its nest (50 CFR 22.3). Because the refurbishment activities would likely be within a 660-ft (200-m) radius of one or more bald eagle nest, FENOC would have to consult with FWS prior to beginning refurbishment activities in the spring of 2014 to ensure that the appropriate mitigation measures are taken to minimize adverse impacts to bald eagles during the 70-day refurbishment period.

FENOC also maintains procedures concerning the Indiana bat (*Myotis sodalis*) (discussed in Section 2.2.7). If any Indiana bats inhabit natural areas on the Davis-Besse site, these individuals may avoid the area for a short period during refurbishment activities due to increased noise and lighting. However, because FENOC will not remove trees as part of the refurbishment activities, the NRC staff does not anticipate any noticeable impacts to the Indiana bat.

None of the refurbishment activities are expected to impact any other Federally listed species, migratory birds, or State-listed species. A number of State-listed plant species are known to occur on the Davis-Besse site (discussed in Section 2.2.7), but because only previously disturbed land would be involved in refurbishment activities, no State-protected plants would be affected. State-listed animals that are known to occur on the site may avoid the immediate area and neighboring habitat edges due to construction noise and lighting.

No critical habitat is designated in the vicinity of Davis-Besse.

Impacts to protected species and habitats would be SMALL because ~~PSEG~~ FENOC has procedures in place to protect the bald eagle, which is the protected species most likely to be affected by refurbishment activities. These protective measures would, in turn, benefit all migratory birds and other protected wildlife in the immediate area. Federally and State-listed plant species would not be impact because all refurbishment activities would take place on previously disturbed land.

Conclusion

The NRC staff concludes that impacts on terrestrial resources from refurbishment would be SMALL to MODERATE. Some animals, especially nesting birds, may avoid habitats neighboring refurbishment activities due to increased noise and lighting during the 70-day refurbishment period. This impact would reduce the available habitat for a short period of time for certain animal populations. If any refurbishment activities are planned within 660 ft (200 m) of any bald eagle nest, FENOC would have to consult with FWS regarding impacts to bald eagles and potential mitigation measures to reduce or avoid impacts. Offsite impacts will vary depending on the necessity to widen or improve rail lines to transport the steam generators to the Davis-Besse site. Potential mitigation measures that could reduce impacts to terrestrial resources during the refurbishment period include installing silt fences to minimize sediment transport and the use of best management practices, such as those currently in place regarding the bald eagle and Indiana bat.

3.0 ENVIRONMENTAL IMPACTS OF REFURBISHMENT

3.2.2 Protected Species and Habitats

Section 3.1.1 discusses FENOC's planned refurbishment activities. The description of protected species and habitats in Section 2.2.7 serves as the basis for the assessment of refurbishment impacts to protected species and habitats contained in this section. The information concerning refurbishment activity timing and logistics was drawn from FENOC (2010)'s ER.

Terrestrial Species and Habitats

Section 3.2.1 discusses terrestrial protected species and habitats and concludes that the impacts to these species would be SMALL because refurbishment activities would take place on previously disturbed areas of the site and would occur for only a short period of time (approximately 70 days). Additionally, impacts to the bald eagle, which is the most likely protected species to be affected by refurbishment activities, would be mitigated by the protective measures identified in FENOC (2011)'s *Environmental Best Management Practices* and by the bald eagle permit regulations (50 CFR 22) implementing the Bald and Golden Eagles Protection Act.

Aquatic Species and Habitats

Aquatic protected species and habitats identified in Section 2.2.7 would not be affected by any refurbishment activities on the Davis-Besse site because FENOC does not anticipate any in-water work as part of refurbishment and the replacement steam generators will be transported overland by rail (versus over water barge).

Conclusion

The NRC staff concludes that the impacts on protected species and habitats from refurbishment would be SMALL. Refurbishment is most likely to impact bald eagles. However, if any refurbishment activities are planned within 660 ft (200 m) of any bald eagle nest, FENOC would have to consult with FWS regarding impacts to bald eagles and potential mitigation measures to reduce or avoid impacts.

4.0 ENVIRONMENTAL IMPACTS OF OPERATION

4.7 Protected Species and Habitats

Table 4.7-1. Threatened or Endangered Species

Issue	GEIS Section	Category
Threatened or endangered species	4.1	2

This site-specific, or Category 2 issue, requires consultation with the appropriate agencies to determine whether threatened or endangered species are present and whether they would be adversely affected by continued operation of Davis-Besse during the license renewal term. In the case of Davis-Besse, the U.S. Fish and Wildlife Service (FWS) is responsible for terrestrial and freshwater species listed under the Endangered Species Act (ESA), the Bald and Golden Eagles Act, and the Migratory Bird Treaty Act (MBTA). The National Marine Fisheries Service is responsible for marine and anadromous species listed under the ESA. The Ohio Department of Natural Resources (ODNR) is responsible species protected by the State of Ohio. Descriptions of protected species and habitats appear in Section 2.2.7.

