NEXUS GAS TRANSMISSION PROJECT

RESOURCE REPORT 3

Fish, Wildlife, and Vegetation

FERC Docket No. CP16-__-000

November 2015

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

RESOURCE REPORT 3—FISH, WILDLIFE, AND VEGETATION	
Filing Requirement	**Location in Environmental Report**
☒ Describe commercial and recreational warmwater, coldwater, and saltwater fisheries in the affected area and associated significant habitats (§380.12 (e) (1)).	Section 3.2, Tables 3.2-1, 3.2-2, 3.2-3 and Table 2.3-6 of Resource Report 2
☒ Describe terrestrial and wetland wildlife and habitats that might be affected by the Project; describe typical species that have commercial, recreational, or aesthetic value. (§ 380.12 (e) (2)).	Section 3.3, Section 3.4, Table 3.3-1
☒ Describe the major vegetative cover types that would be crossed and provide the acreage of each vegetative cover type that would be affected by construction. (§ 380.12 (e) (3)).	Section 3.3, Table 3.3-1,
☒ Describe the effects of construction, operation, maintenance, clearing, and treatment of the Project area on aquatic and terrestrial species and their habitats. (§ 380.12 (e) (4)).	Section 3.2.6, 3.2.7, 3.3.4, and 3.4.2
☒ Evaluate the potential for short-term, long-term, and permanent impact on the wildlife resources and state-listed endangered or threatened species caused by construction and operation of the Project and proposed mitigation measures. (§ 380.12(e) (4)).	Sections 3.4.1, 3.4.2, and 3.5, 3.6.3
☒ Identify all federally listed or proposed endangered or threatened species that potentially occur in the vicinity of the Project and discussion results of consultations with other agencies regarding those potential species. (§ 380.12 (e) (5)).	Section 3.5
☒ Identify all federally listed essential fish habitat ("EFH") that potentially occur in the vicinity of the Project; identify the result of abbreviated consultations with the National Maritimes and Fisheries Service ("NMFS"); and identify any resulting EFH assessments (§§ 380.12(e)(4) & (7)).	Section 3.2.5
☒ Describe any significant biological resources that would be affected. Describe any impacts and any associated mitigation proposed to avoid or minimize that impact (§§ 380.12(e)(4) & (7)).	Sections 3.2.3, 3.2.7, 3.3.2, 3.3.4, 3.4.1, 3.4.2, 3.4.3 and 3.5, 3.6.3

RESPONSE TO FERC JULY 30, 2015 COMMENTS ON
NEXUS RESOURCE REPORT 3 – FISH, WILDLIFE AND VEGETATION

FERC COMMENTS ON DRAFT RESOURCE REPORT 3	LOCATION OR RESPONSE TO COMMENT
39.[1] Section 3.2.6 discusses impacts on fishery resources due to tree clearing. Quantify the amount of riparian habitat that would be removed by clearing activities. Provide mitigation measures for impacts on riparian habitat, including right-of-way neck-downs, if applicable.	The potential impacts from tree clearing, specifically riparian clearing impacts on fisheries habitat is discussed in Section 3.2.7.
40. Section 3.2.6 states that "NEXUS will consult with fishery management agencies regarding the need for mitigation measures in locations where blasting may affect fishery resources." Provide an update on consultation with fisheries management agencies regarding blasting procedures, including mitigation measures NEXUS would adopt.	If blasting is required, NEXUS plans to utilize standard blasting methods for waterbody crossings as described in updated Section 3.2.6 and in more detail in the Project Blasting Plan, Appendix 1B3 of Resource Report 1. No permanent impacts to fishery resources are currently expected due to blasting activities. If conditions change during construction, NEXUS will coordinate with agencies if blasting activities are expected to impact fishery resources beyond the established standard practices.
41. Table 3.2-3 identifies fisheries of special concern. Confirm with the appropriate agencies that the wet cut crossing techniques identified in table 2.3-2 for Middle Branch Nimishillen Creek, Fuller Creek, and Raccoon Creek are suitable for these waterbodies. Rectify the milepost discrepancies between tables 2.3-2 and 3.2-3. .	Middle Branch of Nimishillen Creek, Fuller Creek and Raccoon Creek are proposed to be crossed utilizing the dry cut method as described in detail in Section 3.2.6 and Section 2.3.9 of Resource Report 2. There are no identified restrictions regarding this proposed crossing method. NEXUS has consulted with the Ohio Environmental Protection Agency and the Ohio Department of Natural Resources and discussed the Project in detail. All mileposts have been revised and updated in Tables 2.3-2 and 3.2.3.
42. Update footnotes "e" and "f" in table 3.3-1.	The footnotes in Table 3.3-1 have been updated.
43. Section 3.4.2 states that the majority of the pipeline route is within or adjacent to existing rights-of-way or is "primarily along existing rights-of-way;" however, RR 1 indicates that 45 percent of the route is greenfield. Revise statements as needed.	Section 3.4.2 has been revised to match statements from Resource Report 1. Approximately 45 percent of the proposed pipeline route is co-located with existing utility corridors. The remaining 42 percent of the greenfield pipeline located in active agricultural land, resulting in 87 percent of the proposed pipeline sited in areas that avoid conversion of existing land uses.
44. Section 3.3.2.1 states that "NEXUS will perform botanical surveys in the portion of the pipeline that traverses the Oak Openings Region..." Provide results of the botanical surveys in the Oak Openings region, including the methodology of how Oak Openings	See updated Section 3.3.2.3.

[1] Numbering of comments is based on letter from Federal Energy Regulatory Commission to Nexus Gas Transmission, LLC dated July 30, 2015 and posted to Docket Number PF15-10-000 regarding *Comments on Draft Resource Reports 1 through 8 and 10*.

RESPONSE TO FERC JULY 30, 2015 COMMENTS ON
NEXUS RESOURCE REPORT 3 – FISH, WILDLIFE AND VEGETATION

FERC COMMENTS ON DRAFT RESOURCE REPORT 3	LOCATION OR RESPONSE TO COMMENT
Communities were identified and classified. Provide documentation of any correspondence with managing agencies.	
45. Provide a more robust discussion in section 3.3.2.1 regarding any right-of-way neck-downs, native seed mixtures, construction techniques, or other measures NEXUS would use to mitigate impacts on remnant habitat in the Oak Openings region. Provide correspondence with any managing agency or group that NEXUS contacted to develop these measures.	Section 3.3.2.4 has been updated to include information from ongoing agency consultation regarding impacts and mitigation discussion.
46. Section 3.4.2 describes impacts on wildlife habitat. Provide in section 6.5.1:	
a. Provide a total of the acres of forest land that would be converted to open land, including a calculation of what percentage of that forest land conversion would be adjacent to existing open rights of way.	During construction, approximately 381.8 acres of forested woodland will be converted to open land. 25.4 percent (96.8 acres) of the forest impacts for construction workspace is adjacent to existing ROW corridors. The majority of the forested area cleared for construction (approximately 210 acres) will be temporary and allowed to restore. For the permanent easement post-construction, there will be 170.0 acres of forested woodland permanently converted to open land. Approximately 30.3 percent (51.5 acres) of the permanent conversion is adjacent to existing ROW corridors. See updated Section 3.4.2 for wildlife impacts.
b. It is stated that the permanent right-of-way width would be 100 feet in uplands, while section 1.6.1 states that the permanent right-of-way would be 50 feet. Resolve this discrepancy.	Section 3.4.2 has been updated to reflect the accurate permanent right-of-way width of 50 feet.
47. Section 3.5.1 describes existing resources and effects on listed species.	
a. For threatened and endangered species for which habitat is present and surveys are ongoing (such as the rayed bean mussel and northern riffleshell mussel), provide an update regarding survey status. If the species was identified as present during surveys, provide the proposed mitigation measures and documentation of consultation with the appropriate state and federal agencies.	To date, NEXUS field surveys have identified locations of two federally-threatened and endangered species. Three different locations were identified as occupied habitat by northern long-eared bats and one waterbody was identified as occupied habitat by several individuals of rayed bean mussels. See Section 3.5.1 for details of survey results.
b. For species in which habitat has not been observed but could be observed during ongoing field surveys (such as the Karner blue butterfly), provide an update of the survey status and indicate if any habitat has been observed. If yes, identify how and when presence/absence surveys would be completed.	To date, no additional habitat has been identified for state or federally-listed species. The survey status for each species listed in Section 3.5 has been updated in the text.

RESPONSE TO FERC JULY 30, 2015 COMMENTS ON
NEXUS RESOURCE REPORT 3 – FISH, WILDLIFE AND VEGETATION

FERC COMMENTS ON DRAFT RESOURCE REPORT 3	LOCATION OR RESPONSE TO COMMENT
c. The U.S. Fish & Wildlife Service (FWS) recommended mitigation for the Indiana and northern long-eared bats is to conduct all tree-clearing activities between October 1 and March 31. Indicate if NEXUS would adopt this recommended mitigation measure.	NEXUS performed bat mist net surveys to identify areas potentially used by either the Indiana bat and/or northern long-eared bats. No Indiana bats were captured, but four northern long-eared bats were captured, tagged and tracked. NEXUS will adopt the mitigation measures recommended by the appropriate agencies and develop seasonal clearing restrictions in areas identified as potentially occupied habitat. See updated Section 3.5.1.
d. For state-listed species for which there are no documented occurrences in or within 1 mile of the Project area, justify the no effect findings by providing an assessment of habitat presence.	Surveys were prioritized based on consultation with USFWS, ODNR, and MDNR, however NEXUS collected thorough habitat information through wetland and waterbody surveys, in addition to botanical surveys. NEXUS considered and identified any protected species located within the Project corridor.
e. Clarify why no effects are expected for the piping plover due to the Project size, type, and location.	The Great Lakes population of the endangered piping plover utilizes sandy beaches along the shores of Lake Erie. Consultation with USFWS confirmed that the NEXUS Project does not cross suitable habitat of the piping plover, and therefore impacts are not expected. See updated section 3.5.1.1.
f. Per the Ohio Department of Natural Resources (ODNR), the upland sandpiper has multiple Natural Heritage Database records within 1 mile of the proposed pipeline. Justify the no effect determination for the upland sandpiper.	See updated Section 3.5.2.2.
g. If habitat is present for the upland sandpiper, American bittern, sandhill crane, trumpeter swan, Kirtland's warbler, king rail, northern harrier, lark sparrow, or black tern, indicate if NEXUS would adopt ODNR's recommendation to avoid work in habitat areas during the birds' nesting periods.	NEXUS has avoided large, undisturbed plant communities that are typically utilized as nesting areas for the listed birds. Through agency consultation and compliance with clearing restrictions, no permanent impacts are expected on these species. See updated Section 3.5.2.2 for further details.
h. Provide impact determinations for the greater redhorse, Iowa darter, lake chubsucker, and western banded killfish. These sections currently state that the channel darter would not be affected.	Impact determinations for the greater redhorse, Iowa darter, lake chubsucker and western banded killifish have been updated in Section 3.5.2.3.
i. Provide an assessment of habitat presence and likelihood of impacts for the lake sturgeon and pugnose minnow.	Impacts on lake sturgeon and pugnose minnows are not anticipated. See updated Section 3.5.2.3 for detailed impact determinations.
j. Provide an updated assessment of habitat presence for sandhill cranes, given that they may feed in uplands and agricultural lands..	All upland areas and agricultural areas that may be utilized by the sandhill crane will be restored to original condition post-construction, therefore potential impacts to their feeding grounds will be temporary. See updated Section 3.5.2.2.
k. Section 3.5.1.3 states that the grasshopper sparrow would not be impacted because suitable habitat is not present, although suitable habitat includes grasslands,	NEXUS has avoided large, natural grasslands that are the preferred habitat for grasshopper sparrows. No permanent

RESPONSE TO FERC JULY 30, 2015 COMMENTS ON
NEXUS RESOURCE REPORT 3 – FISH, WILDLIFE AND VEGETATION

FERC COMMENTS ON DRAFT RESOURCE REPORT 3	LOCATION OR RESPONSE TO COMMENT
cultivated fields, hayfields, and old fields. Table 3.3-1 states that construction activities would affect 642.8 acres of agricultural land and operations would affect 215.9 acres. Agricultural land is described as utility rights-of-way, open fields, pasture, etc. Rectify this discrepancy.	impacts are expected on this species. See updated Section 3.5.4.1 for further details on impact assessment.
l. The ODNR comment letter states that impacts on barns, silos, and other old and abandoned structures should be avoided to avoid impacts on barn owls. Indicate if NEXUS would adopt this mitigation measure.	NEXUS does not expect to remove any barns, silos, and other old and abandoned structures within the Project corridor, therefore no impacts are expected to the barn owl. See updated Section 3.5.2.2.
48. Several protected mussel species have the potential to occur in waterbodies identified in table 2.3-9 as a source for hydrostatic test water withdrawal. Provide correspondence with the FWS, the ODNR, and the Michigan Department of Natural Resources regarding the avoidance of potential impacts on mussel species from hydrostatic test water withdrawal activities.	See updated Section 3.2.6 for discussion of hydrostatic test water withdrawal and associated impacts on fisheries.
49. Section 3.6 discusses the Migratory Bird Treaty Act (MBTA). Provide documentation of consultation with fish and wildlife management agencies regarding the MBTA as well as any additional recommended mitigation measures and indicate whether NEXUS would adopt these mitigation measures.	See updated Section 3.6 for discussion of MBTA.
50. Section 3.6.3 states that NEXUS will consult with the FWS regarding minimization of impacts on eagles. Provide documentation of consultation with FWS regarding mitigation measures for the eagle nest at MP 88.9 (within 750 feet of the workspace) and identify if NEXUS would adopt FWS recommended mitigation measures.	NEXUS does not anticipate any impact to the bald eagle nest identified within 750 feet of the Project. The route was designed to avoid potential impacts to this specific nest. The eagle nest is located to the north of an intermediate sized waterbody that will be crossed using the HDD construction method. Consequently, no trees or potential nesting habitat will be impacted near the eagle's nest. See updated Section 3.6.4 for further details.

ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
BCC	Birds of Conservation Concern
BCR	Bird Conservation Region
dbh	diameter at breast height
DTE or DTE Energy	DTE Energy Company
E&SCP	Erosion & Sediment Control Plan
EFH	essential fish habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FERC or Commission	Federal Energy Regulatory Commission
FERC Plan	FERC Upland Erosion Control Revegetation and Maintenance Plan
FERC Procedures	FERC Wetland and Waterbody Construction and Mitigation Procedures
HDD	horizontal directional drill
MBTA	Migratory Bird Treaty Act
M&R	metering and regulating
MDNR	Michigan Department of Natural Resources
MBBA	Michigan Breeding Bird Atlas
MNFI	Michigan Natural Features Inventory
MP	milepost
MWH	Modified Warmwater Habitat
NEXUS	NEXUS Gas Transmission, LLC
NEXUS Project or Project	NEXUS Gas Transmission Project
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
ODNR	Ohio Department of Natural Resources
ROW	right-of-way
SPCC Plan	Spill Prevention Control and Countermeasure Plan
Spectra or Spectra Energy	Spectra Energy Partners, LP
T&E	threatened and/or endangered
TGP	Tennessee Gas Pipeline Company L.L.C.
TNC	The Nature Conservancy
U.S.	United States
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
WWH	Warmwater Habitat

3.0 RESOURCE REPORT 3 – FISH, WILDLIFE, AND VEGETATION

3.1 Introduction

NEXUS Gas Transmission, LLC ("NEXUS") is seeking a Certificate of Public Convenience and Necessity from the Federal Energy Regulatory Commission ("FERC or Commission") pursuant to Section 7(c) of the Natural Gas Act authorizing the construction and operation of the NEXUS Gas Transmission Project ("NEXUS Project" or "Project"). NEXUS is owned by affiliates of Spectra Energy Partners, LP ("Spectra" or "Spectra Energy") and DTE Energy Company ("DTE" or "DTE Energy"). The NEXUS Project will utilize greenfield pipeline construction and capacity of third party pipelines to provide for the seamless transportation of 1.5 million dekatherms per day of Appalachian Basin shale gas, including Utica and Marcellus shale gas production, directly to consuming markets in northern Ohio and southeastern Michigan, and to the Dawn Hub in Ontario, Canada. Through interconnections with existing pipelines, supply from the NEXUS Project will also be able to reach the Chicago Hub in Illinois and other Midwestern markets. The United States ("U.S.") portion of the NEXUS Project includes new greenfield pipeline in Ohio and Michigan and capacity leased from others in Pennsylvania, West Virginia, Ohio and Michigan, terminating at the U.S./Canada international boundary between Michigan and Ontario. The Canadian portion of the Project will extend from the U.S./Canada international boundary to the Dawn Hub.

Resource Report 3 describes the fishery resources associated with the waterbodies crossed by the Project (Section 3.2), the existing vegetation resources in the Project area (Section 3.3), the wildlife habitat in the Project area (Section 3.4), the federally-protected and state-protected species that are known to occur or potentially occur in the Project area (Section 3.5), and compliance with the provisions of the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act (Section 3.6). All sections identify existing resources, potential Project effects on those resources, and measures to avoid, minimize or mitigate potential Project effects. A checklist showing the status of the FERC filing requirements for Resource Report 3 is included following the Table of Contents. A table showing the location of responses to the FERC's July 30, 2015 comments on draft Resource Report 3 follows the FERC filing requirements checklist. Project drawings, maps, and aerial photo based alignment sheets are provided as Appendix 1A in Resource Report 1.

A more detailed description of the Project is set forth in Resource Report 1.

3.2 Fishery Resources

Fishery resources are broadly defined as fish, aquatic invertebrates including mollusks and aquatic animals. Fishery resources are supported year-round by perennial waterbodies, however, depending on their proximity and characteristics, intermittent or ephemeral streams may be used by fishery resources when water is present. NEXUS has consulted with the U.S. Fish and Wildlife Service ("USFWS"), National Oceanic and Atmospheric Administration-National Marine Fisheries Service ("NMFS"), Ohio Department of Natural Resources ("ODNR"), Michigan Natural Features Inventory ("MNFI") and the Michigan Department of Natural Resources ("MDNR") to identify fishery resources in waterbodies crossed by the Project on the proposed route. Agency correspondence is provided as Appendix 1C2 of Resource Report 1.

Fishery resources are found in a variety of waterbodies that occur in the Project area and range from large river systems to small perennial streams. Refer to Resource Report 2, Table 2.3-2 and Section 2.3 for detailed descriptions of the waterbodies crossed by the Project. Proposed waterbody crossings including access roads and construction workspaces are shown on the Project alignment sheets and U.S. Geological Survey topographic map excerpts provided in Appendix 1A and Volume II-B of Resource Report 1.

Fisheries are typically characterized according to water temperature (warmwater or coldwater), salinity (freshwater, marine, or estuarine), types of fishing use (commercial or recreational), and utilization by open water marine fishes that require freshwater upstream areas to spawn (anadromous species) or freshwater species that migrate to marine waters for reproduction (catadromous species). All fishery resources within

the proposed Project are freshwater systems with salinity levels less than 0.5 parts per thousand (Cowardin et al., 1979), and there are no waterbodies that support anadromous or catadromous species impacted by the Project. Significant fishery resources are defined by the FERC as waterbodies that either (1) provide important habitat for foraging, rearing, or spawning of fish species; (2) represent important commercial or recreational fishing areas; or (3) support large populations of commercially or recreationally valuable fish species or species listed for protection at the federal, state, or local level.

3.2.1 Fisheries Habitat Classification

Classification of fisheries habitat includes consideration of both chemical and biological characteristics. Physical and chemical properties that can be used to determine fishery classification include water temperature, salinity, and whether the waterbody is part of a marine, estuarine, or freshwater system. Habitat classification, however, also depends on the presence of certain fish species and associated invertebrate and aquatic vertebrates in the aquatic community that can use the habitat for reproduction. As previously stated, only freshwater systems are found within the proposed Project.

Freshwater systems have low salinity (less than 0.5 parts per thousand) and contain fisheries that are typically classified as either warmwater or coldwater. This designation is dependent upon the dominant species of fish occupying the waterbody based on the regime of water temperatures through the seasons and other physical characteristics. Coldwater fisheries support fish that spawn in water temperatures between 40 and 60° Fahrenheit ("°F") and prefer clear, cold waters, are not tolerant of extreme temperature changes, and cannot survive for long periods with temperatures above 68 °F (Piper et al., 1982). Warmwater fisheries support fish able to tolerate water temperatures above 80°F. Warmwater fish species include crappies (*Pomoxis spp.*), largemouth bass (*Micropterus salmoides*), sunfish (*Lepomis spp.*), and bullhead (*Ameiurus nebulosus*).

In Ohio, pursuant to Ohio State Water Quality Standards, certain waterbodies are designated as having the ability to support either coldwater or warmwater fishery habitat based primarily on temperature regimes and identified water quality impairments, if applicable. The aquatic life habitat designations under Ohio State Water Quality Standards are defined in Section (B)(1) of 3745-1-07 of the Administrative Code. According to Ohio State Water Quality Standards, coldwater habitat fisheries are defined as "waters in which the mean of the maximum daily temperature over a 7 day period generally does not exceed 68°F (20° Celsius ["°C"]) and, when other ecological factors are favorable (such as habitat), are capable of supporting a year-round population of coldwater stenothermal aquatic life such as trout (i.e., Salmonidae)". There are no coldwater habitat designated waters crossed by the proposed NEXUS Project. Warmwater habitat ("WWH") fisheries are defined by the Ohio State Water Quality Standards as "waters in which the maximum mean monthly temperature generally exceeds 68°F (20°C) during the summer months and are not capable of sustaining a year-round population of coldwater stenothermal aquatic life." The waterbodies crossed by the proposed NEXUS Project are all classified under the State of Ohio Water Use Quality Designations for Aquatic Life Habitat as WWH or modified warmwater habitat ("MWH") and are listed in Table 2.3-2 of Resource Report 2. The following sections describe these state water classifications.

WWH waterbodies are defined by the Ohio State Water Quality Standards as those capable of supporting and maintaining a balanced, integrated, adaptive community of warmwater aquatic organisms having a species composition, diversity, and functional organization comparable to the twenty-fifth percentile of the identified reference sites within each of the following ecoregions: the interior plateau ecoregion, the Erie/Ontario lake plains ecoregion, the western Allegheny plateau ecoregion and the eastern corn belt plains ecoregion. For the Huron/Erie lake plains ecoregion, the comparable species composition, diversity and functional organization are based upon the ninetieth percentile of all sites within the region. For all ecoregions, the attributes of species composition, diversity and functional organization can be measured using the index of biotic integrity, the modified index of well-being and the invertebrate community index as defined in "Biological Criteria for the Protection of Aquatic Life: Volume II, User's Manual for Biological Field Assessment of Ohio Surface Waters," as cited in paragraph (B) of rule 3745-1-03 of the Administrative Code. In addition to those water body segments designated in rules 3745-1-08 to 3745-1-

32 of the Administrative Code, all upground storage reservoirs are designated WWH. Attainment of this use designation (except for storage reservoirs) is based on the criteria in the Administrative Code. A temporary variance to the criteria associated with this use designation may be granted as described in paragraph (F) of rule 3745-1-01 of the Administrative Code.

MWH waterbodies, as defined by the Ohio State Water Quality Standards, are those waters that have been the subject of a use attainability analysis and have been found to be incapable of supporting and maintaining a balanced, integrated, adaptive community of warmwater organisms due to irretrievable modifications of the physical habitat. Such modifications are of a long-lasting duration (i.e., 20 years or longer) and may include the following examples: extensive stream channel modification activities permitted under sections 401 and 404 of the Act or Chapter 6131 of the Revised Code, extensive sedimentation resulting from abandoned mine land runoff, and extensive permanent impoundment of free-flowing water bodies. The attributes of species composition, diversity and functional organization are measured using the index of biotic integrity, the modified index of well-being and the invertebrate community index as defined in "Biological Criteria for the Protection of Aquatic Life: Volume II, User's Manual for Biological Field Assessment of Ohio Surface Waters," as cited in paragraph (B) of rule 3745-1-03 of the Administrative Code. The MWH designation can be applied only to those waters that do not attain the WWH biological criteria because of irretrievable modifications of the physical habitat. A temporary variance to the criteria associated with this use designation may be granted as described in paragraph (F) of rule 3745-1-01 of the Administrative Code.

In Michigan, the Natural Resources and Environmental Protection Act, Public Act 451 of 1994, authorizes the MDNR to provide protection and preservation of fish, game, and birds. Fisheries Order 210.15 under the authority of the MDNR, regulates streams where trout are the predominant fish species and lists the streams that are designated trout streams. Trout streams have more stringent fishing regulations to protect the trout population and provide for fishing opportunities. Fish bearing streams not designated as trout streams are subject to general statewide fishing regulations. There are no streams crossed by the proposed Project that are designated trout streams in Michigan.

3.2.2 Existing Fishery Resources

Table 2.3-2 of Resource Report 2 lists the waterbodies crossed by the proposed Project facilities and associated access roads, including the state water quality and designated usage classifications.

3.2.2.1 Fish Species Present along the Proposed NEXUS Pipeline

The proposed Project is located in two major drainage basins: the Ohio River basin and Lake Erie basin. The proposed NEXUS pipeline is within the Ohio River basin from milepost ("MP") 0 at the Kensington Processing Plant to approximate MP 72 and within the Lake Erie basin from MP 72 to the northern terminus of the Project at Willow Run in Michigan. As such, the majority of waterbody crossings are within the Lake Erie basin (*see* Resource Report 2, Table 2.3-2) and all fishery resources present along the proposed pipeline are warmwater fisheries. Tables 3.2-1 and 3.2-2 list the representative fish species known to occur in or near the Project in Ohio and Michigan, respectively.

Ohio

Species of fish found in Ohio include many native species and a number of introduced species in the Ohio River basin and the Lake Erie basin. These drainage basins both support a large diversity of fish species, however, the Ohio River basin typically supports a wider diversity (Trautman, 1981; Rafferty et al., 2012). A study by Saunders et al. identified a total of 162 species of fish in Ohio; including 143 native species and 19 introduced (Sanders et al., 1999). Fish diversity and population abundance has been impacted in many streams in Ohio by historic and recent human activity including dam construction, removal of the riparian zones and stream channelization by agriculture and urbanization, and water quality degradation by nonpoint source and point source pollutants (Harrington, 1999; Sanders et al., 1999). Improvements in stream conditions and water quality in the last 30 years have increased the abundance of certain fish species or

have allowed species that were absent in the streams since the 1950s to recolonize many of the heavily impacted streams, while other species still appear to be declining (Sanders et al., 1999).

The majority of the waterbodies crossed by the proposed Project in Ohio are small, unnamed tributaries or moderately-sized streams. Commonly occurring and representative fish species in these Ohio streams are summarized in Table 3.2-1. Fish species that are found within the larger rivers of Ohio, such as the Maumee River, Sandusky River and the Huron River, and not found in the smaller stream systems include walleye, Coho salmon (*Oncorhynchus kisutch*), Chinook salmon (*Oncorhynchus tshawytscha*) and rainbow trout (*Oncorhynchus mykiss*). These species swim upstream from Lake Erie to spawn and support a large recreational fishery during the spawning runs. The Project is proposing to cross the Maumee, Sandusky, and Huron Rivers, however, no in-water work is currently proposed in these rivers as NEXUS will be employing horizontal directional drill ("HDD") construction crossing method to install the pipeline below these water resources. See Table 1.7-2 (Tables Section of Resource Report 1) for a list of HDDs proposed for the NEXUS Project.

Michigan

All of the waterbodies crossed by the proposed pipeline in Michigan are a part of the Lake Erie drainage basin and are primarily associated with the drainage network of the River Raisin and Ford Lake/Huron River. Land use within the watersheds in this region of Michigan has the greatest influence on the fish assemblages located in these streams. Agriculture comprises approximately 94 percent of the land use in the watershed of the River Raisin (Dodge, 1998). The Huron River watershed has 66.5 percent of its land in agricultural use and another 19 percent in urban use (Hay-Chmielewski, 1995). These uses have resulted in an increase of sediment, nutrients, and chemicals such as pesticides, in addition to increased runoff and peak storm flows in the stream channels causing changes in habitats and subsequent shifts in fish species and abundance (Dodge, 1998; Hay-Chmielewski, 1995). The fishery resources within the Project area in Michigan are present in moderately sized stream channels. Table 3.2-2 lists the representative fish species known to occur in the waterbodies crossed by the proposed pipeline in Michigan.