Species Protected Under the *Endangered Species Act*

The NRC staff corresponded with both the FWS and NMFS to determine impacts to Federally listed species and to decide whether to initiate section 7 consultation as a result of the proposed Davis-Besse license renewal. No species under the NMFS's jurisdiction are present on the Davis-Besse site or within Lake Erie (NMFS 2010). The FWS provided information to FENOC on protected species in 2009 (FWS 2009lr) and confirmed that the information contained in their 2009 letter to FENOC remained current in their scoping letter to the NRC in 2010 (FWS 2010lr). The NRC developed a list of Federally listed species potentially on or in the vicinity of the Davis-Besse site and requested concurrence on this list in a June 1, 2011, letter (NRC 2011mk). At this time, the NRC is awaiting FWS's concurrence with this list [**Keep this placeholder—will need to update prior to issuance of the SEIS in October**].

Based on a review of the ER and the NRC staff's independent review of available information, the NRC staff does not anticipate any adverse impacts to Federally listed species as a result of the proposed license renewal and will not initiate section 7 consultation as a result of the proposed action. Of the 10 Federally listed species identified in Table 2.2.7-1, 6 of these species are very unlikely to occur on the Davis-Besse site or along the transmission line corridors. The remaining four species may occur in the vicinity of the site, but are not likely to be adversely affected by the proposed license renewal. Table 4.7-2 summarizes the 10 Federally listed species, their habitat, and their likelihood to occur on the Davis-Besse site or along the transmission line corridors.

Table 4.7-2. Summary of Impacts to Federally Listed Species

Scientific Name	Common Name	Habitat	Suitable Habitat Present?[a]	Adverse Impact Likely?[b]

Scientific Name	Common Name	Habitat	Suitable Habitat Present?[(a)]	Adverse Impact Likely?[(b)]
Sistrurus catenatus	eastern massasauga	wet prairie; sedge meadows; early successional fields	Yes	Not likely to adversely affect
Platanthera leucophaea	eastern prairie fringed orchid	mesic prairie; sage meadows; marsh edges; bogs	Yes	Not likely to adversely affect
Myotis sodalis	Indiana bat	hibernating: cool, humid caves; abandoned mines roosting: dead trees with loose tree bark foraging: forest edges; riparian zones	Yes	Not likely to adversely affect
Nerodia sipedon ssp. *insularum*	Lake Erie water snake	Lake Erie islands	No	No effect
Hymenoxy acaulis var. *glabra*	lakeside daisy	dry, rocky prairie with full sun and limestone deposits	Yes	Not likely to adversely affect
Charadrius melodus	piping plover	nesting: n/a for Lake Erie foraging: sandy beaches; mudflats	No	No effect
Dendroica kirtlandii	Kirtland's warbler	nesting: grasses and shrubs within young jack pine (*Pinus banksiana*) forests foraging: jack pine forests and surrounding habitat	No	No effect
Lycaeides Melissa samuelis	karner blue butterfly	pine barrons and oak savannahs with wild lupine (*Lupinus perennis*)	No	No effect
Epioblasma torulosa rangiana	northern riffleshell	swift-moving freshwater with gravel, sand, or stone substrate	No	No effect
Villosa fabalis	rayed bean	shallow freshwaters with sandy bottoms	No	No effect

Scientific Name	Common Name	Habitat	Suitable Habitat Present?[a]	Adverse Impact Likely?[b]

[a]This column indicates whether suitable habitat occurs on the Davis-Besse site and along the transmission line corridors.

[b]Conclusions presented are consistent with effect determinations under the ESA: (1) no effect, (2) is not likely to adversely affect, or (3) is likely to adversely affect.

The eastern massasauga, eastern prairie fringed orchid, and lakeside daisy are unlikely to be adversely affected by the proposed license renewal because no construction or maintenance activities occur within marshes or other potential habitat on the Davis-Besse site in which these species could occur. Suitable habitat may exist along the transmission line corridors, but these species are unlikely to be disturbed during regular transmission line maintenance because FirstEnergy does not conduct intensive management within prairie, sedge meadow, or wetland habitat as this type of habitat already contains desirable, low-growing species that will not interfere with transmission lines and structures.