3.2.2.2 Fish Species Present at Aboveground Facilities

Field surveys at the four proposed compressor station sites (Hanoverton, Wadsworth, Clyde and Waterville) were completed during the 2014 and 2015 field seasons. Waterbodies were identified in the vicinity of the proposed Waterville and Hanoverton compressor station sites, however, these stations and associated temporary workspaces have been designed to avoid impacts to these resources. Field surveys have also been completed at the metering and regulating ("M&R") stations and Mainline Valves sites. The M&R station and Mainline Valve sites have been designed to avoid permanent and temporary waterbody impacts. No impacts to fisheries are expected for the construction or operation of aboveground facilities.

3.2.3 Fisheries of Special Concern

Waterbodies with fisheries of special concern include those that have fisheries with important recreational value, support coldwater fisheries, are included in special state fishery management regulations, or provide potential habitat for federally or state-listed threatened or endangered ("T&E") species. Waterbodies that have significant economic value because of fish stocking programs, commercial fisheries, essential fish habitat ("EFH"), or tribal harvest are also considered a fishery of special concern (*see* Section 3.2.5 for a discussion of EFH species).

NEXUS consulted with the USFWS, ODNR, MNFI and the NMFS to identify waterbodies that may contain federally or state protected species and their associated habitat, EFH, coldwater fisheries, or other fishery resources that could be considered fisheries of special concern. During consultation, agencies noted streams that potentially support federal or state-listed threatened, endangered, or candidate species and their habitat (*see* Appendix 1C2 of Resource Report 1). Species identified during consultation include fish, mussels, a damselfly, and a salamander. Table 3.5-1 lists these species and their regulatory status. The ODNR also identified waterbodies crossed by the proposed Project that are considered Salmonid streams.

The identified Salmonid streams are either stocked for a put-and-take sport fishery or are used by Salmonids from Lake Erie to spawn. There are no areas of EFH in the Project area (*see* Section 3.2.5) and no coldwater fisheries exist in the Project area. Therefore, fisheries of special concern in the NEXUS Project area are based largely on potential presence of T&E species (*see* Section 3.5 for a discussion of T&E species). Fisheries of special concern crossed by the proposed Project are listed in Table 3.2-3. Project effects on fishery resources, including fisheries of special concern, are discussed in Sections 3.2.6 and 3.2.7.

3.2.4 Commercial Fisheries

Waterbodies supporting commercial fisheries may be of particular concern because of the need to avoid, minimize and mitigate for any economic impacts that may be caused by construction within the waterbody. The MDNR and ODNR were consulted regarding fisheries and neither agency identified any waterbodies within the Project area as supporting commercial fisheries.

3.2.5 Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act 16 U.S.C. § 1801 et seq.) established a management system for marine fishery resources in the United States. In particular, Congress charged the NMFS and the fishery management councils, along with other federal and state agencies and the fishing community to identify habitats essential to managed species, which include marine, estuarine, and anadromous finfish, mollusks and crustaceans. The habitat is identified as EFH and defined to include "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." According to data extracted from the NMFS EFH Mapper, no EFH areas are located within the Project Area (NMFS, 2014).

3.2.6 Waterbody Crossing Methods and Associated Fisheries Impacts

This section describes potential effects and measures that will be implemented to minimize effects to fishery resources within the Project corridor. Proposed crossing methods include wet crossing, dry crossing, conventional bore, and HDD. Proposed crossing methods are dependent on several factors, including waterbody width and potential presence of fishery resources. Minor waterbodies are defined by FERC as 0 to 10 feet bank width, intermediate waterbodies are greater than 10 feet and less than 100 feet bank width, and major waterbodies are greater than 100 feet bank width. The following section briefly describes these crossing methods and associated potential effects on fishery resources. The waterbody crossing method that NEXUS is proposing to employ for each waterbody is listed in Table 2.3-2 and additional information on crossing methods is provided in Resource Report 2.

The wet open cut method will involve excavation of the pipeline trench across the waterbody, installation of the pipeline, and backfilling of the trench, with all equipment working from the banks of the waterbody. Water is not diverted around the construction area, but is allowed to pass through the trench. Dry open cut crossing methods will include installation of flume pipes and/or dam and pump to divert water around the construction area. The FERC *Wetland and Waterbody Construction and Mitigation Procedures,* dated May 2013 ("FERC Procedures") require that all in-stream construction activities for open cut crossings of minor waterbodies (including trenching, pipe installation, backfill, and restoration of the streambed contours) be completed within 24 hours [except when blasting and other rock breaking activities are required] and within 48 hours for intermediate streams. Stream banks and unconsolidated streambeds may require additional restoration after this time period. The conventional bore method and HDD methods allow installation of the pipeline underneath the waterbody without requiring in-stream construction.

Dry cut, conventional bore or HDD will be used for crossing all waterbodies identified as having fisheries of concern. Wet cut crossings will not be used in waterbodies with known fishery resources, therefore, no in-stream impacts to fisheries are expected using wet cut methods. Additionally, no impacts to fisheries are expected with conventional bore or HDD crossings as no in-stream work is required to employ these methods.

The majority of the fisheries are either in minor or intermediate waterbodies that will be dry cut. Successful implementation of this technique will substantially avoid impacts on fishery resources. Dry cut construction impacts on fishery resources may include direct contact by construction equipment, increased sedimentation and water turbidity immediately downstream of the construction work area, alteration or removal of aquatic habitat cover, introduction of pollutants, impingement or entrainment of fish and other biota attributed to the use of water pumps at dam and pump crossings, and downstream scouring associated with use of those same pumps. Temporary erosion control devices (sediment barriers) will be installed and maintained adjacent to the waterbody and within the construction work area, as needed to further minimize the potential for sediment runoff. Pump intake hoses will be screened appropriately to prevent the entrainment of fish and minimize the potential for impingement. Fish passage during dam and pump crossings will be temporarily restricted during the installation of the new pipeline and will be restored immediately after the pipeline is installed and backfilled. The instream activities will be completed within 24 to 48 hours (depending on stream size) in accordance with the FERC Procedures. The short term and localized interruption of fish passage is not anticipated to affect the success of fish migration within the stream systems. To minimize potential impacts, waterbodies will be crossed as quickly and safely as possible. Additionally, efforts will be made to plan work during dry conditions for intermittent and ephemeral channels, where practicable. Adherence to the construction procedures will ensure that adequate stream flow will be maintained throughout construction to reduce temporary impacts on the aquatic biota.

Blasting

No coldwater fisheries are located within the Project and all waterbodies identified as hosting T&E species will be implementing HDD techniques and therefore, will not be impacted by blasting. For planning purposes, rock drills or test excavations may be used to test the ditch-line during the mainline route blasting operations to evaluate the presence of rock in the trench-line beneath waterbodies designated for open cut crossing. The results from rock drills and test excavation may allow better planning for blasting activity within waterbodies. In the event that unrippable subsurface rock is encountered, blasting for ditch excavation may be necessary. In these areas, care will be taken to prevent damage to underground and aboveground structures, as well as to springs, water wells or other surface water resources. For testing and any subsequent blasting operations, stream flow will be maintained through the site. Blasting is not expected to impact fishery resources beyond what is described in normal construction activities. Environmental inspectors will be consulted if blasting is determined necessary during construction and will evaluate the need for additional consultation with agencies regarding fisheries impacts. Blasting will be performed in accordance with the NEXUS Project Blasting Plan provided as Appendix 1B3 of Resource Report 1.

When blasting is required, FERC timeframes for completing in-stream construction begin when the removal of blast rock from the waterbody is started. The excavation of the test pit or rock drilling is not included in the time window requirements for completing the crossing. For testing and any subsequent blasting operations, stream flow will be maintained through the site. If, after removing the blast rock, additional blasting is required, a new timing window will be determined through consultation with the Environmental Inspector. If blasting impedes the flow of the waterbody, the contractor can use a backhoe to restore the stream flow without triggering the timing window. During blasting operations, the contractor shall comply with the waterbody crossing procedures specified in the NEXUS Project Erosion and Sedimentation Control Plan ("E&SCP") as well as any project-specific permit conditions.

Hydrostatic Testing

Proposed sources of water for hydrostatic testing of the proposed Project facilities are listed in Table 2.3-10 and proposed sources of water for hydrostatic testing of HDDs are listed in Table 2.3-11 in Resource Report 2. Discharge locations will be sited within a well vegetated upland area within the same watershed, where practicable. If local water sources are used for hydrostatic testing, withdrawal intake hoses will be fitted with intake screen devices to prevent the entrainment of small fish during water withdrawal. Discharge will comply with regulatory permit conditions and will be controlled to prevent scour and sedimentation, flooding, or the introduction of foreign or toxic substances into the aquatic system. Erosion

and sediment control measures described in the Project E&SCP will be implemented to minimize the potential for downstream sedimentation and streambed disturbance that may impact fish and macroinvertebrates (*see* the Project E&SCP provided as Appendix 1B1 of Resource Report 1). A detailed description of the hydrostatic test process and mitigation measures is provided in Section 2.3.8 of Resource Report 2. Hydrostatic test water appropriations and discharges are not expected to result in entrainment of fish, loss of habitat, or an adverse effects to water quality.

Spill Prevention, Control and Countermeasures

Accidental spills of construction-related fluids (i.e., oil, gasoline, or hydraulic fluids) on the landscape or directly into waterbodies could result in water quality effects affecting fish and other organisms. Effects to fisheries would depend on the type and quantity of the spill, and the dispersal and attenuation characteristics of the waterbody. Minimization and mitigation procedures related to water quality are discussed in detail in Resource Report 2. To reduce the potential for surface water contamination, NEXUS will have a Spill Prevention, Control and Countermeasure Plan ("SPCC Plan") in place prior to construction that the contractor(s) will be required to implement. The SPCC Plan is provided as Appendix 1B2 of Resource Report 1.

To minimize spill risk, refueling or other handling of hazardous materials within 100 feet of wetland and waterbody resources will be restricted. If the 100-foot setback cannot be met, these activities will be performed under the supervision of an Environmental Inspector in accordance with the SPCC Plan and following the insurance of a variance for such activities by FERC. The SPCC Plan also specifies that NEXUS will conduct routine inspections of tank and storage areas to help reduce the potential for spills or leaks of hazardous materials.

3.2.7 Riparian Zone Construction and Associated Fisheries Impacts

Riparian zones include all vegetated areas within 100 feet of the banks of waterbodies (U.S. Environmental Protection Agency ["EPA"], 2014). Clearing activities will involve the removal of all trees and brush from the 100-foot wide nominal construction right-of-way ("ROW"). Woody vegetation along the 50-foot permanent easement is cleared to the edge of the waterbody; however, where available, a 50-foot wide herbaceous strip is left on the approach until immediately before construction to provide a natural sediment filter that helps minimize the potential for erosion immediately adjacent to the waterbody and sedimentation from cleared upland areas.

Approximately 70.5 acres of riparian area (within 100 feet of waterbody banks) are expected to be impacted by proposed construction activities: 11.6 acres along ephemeral waterbodies, 21.1 acres along intermittent waterbodies, 35.8 along perennial waterbodies and two (2) acres along ponds. The majority of the construction riparian zone will be allowed to restore to pre-construction conditions. In the permanent easement, approximately 34.5 acres are within the riparian zone: 4.8 acres along ephemeral waterbodies, 10.8 acres along intermittent waterbodies, 17.9 along perennial waterbodies and one (1) acre along ponds. These acreages represent the maximum area within the permanent 50-foot easement, NEXUS will regularly maintain a smaller ROW corridor adjacent to waterbodies as described in further detail in the following sections.

Riparian zone construction will include the removal of trees from the edges of waterbodies at the crossing, which may reduce shading of the waterbody, diminish escape cover, and potentially result in locally elevated water temperatures. Elevated water temperatures can, in turn, lead to reductions in levels of dissolved oxygen, which can negatively influence habitat quality and the fish populations that occupy these habitats. These potential impacts are expected to be temporary, as the majority of the construction ROW will be allowed to restore fully to previous conditions. FERC Procedures dictate that a 25-foot wide riparian strip adjacent to waterbodies will be revegetated utilizing native plant seed mixes. Limited vegetation management and clearing will allow vegetation to restore along the waterbody banks. A 10-foot wide area centered on the pipeline will be maintained with herbaceous vegetation to facilitate periodic pipeline corrosion/leak surveys. Trees will be allowed to grow within the 50-foot permanent easement, however

any trees within 15 feet of the pipeline that have roots that could compromise the integrity of the pipeline coating or impact safety, may be cut and removed from the ROW during maintenance activities.

Implementing NEXUS's construction, restoration, and mitigation procedures may result in limited, short-term impacts to fishery resources and the aquatic habitats upon which these fishery resources depend. Over the long term, invertebrate populations will recolonize the crossing area and all temporary work areas will revert to their original condition, including re-establishment of riparian cover. Furthermore, operation and routine maintenance of the pipeline ROWs and aboveground facilities, which will be restricted to clearing and mowing vegetation on the permanent ROW, are not expected to have any noticeable impact on fishery resources in the Project area.

3.3 Vegetation

This section provides descriptions of the various plant communities found in the Project survey area (defined as the 300-foot corridor centered over the proposed pipeline); descriptions of unique or protected vegetation and how these resources will be affected by construction and operation of the Project; and methods NEXUS will employ to minimize impacts to vegetation resources.

3.3.1 Existing Vegetation

The types of vegetation along the proposed NEXUS Project are generally common plant communities found in Ohio and Michigan. Many of the vegetative communities traversed by the proposed Project have been considerably altered by forest conversion and fragmentation and the historic draining of saturated areas primarily for agricultural purposes. Only small areas of undisturbed forest tracts still remain in Ohio (Widmann et al., 2006).

The proposed NEXUS Project has been designed to minimize impacts to existing natural vegetation and approximately 87 percent of the route is either co-located (45 percent) with existing utility corridors that undergo regular vegetation maintenance or within active agricultural lands (42 percent). The natural vegetation communities that do occur within the Project area are generally characterized as small upland forests (less than 20 acres in size), abandoned agricultural land in various degrees of succession ranging from open fields to shrub lands; and emergent, scrub-shrub, and forested wetlands.

The Project spans a large and diverse geographic region. The vegetation communities are best described from a regional perspective using Omernik's Level III Ecoregions, maintained by the EPA. Ecoregions are areas of similarity based on patterns in the mosaic of biotic (living) and abiotic (not living) components and aquatic and terrestrial ecosystems, including geology, physiography, vegetation, climate, soils, hydrology, land use, and wildlife, with humans being considered as part of the biota (Omernik, 2012).

The following five EPA Level III Ecoregions are traversed by the NEXUS Project from east to west:

- Western Allegheny Plateau (Entire Tennessee Gas Pipeline Company L.L.C. ("TGP") Interconnecting Pipeline MP 0 to MP 0.9; less than 1 percent of Project);
- Erie/Ontario Drift and Lake Plains; (MP 0 to MP 95; 37 percent of Project);
- Eastern Corn Belt Plains; (MP 95 to MP 109; 5 percent of Project);
- Eastern Great Lakes Lowlands; and (MP 109 to MP 120; 5 percent of Project); and
- Huron/Erie Lake Plains; (MP 120 to MP 255; 53 percent of Project).

The majority of the proposed Project (90 percent) is located within the Erie/Ontario Drift and Lake Plains and Huron/Erie Lake Plains Ecoregions. Approximately 5 percent of the proposed Project crosses the Eastern Corn Belt Plains Ecoregion, 4 percent crosses the Eastern Great Lakes Lowlands and less than 1 percent of the Project crosses the Western Allegheny Plateau Ecoregion (Omernik, 2012). The proposed mainline route does not cross the Western Allegheny Plateau Ecoregion, the only portion of the Project that crosses it is the TGP Interconnecting Pipeline. Vegetation communities found in these ecoregions and within the Project area are described in the following sections.

Western Allegheny Plateau Ecoregion

The 0.9 mile TGP Interconnecting Pipeline is located within the Western Allegheny Plateau Ecoregion. This ecoregion is a dissected plateau with rugged hills underlain by horizontally bedded sedimentary rock. The natural vegetation historically consisted primarily of mixed mesophytic forest and currently contains chestnut oak, red maple, white oak, black oak, beech, yellow-poplar, sugar maple, ash, basswood, buckeye, and hemlock (Wiken, 2011). This ecoregion remains primarily forested (Omernik, 2012).

Erie/Ontario Drift Lake Plains Ecoregion

The proposed NEXUS mainline pipeline route from approximate MP 0 to MP 95, traverses the Erie/Ontario Drift Lake Plains Ecoregion comprising approximately 37 percent of the total Project route. This ecoregion is characterized by predominantly level terrain and low lime drift and lacustrine surficial geological deposits. Multiple water resources such as lakes, wetlands, and streams occur where drainage networks converge or where the land has flat relief with clay soils. These clay soils are lower in carbonate and are naturally less fertile than other glaciated ecoregions. Land use is comprised of urban development, industrial activity, and agricultural activities with scattered woodlots. Historically this ecoregion was dominated by beech-maple forests, or mixed oak forests with red oak, white oak, and shagbark hickory, and mixed mesophytic forests with sugar maple, yellow birch, beech and hemlock (Wiken, 2011). In damper lowlands, elm-ash swamp forests were historically common. This ecoregion now contains a significant amount of dairy farms and localized urban areas. Lake Erie influences climate throughout this ecoregion by increasing the growing season, winter cloudiness and snow accumulations (Omernik, 2012).

Eastern Corn Belt Plains Ecoregion

The proposed NEXUS mainline pipeline route from approximate MP 95 to MP 109, traverses the Eastern Corn Belt Plains Ecoregion comprising approximately 5 percent of the total Project route. This ecoregion covers large portions of western Ohio and consists of primarily rolling till plains with local end moraines and glacial deposits (Wiken, 2011). The vegetation of this ecoregion was originally dominated by American beech, sugar maple, and American basswood forests. This landscape has also been significantly altered to accommodate agricultural activities and the forests now found in this ecoregion are much smaller and located mainly within disjointed farm woodlots (Omernik, 2012).

Eastern Great Lakes Lowlands Ecoregion

The proposed NEXUS mainline pipeline route from approximate MP 109 to MP 120, traverses the Eastern Great Lakes Lowlands Ecoregion comprising approximately 4 percent of the total Project route. This ecoregion is located in the lowlands along the St. Lawrence, Lake Ontario and Lake Erie (Omernik, 2012). The landscape was formed by glaciation causing irregular plains surrounded by hills. The majority of the plains have been converted to agriculture. The forested areas that remain are generally composed of maples, birch, basswood, ash and various evergreen species (Wiken, 2011).

Huron/Erie Lake Plains Ecoregion

The proposed NEXUS mainline pipeline route from approximate MP 120 to MP 255, traverses the Huron/Erie Lake Plains Ecoregion comprising approximately 53 percent of the total Project route. The portions of the Project that lie within this ecoregion include all of the proposed pipeline facilities in Michigan and approximately 88 miles of the pipeline in Ohio [from MP 120 to MP 208.3 at the Ohio/Michigan border]. This portion of the pipeline is located on flat lake plains adjacent to Lake Erie. The typically poor drainage of this area originally supported many ecosystems including elm-ash swamps, beech forests, and oak savannas (Wiken, 2011). Today, these areas have been substantially cleared and drained in order to accommodate extensive agriculture, development and industrial growth and the remaining forest cover is generally located in small woodlots. Drainage has greatly reduced the swamps and marshes that were once extensive in this ecoregion (Omernik, 2012). Terrain currently consists of broad, nearly flat plains with low gradient perennial streams and rivers (Wiken, 2011).

3.3.1.1 Proposed Pipeline Facilities

Proposed pipeline facilities traverse forested and open upland communities, as well as palustrine (i.e., freshwater) forested, scrub-shrub and emergent wetlands. The proposed pipeline facilities also traverse or are adjacent to urban and developed lands; therefore, vegetative communities in the area also reflect previous and current anthropogenic disturbance.

Upland Forest

Upland forests are found scattered along the proposed pipeline route, generally as small woodlots consisting of deciduous forests with a few areas with planted pine forests. The deciduous forested areas exhibit characteristics of secondary growth meaning they are even aged or uneven aged stands with a defined shrub or sapling strata and prevalent herbaceous layer. Some of the forests that are uneven aged may be managed for timber or firewood production. The forest canopies are mainly closed to partially closed.

In Ohio, the upland forest communities found along the Project area include Midwestern Dry and Dry-mesic Oak Forests, Midwestern Mesic Hardwood Forests, Midwestern Mesic Oak and Oak-Maple Forests, Appalachian Highlands Dry-Mesic Oak Forests, and Appalachian Highlands Mixed Mesophytic/Cove Forest, as described in *Plant Communities of the Midwest* (Faber-Langendoen, 2001). Midwestern Dry and Dry-mesic Oak Forests are located in the western portion of Ohio in very well drained sites. These forests are dominated by northern red oak (*Quercus rubra*), white oak (*Quercus alba*) and shagbark hickory (*Carya ovata*). Commonly observed species in these forests during field surveys include red oak, white oak and shagbark hickory. Midwestern Mesic Hardwood Forests are found in central and eastern Ohio where the soils tend to be moderately drained to not very well drained and composed of silt loams and silty clay loams. These forests are dominated by American beech (*Fagus grandifolia*) and sugar maple (*Acer saccharum*) (Faber-Langendoen, 2001). Other species observed within these forests during field surveys include red maple (*Acer rubrum*), eastern cottonwood (*Populus deltoides*), shagbark hickory, black cherry (*Prunus serotina*) and American elm (*Ulmus americana*). Midwestern Mesic Oak and Oak-Maple Forests are typically found in areas where fire was historically prevalent and consist mainly of red oak, sugar maple and elms. In eastern Ohio, Appalachian Highlands Dry-mesic Oak Forests are found on moist slopes and on well drained flatlands. Typical species of this community type include red oak, sugar maple and yellow poplar *(Liriodendron tulipifera)*. Appalachian Highlands Mixed Mesophytic/Cove Forests are found on mesic slopes and bottoms. These forests are dominated by a variety of tree species, including sugar maple, red maple, American beech, white ash *(Fraxinus americana)*, yellow poplar, black cherry, white oak, and northern red oak (Faber-Langendoen, 2001). Trees indicative of this community type, specifically basswood (*Tilia americana*) and umbrella magnolia (*Magnolia tripetala)* were observed during field survey.

Upland forest communities along the Project area in Michigan are described as either Mesic Southern Forest or Dry-mesic Southern Forest (Kost et al. 2010). Dry-mesic Southern Forests are fire dependent and generally found in southern Michigan. These forests along the proposed route are dominated by white oak, black oak (*Quercus velutina*) and red oak with hickory species interspersed. The Mesic Southern Forests are typically dominated by American beech and sugar maple, but may also include bitternut hickory (*Carya cordiformis*), yellow poplar, white oak and red oak (Kost et al., 2010). The Mesic Southern Forest is the most common forest type in southeast Michigan, although it is mainly found as small woodlots in the vicinity of the proposed Project.

Open Upland

Open uplands are areas within the Project area (both Ohio and Michigan) that have experienced relatively recent disturbance or undergo regular maintenance. Open uplands are mainly composed of old fields or abandoned agricultural fields in various stages of succession ranging from all herbaceous species to shrublands, but may also be found as vegetated roadway medians, railroad corridors and utility ROW's. These vegetation communities are not described in the *Plant Communities of the Midwest Ohio Subset* (Faber-Langendoen, 2001) or *Natural Communities of Michigan* (Kost et al., 2010) since they are a result

of anthropogenic disturbance and are typically composed of introduced species. Shrub species commonly observed in these areas along the proposed pipeline route include multiflora rose (*Rosa multiflora*), blackberries or brambles (*Rubus spp.*), and Viburnum shrubs (*Viburnum spp.*). Herbaceous plants most commonly associated with open uplands include Canada goldenrod (*Solidago canadensis*), poison ivy (*Toxicodendron radicans*), common cinquefoil (*Potentilla simplex*), tall fescue (*Fescue arundinacea*), common dandelion (*Taraxacum officinale*), Queen Anne's lace (*Daucus carota*), garlic mustard (*Alliaria petiolata*), smooth brome (*Bromus inermis*), Kentucky bluegrass (*Poa pratensis*), Canada thistle (*Cirsium arvense*), red fescue (*Festuca rubra*), and common plantain (*Plantago major*). Several of these species are non-native invasive plants.

Forested Wetland

Forested wetlands in the Project area in Ohio consist mostly of Midwestern Rich Hardwood Swamps, which occur primarily in wetland depressions on level or undulating topography or in backwater sloughs away from direct flooding (Faber-Langendoen, 2001). Soils can be deep silt loam, silty clay loam, to clay loam with the water table at or near the surface for at least a few months of the year, with ponding common (Faber-Langendoen, 2001). Typical tree species identified during environmental surveys in Ohio in this community include red maple, American elm, green ash (*Fraxinus pensylvanica*), black willow (*Salix nigra*), pin oak (*Quercus palustris*), shagbark hickory, silver maple (*Acer saccharinum*), and other oak species (*Quercus spp.*).

Additional, but less common forest types found along the Project area in Ohio, include Midwestern Riverfront Floodplain Forests, Midwestern Bottomland Hardwood Forests, and Midwestern Wet Flatwoods. Riverfront floodplain forests occur on temporarily flooded soils along major rivers and smaller perennial streams. Canopy cover is dominated by silver maple with eastern cottonwood, American sycamore (*Platanus occidentalis*), American elm, black willow, boxelder *(Acer negundo*), river birch (*Betula nigra*), common hackberry (*Celtis occidentalis*), and green ash as codominant species. Midwestern Bottomland Hardwood Forests are mainly comprised of maple (*Acer spp.*), hickory (*Carya spp.*) and pawpaw (*Asimina triloba*). Midwestern Wet Flatwoods are dominated by trees that can be found in both upland and lowland sites. Among the most common species are American beech, sugar maple, swamp white oak (*Quercus bicolor*) and red maple (Faber-Langendoen, 2001).

Forested wetlands traversed by the proposed Project in Michigan are characterized as Southern Hardwood Swamps, Floodplain Forests and Wet-mesic Flatwoods (Kost et al., 2010). Southern Hardwood Swamps are common in southern Michigan and occur on a variety of sites from depressions to riparian areas adjacent to streams and rivers (Kost et al., 2010). Typical wetland tree species identified during environmental surveys in this community in Michigan include: red maple, eastern cottonwood, pin oak, American sycamore, and silver maple. Floodplain forests are less common in the Project area, typical species include silver maple and green ash. Wet-mesic Flatwoods are dominated by a highly diverse mixture of upland and lowland hardwoods, including oak (*Quercus spp.*), hickory (*Carya spp.*), maple (*Acer spp.*), ash (*Fraxinus spp.*), and basswood.

Scrub-shrub Wetland

Scrub-shrub wetlands along the Project area in Ohio consist mostly of Midwestern Rich Shrub Swamps (Faber-Langendoen, 2001). These communities vary widely from occurring on the edges of open water areas to sites with shallow groundwater. They are dominated by tall shrubs between one and three meters tall, with at least 25 percent cover, and are often very dense (greater than 60 percent cover) (Faber-Langendoen, 2001). Typical dominant shrub species identified in Ohio along the proposed pipeline route include steeple bush (*Spiraea tomentosa*), redosier dogwood (*Cornus sericea*), black raspberry (*Rubus occidentalis*), multiflora rose, and elderberry (*Sambucus nigra*).

Scrub-shrub wetland communities along the proposed pipeline route in Michigan were found as a small component of larger wetland complexes, mainly in association with the understory or edges of southern

hardwood swamps. These areas did not contain any of the characteristics of scrub-shrub wetland communities described by Kost et al. (2010).

Emergent Wetland

In Ohio, Midwestern Deep Emergent Marsh, Emergent wetlands and depression marshes are shallow with herbaceous vegetation and sandy soils. Typical wetland vegetation identified in emergent wetlands along the Project area in Ohio include jewelweed (*Impatiens capensis*), deer tongue grass (*Dichanthelium clandestinum*), tearthumb (*Polygonum sp.*), joe pye weed (*Eutrochium purpureum*), reed canary grass (*Phalaris arundinacea*), rice cutgrass (*Leersia oryzoides*), common rush (*Juncus effusus*), fowl mannagrass (*Glyceria striata*), arrowleaf tearthumb (*Persicaria sagitatta*), woolgrass (*Scirpus cyperinus*), sensitive fern (*Onoclea sensibilis*), narrowleaf cattail (*Typha angustifolia)*, fowl bluegrass (*Poa palustris*), Canada bluejoint (*Calamagrostis canadensis*), giant goldenrod (*Solidago gigantea*), Canada goldenrod, gray's sedge (*Carex grayi*), and green bulrush (*Scirpus atrovirens*).

Typical wetland vegetation identified in emergent wetlands along the NEXUS Project area in Michigan include gray's sedge, Canada bluejoint, reed canary grass, and common reed (*Phragmites australis*).