Suitable roosting and foraging habitat for the Indiana bat exists on the Davis-Besse site and along the transmission line corridors. Tree removal as part of site or transmission line maintenance could affect the Indiana bat. However, FENOC (2011)'s *Environmental Best Management Practices* require FENOC staff to conduct all tree removal or disturbance between September 30 and April 1 when bats would not be in the region. If trees need to be removed during the summer months, FENOC's procedure specifies that FENOC must conduct a net survey for those tree species that are likely to provide Indiana bat roosting habitat. These surveys must be done before disturbing the trees to ensure that the Indiana bat is not adversely affected.

As noted in Section 2.2.7, no designated critical habitat occurs on the Davis-Besse site or along the transmission line corridors. Therefore, the proposed license renewal would not result in the adverse modification or destruction of any critical habitat.

Species Protected Under the *Bald and Golden Eagles Protection Act*

Bald eagles (*Haliaeetus leucocephalus*) are relatively common in the vicinity of the Davis-Besse site. Many bald eagle nests are located on the Davis-Besse site and along each of the four transmission line corridors. Two bald eagle nests are specifically located on the Davis-Besse site—one within Navarre Marsh and one northwest of the cooling tower near the site boundary (FWS 2010ms).

No activities on the Davis-Besse site would disturb bald eagles during the proposed license renewal term. Ground disturbing activities, increased noise and lighting, and other refurbishment impacts to bald eagles are discussed in Section 3.2.1 and 3.2.2. Transmission line corridor maintenance has the potential to disturb eagles if trees with nests need to be trimmed or cut down. However, FENOC (2011)'s *Environmental Best Management Practices* (discussed in Section 2.2.7) require that activities within 660 ft (200 m) of eagle nests that could disturb those nests be limited to August 1 through December 31—when eagles are least likely to be in the area. Additionally, the procedure requires FENOC to coordinate with FWS to discuss potential mitigation options that could reduce or minimize impacts to eagles if activities must take place from January 1 through July 31. These specifications apply to the Davis-Besse site as well as the in-scope transmission line corridors. Additionally, the Bald and Golden Eagle Protection Act

prohibits the taking of eagles without an FWS-issued eagle permit. Therefore, any activities that would require coordination per the procedures in FENOC's *Environmental Best Management Practices* may also require an eagle permit under the Bald and Golden Eagle Act implementing regulations (50 CFR 22). As a result of these two processes, impacts to the bald eagle as a result of transmission line maintenance during the proposed renewal term would be minimal.

Species Protected Under the *Migratory Bird Treaty Act*

No activities associated with the proposed license renewal would directly impact migratory birds. Transmission line corridor maintenance has the potential to disturb migratory bird nests if trees or shrubs containing nests are trimmed or cut down. However, the MBTA only pertains to direct impacts to migratory birds and does not protect migratory bird habitat (as described in 2.2.7.3).

Species Protected by the State of Ohio

A number of Ohio-listed species occur (or have been recorded as historically occurring) on and in the vicinity of the Davis-Besse site, including many species of birds, seven species of plants, five species of mussels, and three species of reptiles. These species are discussed in Section 2.2.7.2.

In their correspondence with FENOC, prior to FENOC's submittal of the Davis-Besse license renewal application to the NRC, the ODNR determined that the proposed license renewal would not impact any State-listed species because no tree removals, in-water work, or other major construction activities would take place that might disturb the habitat of or otherwise impact any species (ODNR 2010BM). The NRC (2010BM, 2010DG) sent letters to the ODNR during its scoping process to confirm the information contained in ODNR's previous letter to FENOC and to request any updated information concerning State-listed species. [**Keep this placeholder—will need to update prior to issuance of the SEIS in October**] The ODNR provided no updated information concerning effects to State-listed species as a result of the proposed Davis-Besse license renewal. Based on correspondence with the ODNR and the NRC staff's independent review, the NRC staff concludes that the proposed Davis-Besse license renewal will have no adverse impacts on any State-listed species.

Conclusion

The NRC staff concludes that the impacts to protected species and habitats during license renewal would be SMALL. A potential mitigation measure that could further reduce this SMALL impact include would be for FENOC to report existence of any Federally or State-listed endangered or threatened species within or near the transmission line corridors to the ODNR and FWS if any such species are identified during the renewal term. In particular, if any evidence of injury or mortality of migratory birds, State-listed species, or Federally listed species is observed within the corridor during the renewal period, coordination with the appropriate state or Federal agency would minimize impacts to the species and, in the case of Federally listed species, ensure compliance with the ESA.