3.3.1.2 Aboveground Facilities

The following section describes the existing vegetation at the proposed aboveground facility sites on the NEXUS Project.

Hanoverton Compressor Station, Compressor Station 1 – Hanoverton, Columbiana County, Ohio

The Hanoverton Compressor Station (Compressor Station 1) site is located within in the Erie Drift Plain Ecoregion. The proposed location for Compressor Station 1 consists of predominantly open land and agricultural land. The site is surrounded by upland forest, likely composed of mature Appalachian Highlands Dry-Mesic Oak forests as described in Section 3.1.1.1. Approximately 0.2 acres of this forest community is located within the proposed temporary construction workspace for Compressor Station 1. NEXUS will be adjusting the construction workspace to avoid these forest impacts, and the estimated temporary forest impacts will be adjusted accordingly. Plant species observed at the proposed site include Kentucky bluegrass, common dandelion, Queen Anne's lace, and red clover (*Trifolium pratense*). The approximately 96-acre site includes four small wetland areas, these wetlands are shown on the proposed Hanoverton Compressor Station Plot Plan included in Appendix 1A – Volume IV, of Resource Report 1. Construction workspace has been designed to avoid these resources. Species of vegetation common in these degraded wetlands include reed canary grass and American black elderberry (*Sambucus nigra ssp. canadensis*).

Wadsworth Compressor Station, Compressor Station 2 – Guilford, Medina County, Ohio

The Wadsworth Compressor Station (Compressor Station 2) is located within the Ontario/Erie Drift Lake Plain Ecoregion. Current vegetative communities within this proposed compressor station site consist primarily of agricultural land with minimal naturally occurring vegetation. No trees or shrubs were identified in the vicinity of the proposed Wadsworth Compressor Station.

Clyde Compressor Station, Compressor Station 3 – Townsend, Sandusky County, Ohio

The Clyde Compressor Station (Compressor Station 3) is located within the Huron/Erie Lake Plains Ecoregion. Current vegetative communities within the proposed Clyde Compressor Station site consist primarily of agricultural land with minimal naturally occurring vegetation. No forested areas were identified in the vicinity of the proposed Clyde Compressor Station.

Waterville Compressor Station, Compressor Station 4 – Waterville, Lucas County, Ohio

The Waterville Compressor Station (Compressor Station 4) is located within the Huron/Erie Lake Plains Ecoregion. Current vegetative communities within the proposed Waterville Compressor Station site consist primarily of agricultural land with minimal naturally occurring vegetation. The naturally occurring

vegetation at the site consists of an open land community. No forested areas were identified in the vicinity of the proposed Waterville Compressor Station.

TGP M&R Station (MR01)

MR01 is located at the southern terminus of the proposed TGP interconnecting pipeline, connecting with the TGP mainline in Columbiana County, Ohio. The current vegetation at the proposed site is almost entirely active agriculture (98 percent). The remaining 2 percent is upland open land. No forested areas or water resources were identified at the site for MR01.

Kensington M&R Station (MR02) and Texas Eastern M&R Station (MR03)

MR02 is located at the Kensington Processing Plant and MR03 is located directly east of the MR02 at the northern terminus of the TGP interconnecting pipeline, connecting with the Texas Eastern Appalachian Lease Project's proposed Texas Eastern interconnecting pipeline in Columbiana County, Ohio. The majority of the site for MR02 and MR03 is located within active agricultural land use (97.5 percent), the remaining vegetation types are upland open land, upland forested land and industrial land uses (road). The site is adjacent to upland forest, likely composed of middle-aged Appalachian Highlands Dry-Mesic Oak forests as described in Section 3.1.1.1. Approximately 0.1 acres of this forest community is slightly within the proposed construction workspace of the M&R stations site. NEXUS will be adjusting the proposed construction workspace for these M&R stations to avoid forested impacts, and temporary forest impact numbers will be adjusted accordingly. No water resources were identified within the site identified for MR02 and MR03.

Dominion East Ohio M&R Station (MR05)

MR05 is located at the delivery point with Dominion East Ohio Gas in Groton Township, Erie County, Ohio. The permanent easement for MR05 is located entirely within agricultural land uses. The site is directly adjacent to upland forested areas along the eastern boundary of the workspace. Construction for MR05 will avoid any impacts to the forested areas. No water resources are located at the site.

Willow Run M&R Station (MR04)

MR04 is located at the northern terminus of the proposed pipeline in Washtenaw County, Michigan. The site is located within a highly industrial and commercial areas (40 percent) and an upland open land area (40 percent). The remaining area of 0.2 acres (20 percent) is comprised of low quality emergent wetland with high percentages of invasive species. No forested areas or water resources are located within the site identified for MR04.

3.3.2 Unique, Sensitive, or Protected Vegetation

This section summarizes unique, sensitive and protected vegetation identified along the proposed NEXUS Project route. NEXUS consulted federal and state resource agencies to determine if federally or state-listed T&E plant species (including federal and state species of special concern) or their designated habitats, occur within the Project area. Agencies contacted by NEXUS include the USFWS, ODNR, MNFI and MDNR. Copies of agency correspondence, including consultation letters, electronic mail, and response letters from agencies are included in Appendix 1C2 of Resource Report 1. Federal and state-listed plant species with previous records in the Project area, as identified by agencies, are included in Table 3.5-1. Detailed botanical surveys were undertaken in selected areas determined to be potential habitat for protected species along the proposed pipeline and in the vicinity of aboveground facilities during the summer of 2015. The survey efforts were focused on the areas with highest potential for diverse plant communities. A total of 110 survey areas were identified for botanical survey along the line, 93 in Ohio and 17 in Michigan. The botanical surveys represented several general community types including upland woodland, pine plantation, bottomland hardwood, floodplain forest, shrubland, field, forested wetland, scrub-shrub wetland, wet meadow and shallow/deep marsh. No federal or state-listed plant species were observed during the survey effort. The *Botanical Survey and Floristic Quality Assessment Index Report for the NEXUS Gas*

Transmission Project is included as Appendix 3A and describes the protocols implemented for the botanical surveys and reports the full survey results.

3.3.2.1 Historical Oak Openings Region

The historical Oak Openings Region is a uniquely diverse region spanning six counties in southeast Michigan and northwest Ohio. Sandy dunes and swales, formerly the shoreline of historic Lake Warren, sit atop a layer of clay, which retains water throughout the year. Historically, where sands were deep, oak savannas and sand barrens persisted, whereas wet prairies dominated areas of shallow sand and high water tables. According to The Natural Conservancy ("TNC") in Ohio, over 99 percent of these habitats have been obliterated due to industrial, urban and agricultural growth (TNC, 2015). In 2000, conservation agencies within the historical Oak Openings Region formed the Green Ribbon Initiative to inform local communities about the Oak Openings Region; identify, and support the preservation, restoration and enhancement of critical natural areas; build partnerships and coalitions and to support partner organizations to ensure ongoing, sustainable efforts in the Oak Openings Region. The Green Ribbon Initiative has a core of 14 organizations, six counties in northwest Ohio, four local governments and over 100 individuals and helps to facilitate various groups, including TNC, Ohio Metroparks, ODNR, USFWS and local utilities, to act in collaboration to protect the remaining intact natural areas within the Region. Additionally, the Green Ribbon Initiative provides specific information to landowners in the Oak Openings Region to manage, restore and create Oak Openings communities on private land. NEXUS has been in communication with TNC, ODNR, USFWS, and others to discuss the proposed Project and to share information regarding potential impacts on the Oak Openings Region (*see* Appendix 1C2 for agency consultation correspondence). NEXUS will coordinate restoration efforts that are consistent with historical Oak Openings Region objectives as per agencies and the Green Ribbon Initiative.

The region currently defined as Oak Openings was originally mapped by Edwin Moseley in the 1920s (Ohio Nature, 2013). The underlying geology of the region is remnant from the last ice age when a large lake created by melting glaciers slowly drained, leaving deep sand deposits and rolling dune landscapes (EPA, 2012). The geology is the main driver of the Oak Openings Region supporting a variety of unique ecological communities. Historically the dune landscape was likely composed of low density, large oak savannas with diverse herbaceous understories. Fire was a common, natural occurrence in the Region that prevented mid-story growth and allowed the large black oak (*Quercus velutina*) trees to thrive. The relatively common disturbances from fire also fostered the unique herbaceous plant communities that historically dominated the Oak Opening Region landscape. The lowland areas were vast wet meadows and wet prairies that spanned for miles across the region. The wet prairie communities were also fire dependent to help prevent overgrowth by woody vegetation and allow the highly diverse grasses and sedges to thrive. Swamp forests were historically found throughout the region, typically found adjacent to the oak savannas (EPA, 2012).

Very little of the natural communities within the historical Oak Openings Region remain intact, 99 percent of the natural areas no longer exist (TNC, 2015). Early agricultural development changed the landscape drastically, leading to conversion of approximately 50 percent of the historical Oak Openings plant communities (EPA, 2012). The majority of the wetlands in the region were either drained or filled and large, deep ditches were dug to continually drain water from the area, actively reducing the groundwater levels. Much of the upland forested areas were cleared to increase land for agricultural use. In areas that weren't cleared, fire suppression allowed mid-story communities to flourish and eventually the oak savannas became overgrown (Ohio Nature, 2013). While the underlying geology of the historical Oak Openings Region remains the same, there are very few remaining areas that harbor the unique ecological communities endemic to the Region. The historical Oak Openings Region is home to six community types that are composed of the plant species that were previously common. These communities include the Great Lakes Twig-rush Wet Meadows, Great Lakes Swamp White Oak-Pin Oak Flatwoods, Mesic Sand Prairies, Midwest Sand Barrens, Black Oak/Lupine Barrens, and Black Oak-White Oak/Blueberry Forests. Five of the six historical Oak Openings plant communities are considered globally rare (with conservation ranks of G1-G3), with the exception of Black Oak-White Oak/Blueberry Forests which are considered to be at the

'apparently secure' level. The historical Oak Openings communities and their associated conservation ranks are described in the following sections. The *Botanical Survey and Floristic Quality Assessment Report* provided as Appendix 3A details the Oak Openings plants and species composition identified during 2015 field surveys for the NEXUS Project.

3.3.2.2 Historical Oak Openings Plant Communities

Approximately 1 percent of the natural communities remain intact within the historical Oak Openings Region. The majority (99 percent) of covertype conversion was for agricultural, commercial and industrial land uses. The majority of the state and globally rare ecosystems endemic to the area that still exist in the historical Oak Openings Region are located within protected lands. The largest protected area is the Oak Opening Preserve Metropark, located approximately 2.5 miles east of the proposed NEXUS Project. Other protected areas include Kitty Todd State Nature Preserve, Maumee State Forest, and Irwin Prairie State Nature Preserve. Fire plays a significant role in the success of the historical Oak Openings communities, and prescribed burns are necessary to restore and maintain the communities to their historic quality. Outside of the protected areas, agriculture and fire suppression reduce the success rates of the historical Oak Openings community types. The historically common Oak Openings plant communities within the Oak Openings Region are described as follows:

Twig-rush Wet Meadows

The Twig-rush Wet Meadows are unique communities to the Great Lakes and in Ohio are only found within the historical Oak Openings Region. They typically have a mucky soil layer overtop sand occurring in seasonally flooded lowlands. They are highly diverse with several types of sedges and grasses dominating the community. Permanent to seasonal flooding and periodic fire disturbances are required to maintain the diverse herbaceous vegetation typical of Twig-rush Wet Meadows which historically spanned over miles of lowland areas. Fire suppression and agriculture have caused permanent conversion of this community type. The lack of periodic fire has allowed woody vegetation to overwhelm the herbaceous stratum, changing the community covertype to become the more common Great Lakes Pin Oak-Swamp White Oak Flatwoods natural community. Agricultural practices, specifically construction of ditches to drain open land, has dramatically decreased the presence of the wet meadows (TNC, 2015).

Twig-rush Wet Meadows are considered to have a conservation rank of "S1G1Q" or "S1G2?"; state critically imperiled (S1) and globally critically imperiled (G1) or globally imperiled rank (G2). The "?" or "Q", in the rankings of G1 and G2 means the rating is questionable or inexact (Faber-Langendoen, 2001; EPA, 2012). Effectively, the conservation rank is on the border of G1/G2, and is considered one of the globally rare natural communities in the historical Oak Openings Region. No Twig-rush Wet Meadows were identified in the Project corridor (*see* Section 3.3.2.3 for botanical survey details). The best example of a Twig-rush Wet Meadow is found in Irwin Prairie State Nature Preserve in Lucas County (TNC, 2015), located approximately 9.3 miles northeast of the closest crossing of the proposed NEXUS Project within the historical Oak Openings Region.

Mesic Sand Tallgrass Prairie

The Mesic Sand Tallgrass Prairies are one of the rarest Oak Openings community types. This community can be comprised of a variety of tallgrasses, forbs, and short shrubs. The most common species include bluestem (*Andropogon gerardii*), Canada bluejoint, Virginia mountainmint (*Pycnanthemum virginianum*), little bluestem (*Schizachyrium coparium*), and yellow indiangrass (*Sorghastrum nutans*). These prairies occur in sandy soils that typically have a thick dark surface due to seasonal high water table and seepage hydrologic influences (Faber-Langendoen, 2001). Mesic Sand Prairies were once the most common wetland community type in the historical Oak Openings Region, but fire suppression, development and intensive agriculture have fragmented the remaining communities. The land use changes have allowed the Mesic Sand Prairies to succeed into the presently more common Swamp White Oak-Pin Oak Flatwoods (TNC, 2015).

Mesic Sand Prairies have a conservation rank of "G2"; globally imperiled (G2) (Faber-Langendoen, 2001; EPA, 2012). This community is considered a globally rare community. No Mesic Sand Tallgrass Prairies were identified in the Project corridor (*see* Section 3.3.2.3 for botanical survey details). One of the best examples of a Mesic Sand Tallgrass Prairie is found in Kitty Todd State Nature Preserve in Lucas County (TNC, 2015), located approximately 7.7 miles northeast of the closest crossing of the proposed NEXUS Project within the historical Oak Openings Region.

Great Lakes Swamp White Oak-Pin Oak Flatwoods

The Oak Flatwoods is a wetland community type dominated by swamp white oak and pin oak but can also have northern pin oak (*Quercus ellipsoidalis*), red maple, American elm and winterberry (*Ilex verticillata*). The understory is typically sparse, but can host a diverse community including cinnamon fern (*Osmunda cinnamomea*), fowl mannagrass, and muskingam sedge (*Carex muskingumensis*) (Faber-Langendoen, 2001). As with other historical Oak Openings communities, the natural occurrence of the Oak Flatwoods has been reduced by clearing and draining for agricultural conversion. Additionally, due to fire suppression, the Oak Flatwoods areas that remain are likely to have a more closed canopy than the relatively open canopies found historically. The Oak Flatwoods communities are the most common wetland community in the Oak Openings Region, which is mainly the result of the succession of both Twig-rush Wet Meadows and the Mesic Sand Prairies (TNC, 2015).

The Swamp White Oak-Pin Oak Flatwoods have a "S3G2" or "S3G2/G3" conservation rank; state vulnerable (S3) and globally imperiled (G2) or globally imperiled/vulnerable (G2/G3) (Faber-Langendoen, 2001; EPA, 2012). The Oak Flatwoods are considered globally rare, however it is important to note that the Ohio status is vulnerable (less rare). The succession of the prairies and meadows are result of major land use disturbances, which are evident in the second growth of the Oak Flatwoods. Components of the historical community were identified within the proposed Project corridor during the botanical field surveys. Natural, old growth Oak Flatwoods, as described by EPA, TNC and Faber-Langendoen (2001), are rare and have been avoided by the proposed NEXUS Project (*see* Section 3.3.2.3 for botanical survey details).

Midwest Sand Barrens

This community can be found on sandy ridges, inland dunes, sandy outwashes, lakeplains and alluvial deposits where soils are well drained. The floral makeup is dominated by a variety of grasses including sedges (*Carex spp.* and *Cyperus spp.*), little bluestem, and wiregrasses (*Aristida spp.*) (EPA, 2012). Increased diversity is seen in highly disturbed areas such as windstorm blowouts or slipfaces. Periodic fire is required to maintain the diverse plant community. As such, success of the Midwest Sand Barrens can be highly dependent on active vegetation management, including prescribed burns.

Midwest Sand Barrens have a conservation rank of "S2G2/G3"; state imperiled (S2) and globally imperiled/vulnerable (G2/G3) (Faber-Langendoen, 2001; EPA, 2012). This is considered one of the globally rare communities found within the Oak Openings Region. No Midwest Sand Barrens were identified in the proposed Project corridor (*see* Section 3.3.2.3 for botanical survey details). The best examples of a Midwest Sand Barrens can be found in Kitty Todd State Nature Preserve and Oak Openings Preserve Metropark in Lucas County (TNC, 2015), located approximately 7.7 miles northeast and 2.5 miles east, respectively, of the closest crossing of the proposed NEXUS Project within the historical Oak Openings Region.

Black Oak – White Oak/Blueberry Forest

The Oak/Blueberry Forest is a common community that remains in the historical Oak Openings Region (TNC, 2015). This community has a much more closed canopy than other Oak Openings communities, typically with 80 percent cover or greater. The Oak/Blueberry Forests have low species diversity, with black oak and white oak as the dominant tree species. The shrub layer typically contains northern lowbush blueberry (*Vaccinium angustifolium*) and hillside blueberry (*Vaccinium pallidum*), with Pennsylvania sedge

dominating the herbaceous layer. Fire suppression has allowed increased canopy cover and decreased diversity of understory plant species. Succession and overgrowth of other community types have increased the presence of the Oak/Blueberry in the Oak Openings Region. Consequently, these forests are more common today than they were historically (TNC, 2015).

Oak/Blueberry Forests have a conservation rank of "G4?"; globally apparently secure with inexact rank (G4?) (Faber-Langendoen, 2001; EPA, 2012). This community is not considered globally rare, as it remains relatively common within the Oak Openings Region. The succession of other community types to Oak/Blueberry Forests is evident in areas containing some species typical of the forests without presence of all the described components, in addition to presence of invasive species and signs of disturbances. While the components of the community have been identified within the proposed Project, they are mainly edges of existing utility corridors. Natural, old growth Oak/Blueberry Forests, as described by EPA, TNC and Faber-Langendoen (2001) have been avoided to the extent practicable by the NEXUS Project (*see* Section 3.3.2.3 for botanical survey details).

Black Oak/Lupine Barrens (Oak Savanna)

The Oak Savanna is the community type for which the Oak Openings Region is named, which historically covered approximately 45 percent of the Region. This community is defined by open canopies composed of black oak, white oak and northern pin oak found in very low densities (about 14 trees/hectare) (TNC, 2015). The dominant stratum is typically the herbaceous layer composed mainly of grasses, although some oak savannas have more closed canopy with reduced herbaceous vegetation. Subcanopy layers may include black cherry, sassafras (*Sassafras albidum*) and shagbark hickory. The shrub layer can include dogwood (*Cornus spp.*) and New Jersey tea (*Ceanothus americanus*). In the remaining natural areas of Black Oak/Lupine Barrens, wild lupine (*Lupinus perennis*) can be found in high amounts supporting the endangered Karner blue butterfly *(Lycaeides melissa samuelis)*. Periodic fire is required to maintain the open understory of the Oak Savanna, and therefore fire suppression has been a leading cause of the reduction of this community type. Additionally, conversion of land for development and agriculture continue to decrease the overall presence of the Oak Savanna.

This community is considered a "S1G3" conservation rank; state critically imperiled (S1) and globally vulnerable (G3) (Faber-Langendoen, 2001; EPA, 2012). The Oak Savanna is a globally rare community within the Oak Openings Region. No Black Oak/Lupine Barren communities were identified in the Project corridor (*see* Section 3.3.2.3 for botanical survey details). The best examples of Black Oak/Lupine Barrens can be found in Kitty Todd State Nature Preserve and Oak Openings Preserve Metropark in Lucas County (TNC, 2015), located approximately 7.7 miles northeast and 2.5 miles east, respectively, of the closest crossing of the NEXUS Project within the Oak Openings Region.

3.3.2.3 Historical Oak Openings Region Botanical Survey Results

The NEXUS Project crosses through the southwestern extent of the historical Oak Openings Region from MP 186.6 to MP 196.3, mainly in Henry and Fulton Counties. Approximately 189 acres of the proposed Project corridor crosses the historical Oak Openings Region, 89 percent of which (168.37 acres) is currently within agricultural land use. The remaining land uses crossed by the proposed Project within the region include forested areas (6 percent), open land (3 percent), commercial or industrial (1 percent), residential (less than 1 percent), and open water (less than 1 percent). The commercial or industrial category is almost entirely composed of existing public road crossings.

NEXUS performed botanical surveys within the historical Oak Openings Region in the summer of 2015 to identify occurrences of plant species representative of remaining Oak Openings communities potentially occurring in the proposed Project corridor. Survey efforts were focused on the 11 percent of acreage outside of active agriculture including forested areas, open land, and residential areas. Ten areas were surveyed within the historical Oak Openings Region by a professional botanist representing the following community types: field (two), wet meadow (one), forested wetland (two) and woodlands (five). The botanist identified

every individual plant species at each survey area and compared the existing community plant compositions to the typical plant community compositions found in the historical Oak Openings communities.

Surveys efforts yielded no evidence of Great Lakes Twig-rush Wet Meadow, Mesic Sand Tallgrass Prairie, Midwest Sand Barrens or the Black Oak/Lupine Barrens community types. Plant species known to occur as components of the Great Lakes Swamp White Oak-Pin Oak Flatwoods and the Black Oak-White Oak/Blueberry Forest were observed within the proposed Project corridor, however several key species of each community were missing and species outside of the typical community descriptions were dominant at some locations. As such, no intact old-growth or historical Oak Openings plant communities, as described by the EPA, TNC or Faber-Langendoen, were located within the proposed Project corridor. The potential communities identified within the Project area were not considered high quality/pristine condition. According to consultation with TNC, Oak Flatwoods and Oak/Blueberry Forests are the most common community types remaining in the Oak Openings Region (TNC, 2015), therefore many of the natural areas that remain likely have components of these community types. The following sections summarize the results of the botanical survey; the complete *Botanical Survey and Floristic Quality Assessment Report* is included as Appendix 3A.

Great Lakes Swamp White Oak-Pin Oak Flatwoods Components

Indicative plant species of Great Lakes Swamp White Oak-Pin Oak Flatwoods (as identified through consultation with TNC) were observed during botanical surveys. Species identified include pin oak, Canada bluejoint, common lake sedge (*Carex lacustris*), royal fern (*Osmunda regalis*), fowl mannagrass, winterberry, swamp rose (*Rosa palustris*), and common spicebush (*Lindera benzoin*).

Botanical surveys were conducted at the two forested wetlands (Survey Areas 87 and 91) located within the historical Oak Openings Region. Survey Area 87 (MP 189), had a few components of the Great Lakes Swamp White Oak-Pin Oak Flatwoods community type, including pin oak, red maple, spicebush, and fowl mannagrass. However, some portions of Survey Area 87 were dominated by species not listed as indicative, including silver maple and cottonwood in the canopy and several invasive species, including common buckthorn and multiflora rose in the understory. Survey Area 91, located within the Maumee State Forest, had several species associated with the Great Lakes Swamp White Oak-Pin Oak Flatwoods community type, including pin oak, red maple, winterberry, spicebush, and common lake sedge. However, Oak Flatwoods communities observed in the Survey Area do not have all of the indicative species described in the natural, high quality communities of this type.

Several of the species common in the Oak Flatwoods community were absent from the survey areas within the proposed Project area, including swamp white oak, cinnamon fern, dogwood species, and chokeberry (*Aronia melanocarpa*). The absence of swamp-white oak could be due to past disturbance and it is possible that the observed potential Oak Flatwoods communities within the Project corridor were previously wet meadows that have overgrown due to fire suppression (as is the case with a high percentage of remaining Oak Flatwoods). Additionally, the potential Oak Flatwoods communities observed in the Project corridor were located along an existing transmission ROW and showed signs of edge disturbances including encroachment of invasive species, specifically common buckthorn and multiflora rose. The proposed NEXUS Project is co-located with the transmission line through the historical Oak Openings Region to avoid creation of new forested edges where practicable.

Black Oak-White Oak/Blueberry Forest Components

Several of the indicative plant species of the Black Oak-White Oak/Blueberry Forest (as identified through ongoing consultation with TNC) were observed in the Project area including black oak, white oak, witch-hazel (*Hamamelis sp.*), huckleberry (*Gaylussacia sp.*), sassafras, pasture rose (*Rosa carolina*), lowbush blueberry, Pennsylvania sedge, wild sarsaparilla (*Aralia nudicaulis*), and bracken fern (*Pteridium sp.*). Two species that are typical of the community were not found, large-leaved aster (*Eurybia macrophylla*) and whorled loosestrife (*Lysimachia quadrifolia*).

Five upland woodland areas were surveyed within the historical Oak Openings Region, four of which had (Survey Areas 86, 88, 89, and 90) some species present that are associated with the Black Oak-White Oak/Blueberry Forest community type. One of these areas (Survey Area 89; MP 190.7), while adjacent to the proposed NEXUS Project, has been completely avoided to reduce forest impacts within the historical Oak Openings Region. Consequently, only three areas were identified to have components of the Oak/Blueberry Forest within the proposed Project construction footprint. Survey Area 86 (MP 189) had components of this community type within a very small portion (approximately 0.16 acres) of its total forested area. Species indicative of the Oak/Blueberry Forest include black oak, white oak, sassafras, lowbush blueberry and bracken fern. Several invasive species were found at Survey Area 86, including Japanese barberry, privet, honeysuckle, buckthorn and multiflora rose. Survey Area 88 (MP 189.6) had several indicative species present including black oak, white oak, sassafras and blueberry, however the area had extensive drainage ditches and signs of agricultural disturbances, in addition to an existing ROW corridor traversing its length. Survey Area 90 (MP 193.7), located in the Maumee State Forest, had several components of the Oak/Blueberry Forest present in addition to several nonnative species including Japanese barberry, burning bush (*Euonymus alatus*) and multiflora rose. The woodlands at Survey Area 90 is located along the edge of an existing transmission corridor, which will reduce effects on wildlife and interior bird species compared to a pipeline crossing bisecting the woodlands.

The three areas proposed to be impacted by the NEXUS Project with potential Oak/Blueberry Forest communities present had varying ranges of previous disturbances, including presence of agricultural ditches, thick edge communities along co-located corridors and presence of invasive species. Several invasive species, including Japanese barberry (*Berberis thunbergii*), honeysuckles (*Lonicera spp.*), and garlic mustard (*Alliaria petiolata*) were becoming established in the Oak/Blueberry Forest communities found along edges of the existing utilities and in areas with evident disturbances.

3.3.2.4 Impacts to the Historical Oak Openings Region

NEXUS has minimized impacts to the historical Oak Opening Region by siting proposed facilities in already disturbed agricultural areas (89 percent) and adjacent to maintained utility corridors to the extent practicable. A detailed assessment of the land use impacts within the historical Oak Openings Region is provided in Resource Report 8. The potential Great Lakes Swamp White Oak-Pin Oak Flatwoods community and the potential Black Oak-White Oak/Blueberry Forests found within the proposed Project area were located mainly adjacent to existing utility corridors co-located with the proposed route and exhibit lower quality examples of these community types. None of the communities identified within the Oak Openings Region had all of the components of historical Oak Openings communities as described by TNC, EPA and Faber-Langendoen (2001). The plant communities identified during botanical surveys showed signs of historic and current disturbances that have reduced the overall quality of the native Oak Openings vegetative communities. This includes the presence of invasive species and overgrowth of historic meadows and grasslands that used to dominate the historical Oak Openings Region.

NEXUS has prepared Site Specific Crossing Plans for the historical Oak Openings Region (*see* Appendix 8E of Resource Report 8). NEXUS will continue communications with ODNR and TNC to identify both construction and restoration methods that minimize potential impacts on Oak Openings vegetative communities and that are consistent with management objectives of the historical Oak Openings Region and the Green Ribbon Initiative.

3.3.3 Invasive Species

Invasive species are species that display rapid growth and spread, becoming established over large areas. Most commonly they are exotic species that have been introduced from another part of the United States, another region, or another continent, although native species that exhibit rapid growth and spread are sometimes considered invasive. The USFWS defines invasive species as “organisms that are introduced into a non-native ecosystem and which cause, or are likely to cause, harm to the economy, environment or human health” (USFWS, 2012a). Invasive plant species can change or degrade natural vegetation

communities by reducing diversity, which can reduce the quality of habitat for wildlife and native plant species.

Several plant species considered to be non-native or nuisance plant species in the Great Lakes Region of the United States have been identified along the proposed pipeline corridor and at aboveground facility sites in Ohio and Michigan. Species identified within the project corridor include Canada thistle, wild parsnip (*Pastinaca sativa*), buckthorn species (*Rhamnus spp.*), garlic mustard, Japanese honeysuckle (*Lonicera japonica*), purple loosestrife (*Lythrum salicaria*) and phragmites. None of these species are listed on the List of Federal Noxious Weeds (USDA, 2010) pursuant to the Federal Noxious Weed Act of 1974. On June 5, 2014, Ohio Governor John Kasich signed the Amended Substitute Senate Bill 192 which provides the director of the Ohio Department of Agriculture the authority to regulate invasive plant species in Ohio, "including the identification of invasive plant species and establishment of prohibited activities regarding them". The rules of the Senate Bill are currently being drafted prior to implementation (Ohio Invasive Plants Council, 2015). In Michigan, certain invasive plant species are prohibited or restricted to be released or propagated under the Natural Resources and Environmental Protection Act Part 413-Transgenic and Nonnative Organisms. Phragmites and purple loosestrife are restricted species (MNFI, 2009).

While no formally designated noxious weeds occur within the Project area, NEXUS is committed to minimizing the potential introduction of invasive weeds along active ROW. To minimize potential impacts from invasive plants, an invasive plant species management plan has been developed for the Project (*see* Appendix 1B7 of Resource Report 1).

3.3.4 Vegetation Effects and Mitigation

This section summarizes the NEXUS Project construction and operation effects to the vegetative cover types. Table 3.3-1 provides the approximate acreages of forested land and non-forested land that would be affected during construction and operation of the proposed NEXUS pipeline.

3.3.4.1 Proposed Pipeline Facilities

Construction of proposed pipeline facilities will result in temporary and permanent impacts to vegetation. The creation of new ROW is required for segments of the proposed pipeline route that cannot be located adjacent or parallel to existing ROWs. The nominal construction ROW width will be 100 feet wide, which includes the permanent 50-foot wide easement required for operations. The construction ROW width within wetlands will be reduced to 75 feet wide, which conforms to the FERC Procedures.

As previously noted, approximately 45 percent of the proposed pipeline is located within or adjacent to existing pipelines, electric transmission lines, or railroad ROWs (see Section 8.2.1.2 of Resource Report 8). The NEXUS Project has been designed to minimize impacts to existing natural vegetation and approximately 87 percent of the route is either co-located with existing utility corridors that undergo regular vegetation maintenance or within active agricultural lands.

The pipeline ROW and temporary workspaces will be cleared of vegetation prior to construction to provide a safe working area. The limits of clearing will be identified and flagged in the field prior to the start of clearing operations. The proposed NEXUS Project pipeline will temporarily impact approximately 381.8 acres of forested land (upland forest and forested wetland) during construction and will permanently covert approximately 170.0 acres of forested land (upland forest and forested wetland) to a either scrub-shrub or herbaceous vegetative type during operation of the pipeline.

Access roads

To the extent practicable, NEXUS will use existing roads and existing open land to access the Project, therefore, impacts to forested areas, wetland and waterbodies were avoided in the siting of access roads when possible. Construction of new access roads will result in minor temporary and permanent impacts to vegetation. Proposed access roads are shown on U.S. Geological Survey topographic map excerpts and Project alignment sheets located in Appendix 1A – Volume II-B of Resource Report 1. The majority of

access roads will be temporary for the construction of the Project, therefore, the vegetation impacts are much greater for construction compared to operation. Impacts are mostly within agricultural and open land uses. Approximately 1.6 acres of upland forested land will be cleared for construction, but restored for operation and no wetlands areas will be permanently converted for access roads. Table 3.3-1 summarizes vegetation impacts associated with the proposed NEXUS Project.

Clearing

Vegetative clearing will be required for construction of proposed pipeline facilities that traverse forested or shrub-scrub habitats. The limits of clearing will be identified and flagged in the field prior to clearing operations. Initial clearing operations will include the removal of vegetation within the pipeline permanent easement and the temporary construction workspace either by mechanical or hand cutting. In wetlands, trees and brush will either be cut with rubber-tired and/or tracked equipment, or hand-cut. Unless grading is required for safety reasons, wetland vegetation will be cut off at ground level leaving existing root systems intact outside of the area excavated for the trench. The aboveground vegetation will be removed from the wetlands for chipping or disposal. In uplands, tree stumps and rootstock will be left in the temporary workspace wherever possible to encourage natural revegetation. Brush and tree limbs will be chipped and removed from the ROW.

The cleared width within the permanent ROW and temporary construction workspaces will be kept at 100-feet where possible, with additional temporary workspace in areas that will require more space for all other activities required to safely construct the pipeline. Following construction, the entire pipeline ROW will be revegetated, and the minimum ROW width necessary (maximum of 50 feet) for operation will be maintained by NEXUS. The temporary workspace areas used during construction will be seeded and allowed to revegetate with no further maintenance or disturbance associated with the pipeline. In accordance with the FERC Plan, NEXUS will monitor all disturbed areas to determine the post-construction revegetative success for two growing seasons following construction, or until revegetation is successful.

3.3.4.2 Aboveground Facilities

Aboveground facilities were sited, in part, to avoid unnecessary impacts to wetlands, forest, and high quality vegetative communities. The construction of NEXUS aboveground facilities will result in temporary and permanent impacts to mainly upland open land and agricultural land in addition to commercial and industrial areas. Approximately of 227.2 acres of agricultural land will be impacted for the construction of the four compressor stations, with 123.2 acres located within the permanent easement. Approximately 29.2 acres will be impacted for the construction of the five proposed M&R stations, with 8.2 acres located within the permanent easement. Due to design efforts to avoid forested impacts, approximately 0.3 acres of forested lands is currently proposed for temporary impact for the construction of aboveground facilities, including all compressor stations and M&R stations, for the NEXUS Project. The construction workspace will be modified to avoid all forest clearing at aboveground facilities. Table 3.3-1 displays the total construction and operation totals of vegetation impacts.

3.4 Wildlife

NEXUS consulted with the USFWS, NMFS, ODNR, MNFI and the MDNR regarding potential wildlife effects and significant habitats in the Project area. Copies of all agency correspondence, including consultation letters, electronic mail, meeting minutes and response letters are included in Appendix 1C2 of Resource Report 1.

3.4.1 Existing Resources

The NEXUS Project traverses terrestrial and wetland habitats that support a diversity of wildlife species in a variety of ways. The wildlife species that occur along the proposed pipeline route are representative of the vegetation community structure and composition of the terrestrial and wetland habitats present within the footprint or immediate vicinity of the Project.

The composition, structure and distribution of the plant community in an area are referred to as the vegetative cover. Existing plant communities, as well as aspects of the physical environment (e.g. climate, microclimate, hydrology, and geology) will influence the wildlife species that are present in a particular habitat. This section describes major wildlife habitat types and wildlife species associated with vegetative cover types present in the NEXUS Project (*see* Section 3.3.1 for descriptions of plant communities present in the Project area).

Dominant wildlife habitat types have been identified along the proposed pipeline route and at aboveground facility locations based on field surveys and review of available resource material. These habitat types include upland forest, open uplands (early successional scrub-shrub and herbaceous vegetation cover), forested wetlands, scrub-shrub wetlands, emergent wetlands, urban and open water habitats. Wetland habitat types are further described in Section 2.4.1 of Resource Report 2.

Upland Forest

Upland forests are found throughout the Project area and mostly occur along existing ROWs. Upland forests provide year-round food resources, cover, and nesting habitat for a variety of wildlife species. Mast-producing oaks generate an abundance of seeds and nuts, which are utilized by a diverse group of forest species. Even in relatively developed and urbanized areas, forested patches may be inhabited by a number of wildlife species. Large wildlife species such as the white-tailed deer (*Odocoileus virginianus*) use these forested habitats for food and cover. Small mammals including the gray squirrel (*Sciurus carolinensis*), Virginia opossum (*Didelphis virginiana*), and the common raccoon (*Procyon lotor*) capitalize on the availability of the numerous nest cavities in the form of snags and felled logs. The abundant small mammal population in upland forests provides prey for owls and hawks.

A variety of songbirds, including species of neotropical migrants and resident species, use hardwood oak habitat for all or parts of their life cycle. Many neotropical migrants feed on the numerous insects occurring within the forest canopy. Breeding birds use a range of different nest sites, with some species nesting on the forest floor, some in the understory vegetation, and some in the tree canopy. Characteristic resident bird species in oak forests include red-bellied woodpecker (*Melanerpes carolinus*) and wild turkey (*Meleagris gallopavo*). Migratory species may include great crested flycatcher (*Myiarchus crinitus*) and wood thrush (*Hylocichla mustelina*).

Open Uplands

The early successional habitat types in the Project area include successional scrub-shrub areas, fields, and disturbed and/or maintained areas, such as existing utility ROWs or other open spaces. Early successional and grassland habitats are attractive to many wildlife species including ground-nesting birds such as eastern meadowlark (*Sturnella magna*), killdeer (*Charadrius vociferus*), and song sparrow (*Melospiza melodia*). Species such as eastern cottontail (*Sylvilagus floridanus*) frequently prefer shrubby, overgrown open habitats.

High quality edge habitats adjacent to open space areas can create another type of habitat used by a distinct group of species. The majority of the edge habitats show signs of disturbance and have thick mid-story vegetation. Species utilizing forest edge habitats include coyote (*Canis latrans*), eastern cottontail, gray fox *(Urocyon cinereoargenteus*), red fox (*Vulpes vulpes*), white-tailed deer, and wild turkey. Eastern box turtles (*Terrapene carolina*) can travel between forest, forest edge, and open habitats. Bird species that are forest edge specialists, including blue-winged warbler (*Vermivora cyanoptera*), field sparrow (*Spizella pusilla*), prairie warbler (*Setophaga discolor*) and eastern towhee (*Pipilo erythrophthalmus*), are often present where the upland fields border forested areas and along utility ROWs. Corridors and edges are also used by hunting raptors, such as American kestrels (*Falco sparverius*), red-tailed hawks (*Buteo jamaicensis*) and sharp-shinned hawks (*Accipiter striatus*), which feed on small mammals and birds.

Forested Wetlands

Forested wetlands have a diverse assemblage of plant species that provide important food, shelter,

migratory and overwintering areas, and breeding areas to a variety of fauna. Typical wildlife in forested wetlands include wood frog (*Lithobates sylvaticus*), red-spotted newt (*Notophthalmus viridescens*), garter snake (*Thamnophis sirtalis sirtalis*), little brown bat (*Myotis lucifugus*), the common raccoon, white-tailed deer, wild turkey, and wood duck (*Aix sponsa*).

Scrub-shrub Wetlands

Scrub-shrub wetland habitats are typically not as structurally diverse as forested wetlands. They contain vegetation that is characteristically low and compact. Under normal conditions the vegetative structure is usually a result of surface water inundation for extended periods of time. Scrub-shrub wetlands can also be maintained by periodic maintenance (such as along existing ROWs) including removal of larger trees. Plant species occurring within scrub-shrub wetlands offer nesting sites for birds, including many species of warblers. Common species found in these wetlands include pickerel frog (*Rana palustris*), red-winged blackbird (*Agelaius phoeniceus*), and spring peeper (*Pseudacris crucifer*).

Emergent Wetlands

Freshwater emergent wetlands include wet meadows and emergent marshes, which are characterized by a variety of grasses, sedges and rushes. These wetlands are often associated with areas containing standing water for extended periods of time. Common species of birds associated with emergent wetlands include common grackle (*Quiscalus quiscula*), killdeer, and red-winged blackbird. Mammals typically associated with this habitat type include American mink (*Neovison vison*), muskrat (*Ondatra zibethicus*), raccoon, and star-nosed mole (*Condylura cristata*). White-tailed deer also frequent these areas and capitalize on the abundance of grasses and forbs. A large variety of amphibians and reptiles are also identified within these areas. These include American bullfrogs (*Rana catesbeiana*), common snapping turtle (*Chelydra s. serpentina*), painted turtle (*Chrysemys picta*), and pickerel frog.

Urban

Urban environments are characterized by a low diversity of wildlife species that have become tolerant of human development and activity. The mammal species that are commonly found in urban areas include raccoon, striped skunk (*Mephitis mephitis*), squirrels and rat species (*Rattus spps.*). Common bird species in cities and residential areas include European starlings (*Sturnus vulgaris*), house sparrows (*Passer domesticus*), mourning doves (*Zenaidura macroura*), northern mockingbirds (*Mimus polyglottos*), and rock pigeons (*Columba livia*). The proposed NEXUS pipeline is not located in heavily urbanized areas, but some urban environments do occur within the Project vicinity.

3.4.2 Wildlife Effects and Mitigation

Construction of the proposed NEXUS pipeline will affect a total of approximately 328.4 acres of upland forest and approximately 457.5 acres of open upland habitat (*see* Table 3.3-1). Construction will also temporarily affect a total of 109.6 acres of wetland. Of the total acreage of wetland impacted during construction, 46.7 acres will be allowed to return to the pre-construction cover type. A total of 32.4 acres of forested wetland vegetation will be permanently affected by routine vegetation maintenance during operation of the pipeline facilities. Required compensatory mitigation will be performed for cover type conversion of forested wetlands through Section 404 permitting of the Clean Water Act. Approximately 45 percent of the proposed route is co-located with existing utility corridors, 42 percent is located within active agricultural land use, resulting in a total of 87 percent of the proposed pipeline that is sited in areas that avoid conversion of existing land uses. The existing ROWs are routinely maintained as part of regular facility operations to control vegetative growth, thus establishing shrub and/or open field habitat types. Many species of resident and migratory wildlife in the Project area use these existing utility corridors as preferred habitat.

Temporary wildlife effects are those associated with disturbance to habitats during construction, while permanent effects are those associated with conversion of forested habitats to scrub-shrub and emergent habitats, resulting from periodic maintenance of the permanent ROW. Indirect wildlife effects associated

with construction noise and increased activity will be temporary and could include abandoned reproductive efforts, displacement, and avoidance of work areas. Direct mortality to small mammals, reptiles, and amphibians that are less mobile could occur during clearing and grading operations.

As 87 percent of the proposed NEXUS pipeline route is located along existing utility corridors and/or active agricultural areas, permanent conversion of existing land uses, including forested habitats, has been minimized. The forested areas adjacent to co-located ROWs that are present along the proposed pipeline route already exist as edge habitat, not interior forested habitat. Consequently, effects on habitat for forest-dwelling wildlife will be minimal, although some conversion of forested vegetation will occur. During construction, approximately 381.8 acres of forested woodland will be converted to open land. 25.4 percent (96.8 acres) of the forest impacts for construction workspace is adjacent to existing ROW corridors. The majority of the forested area cleared for construction (approximately 200 acres) will be temporary and allowed to restore. For the permanent easement, there will be 170.0 acres of forested woodland permanently converted to open land. Approximately 30.3 percent (51.5 acres) of the permanent conversion is adjacent to existing ROW corridors.

Conversion of forested habitats creates potential to reduce the area of habitat available for woodland amphibians such as the spotted salamander (*Ambystoma maculatum*) and wood frog (*Lithobates sylvatica*); however, this effect is expected to be minimal, given the relatively small amount of forested vegetation that will be affected over the entire Project.

Construction activities within wetland habitats will temporarily affect wildlife using the area. Disturbances to wetland-dependent wildlife will be similar to those described for terrestrial wildlife species. The alteration and conversion of habitat may displace some species which prefer forested wetlands. Existing nest sites and burrows along stream banks could also be disturbed. Some individuals may relocate to similar forested wetland habitat beyond the limits of work; however, a small overall reduction in carrying capacity for forest dwelling species is expected.

In accordance with the FERC's Plan, vegetative maintenance in upland areas along the ROW will occur no more than once every 3 years. However, a corridor centered over the pipeline up to 10 feet wide may be mowed annually for maintenance and inspection purposes. To avoid effects to ground nesting birds, maintenance activities will not be scheduled between April 15 and August 1. Additional information regarding mitigation for potential impacts to migratory birds is provided in Section 3.6.3.

In wetlands, vegetation maintenance over the full width of the permanent ROW is prohibited. However, to facilitate periodic pipeline corrosion/leak surveys, a corridor centered on the pipeline up to 10 feet wide may be maintained annually in an herbaceous state. In addition, trees located within 15 feet on either side of the pipeline that may affect the integrity of the pipeline coating may be selectively cut and removed from the ROW. Trees and shrubs that become reestablished beyond 15 feet on either side of the pipeline will not be disturbed.

Vegetation maintenance practices on the construction ROW adjacent to waterbodies will consist of maintaining a riparian strip within 25 feet of the stream as measured from the mean high water mark. This riparian area will be allowed to permanently revegetate with native woody plant species across the entire ROW. However, as in wetland areas, a corridor centered on the pipeline up to 10 feet wide may be maintained in an herbaceous state and trees located within 15 feet on either side of the pipeline that may affect the integrity of the pipeline may be selectively cut and removed from the ROW.

Regionally, maintained utility ROWs can provide early successional habitats for several important game species including white-tailed deer and wild turkey. The permanent ROW proposed for the NEXUS pipeline will be 50 feet wide in uplands. ROW corridors may function as travel corridors for some generalist species and provide edge habitat along large forested areas. ROWs revegetated with herbaceous and shrub cover will provide food, cover and breeding habitat for those species that utilize open habitats.

In an effort to minimize permanent effects to wildlife and promote the rapid stabilization and revegetation of the disturbed areas, NEXUS will comply with the FERC's Plan and Procedures thereby reducing disturbance to vegetation and providing for stabilization of affected areas to mitigate direct and indirect effects to wildlife. Revegetation will be completed in accordance with permit requirements and in consultation with agency and non-agency stakeholders affected by the Project.

Following construction, stabilization, and establishment of vegetative cover, temporarily disturbed areas will be allowed revegetate naturally. There will be minimal permanent loss of trees that will occur within the ROW, which will be maintained in an early successional stage by mowing and periodic tree removal. Temporary workspaces will be allowed to naturally revegetate via natural succession. This natural revegetation process will gradually develop a stratified vegetative cover between the ROW and adjacent habitats. Overall, construction and operation of the proposed pipeline facilities is not expected to adversely affect the distribution or regional abundance of wildlife species given the amount and distribution of similar habitat types available in the immediate Project area.

3.4.3 Significant or Sensitive Wildlife Habitat

This section identifies and describes the significant or sensitive wildlife habitats within the NEXUS Project area. Significant or sensitive wildlife habitats include wildlife management and refuge areas, or other known wildlife resources not specific to T&E species. T&E wildlife species and their habitats are described in Section 3.5, Table 3.5-1. One wildlife area has been identified within the Project corridor. The NEXUS Project crosses underneath Missionary Island State Wildlife Preserve, an island within the Maumee River that is managed by ODNR. The Maumee River, and consequently, the Missionary Island State Wildlife Preserve is proposed to be crossed utilizing HDD construction methods, therefore NEXUS does not anticipate impacts to the preserve or any wooded buffers along the Maumee River.

3.5 Endangered, Threatened and Special Concern Species

The Endangered Species Act ("ESA") of 1973 (16 United States Code A-1535-1543, P.L. 93-205) protects federally-listed T&E species. The ESA states that T&E plant and animal species are of aesthetic, ecological, educational, historic, and scientific value to the U.S. and that protection of these species and their habitats is required. The ESA protects fish, wildlife, plants, and invertebrates that are federally-listed as T&E. A federally-listed endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A federally-listed threatened species is likely to become endangered in the foreseeable future throughout all or a significant portion of its range. The USFWS, which is responsible for terrestrial and freshwater species, and NMFS, which is responsible for marine species, jointly administer the ESA.

Protection is also afforded under the ESA to designated "critical habitat," which the USFWS defines as specific areas both within and outside the geographic area occupied by a species on which are found those physical and biological features essential to its conservation. In addition to federal law, Ohio and Michigan have passed laws to protect state T&E species. The state-specific regulations are as follows:

- Ohio law allows the Chief of the Division to adopt rules to restrict taking or possessing native wildlife species that are threatened with statewide extirpation. Additionally, the Chief may develop and periodically update the list of endangered species (Ohio Revised Code 1531.25). The first list of Ohio's endangered wildlife was adopted in 1974 and included 71 species. An extensive examination of this list is conducted every 5 years (ODNR, 2012a).
- Michigan law under the Michigan Natural Resources and Environmental Protection Act, Act 451 of 1994 (Section 324.36501-36507) states that the department shall perform those acts necessary for the conservation, protection, restoration, and propagation of endangered and threatened species of fish, wildlife, and plants in cooperation with the federal government, pursuant to the ESA.

Prior to commencing field studies, NEXUS consulted with the USFWS Columbus Field Office and East Lansing Field Office, ODNR, MNFI, and the MDNR to request known federal or state species records

within a 1-mile wide corridor of the proposed pipeline route (*see* Resource Report 1, Appendix 1C2). The list of protected species that could occur within 1-mile of the Project is provided as Table 3.5-1. Based on the information received from the agencies, NEXUS evaluated the potential occurrence of protected species and their locations relative to the proposed pipeline route. Further evaluation of habitat information collected from field surveys and publically available information was also performed to determine the need for on-site species specific surveys. NEXUS has developed several species survey protocols and has ongoing consultation with USFWS, MDNR and ODNR regarding proposed species-specific surveys. Furthermore, NEXUS is also providing the resource agencies revised information to update them on the Project route, field survey status, and to obtain any new information on the locations of rare, threatened and endangered species (*see* Resource Report 1, Appendix 1C2). Species-specific field surveys were conducted in suitable habitats during the 2015 field season for the protected species. Surveys will continue into the 2016 field season as necessary.

The federally and state-protected wildlife species that potentially occur in the Project area are summarized in Table 3.5.1. Federally-listed species are discussed in Section 3.5.1, Ohio T&E state-listed protected species are discussed in Section 3.5.2, Michigan T&E state-listed protected species are discussed in Section 3.5.3, and state-listed species of special concern are discussed in Section 3.5.4.

3.5.1 Federally-listed Species

This section describes the federally-listed species that have been identified by USFWS to potential occur within the Project corridor. Several of these species are also listed as stated protected and have been identified as such below.

3.5.1.1 Avian Species

Kirtland's warbler (Setophaga kirtlandii)

This small blue-gray songbird has a bright yellow colored breast and requires areas with small scrubby jack pines for nesting and breeding. Specifically, the Kirtland's warbler is found in low scrub, thickets, and deciduous woodland (Mayfield, 1992). This warbler migrates through Ohio in the spring and fall, traveling between breeding grounds in north-central North America and wintering grounds in the Bahamas. While migration occurs in a broad front across the entire state, approximately half of all observations in Ohio are within 3 miles of Lake Erie. During migration, individual birds usually forage in shrub/scrub or forested habitats and only stay in the area for a few days.

The Kirtland's warbler is a federally-listed endangered species and a state-listed endangered species in Ohio. USFWS recommends clearing restrictions to be applied to areas within 3 miles of the lake. The current location of the proposed Project is further than 3 miles from Lake Erie, even at its closest location to the lake in Erie County. As per USFWS consultation, no clearing restriction will apply and no adverse impacts are anticipated by USFWS (*see* Resource Report 1, Appendix 1C2).

Piping plover (Charadrius melodus)

Piping plovers are generally small, stocky shorebirds with a sand-colored upper body, a white underside and orange legs. During the breeding season, adults have a black forehead, a black breast band, and an orange bill. They use wide, flat, open, sandy beaches with very little grass or other vegetation to feed on insects, spiders, and crustaceans. Nesting territories can include small creeks or wetlands. This species became listed as many of the coastal beaches traditionally used by piping plovers for nesting have been lost to commercial, residential, and recreational developments. Through the use of dams or other water control structures, humans are able to raise and lower the water levels of many lakes and rivers of plover inland nest sites (USFWS, 2015a). The Great Lakes population of the piping plover utilize the sandy beaches along the shorelines of Lake Erie and Lake Ontario.

The Piping plover is federally-listed as endangered and state-listed as endangered in Ohio. The plover has been documented in Erie County, however the proposed Project will not cross close enough to suitable

habitat to impact the Great Lakes populations. During consultation about NEXUS Project, USFWS stated that no impacts to the piping plover are anticipated, and no action is required due to Project size, type and location (*see* Resource Report 1, Appendix 1C2).

3.5.1.2 Insect Species

Karner blue butterfly (Lycaeides melissa samuelis)

The Karner blues have four stages in its life cycle; the egg, larva, pupa, and adult. There are two generations per year, the first adults appearing in late May to mid-June. The second brood adults, emerging in mid-July to early August, lay their eggs singly in dried lupine seed pods or near the ground on the lupine stems. Eggs of the second brood hatch the following May. Additionally, although the Karner blue adults are nectar-feeders, the larvae are highly specialized and feed exclusively on the wild lupine leaves. Without lupine, the butterfly populations would not survive (USFWS, 2008).

The Karner blue butterfly is federally-listed as endangered, and state-listed as endangered in Ohio and threatened in Michigan. In Ohio, no impacts to this species are anticipated according to the USFWS (*see* Resource Report 1, Appendix 1C2). In Michigan, the species distribution is limited to pine and scrub oak habitats scattered among open grassy areas, commonly within habitat of wild lupine (*Lupinus perennis*) (USFWS, 2008). The USFWS identified this species as potentially occurring near the proposed Project areas in Michigan. NEXUS completed botanical surveys and confirmed that neither oak savanna nor the associated wild lupine is located within the proposed Project. Due to the avoidance of oak savanna communities, no impacts on the Karner blue are expected to occur. The *Mitchell's Satyr, Poweshiek Skipperling, Karner Blue Butterfly Survey Protocol for the NEXUS Gas Transmission Project*, included as Appendix 3B, details the Karner blue butterfly habitat assessment survey protocols.

Mitchell's satyr butterfly (Neonympha mitchelli mitchelli)

Mitchell's satyr is a medium sized, brown butterfly with black circular eyespots outlined in distinctive orange rings. This butterfly inhabits prairie fens, geologically and biologically unique wetland communities. Hydrological processes are critical in maintaining the vegetative structure and ultimately the habitat for this species of butterfly. In addition to alteration of the hydrology and elimination of this fen habitat, invasion of woody plant vegetation eliminates the population of suitable host plants for this butterfly and its caterpillars. This butterfly has become endangered as the suitable prairie fen habitat is continually disrupted or lost and consequently has limited distribution, occurring at only 19 sites in southern Michigan and two counties in north Indiana (USFWS, 1999).

Mitchell's satyr has historic occurrences in Washtenaw County, Michigan and USFWS identified this species as potentially occurring near the proposed Project areas in Michigan. NEXUS completed botanical surveys and confirmed that no Michigan prairie fens or large undisturbed grasslands remain with the Project area. No impacts on the satyr are anticipated due to the avoidance of suitable habitat within the NEXUS project corridor. The *Mitchell's Satyr, Poweshiek Skipperling, Karner Blue Butterfly Survey Protocol for the NEXUS Gas Transmission Project*, included as Appendix 3B, details the Mitchell's satyr butterfly habitat assessment survey protocols.

Poweshiek skipperling (Oarisma poweshiek)

The Poweshiek skipperling is a small butterfly with dark brown and orange wings with a lighter brown and prominent white veins on the underside of the wing. This butterfly lives in high quality prairie habitats and is typically found in select upland or wet tallgrass prairies. In Michigan, the skipperling has been found mainly in prairie fen habitats. Adult butterflies will feed on nectar from various prairie flowers including purple coneflower (*Echinacea angustifolia*), blackeyed susan (*Rudbeckia hirta*) and palespike lobelia (*Lobelia spicata*). It is thought that the larval stage of the skipperling utilizes native, fine-stemmed grasses and sedges such as little bluestem (*Schizachyrium scoparium*) and prairie dropseed (*Sporobolus heterolepis*). The Poweshiek skipperling populations have disappeared across much of its historic range, and now only a few known populations remain in the Midwest (USFWS, 2014a).

The Poweshiek skipperling is federally-listed as endangered and state-listed as threatened in Michigan. The USFWS noted occurrence records for Washtenaw County, Michigan. The majority of the route in Michigan is within active agriculture, commercial or industrial land uses. NEXUS completed botanical surveys and confirmed that no Michigan prairie fens or large undisturbed grasslands remain with the proposed Project area. No impacts on the skipperling are anticipated due to the avoidance of suitable habitat within the NEXUS project corridor. The *Mitchell's Satyr, Poweshiek Skipperling, Karner Blue Butterfly Survey Protocol for the NEXUS Gas Transmission Project*, included as Appendix 3B and details the Poweshiek skipperling habitat assessment survey protocols.

3.5.1.3 Mammal Species

Indiana bat (Myotis sodalis)

The Indiana bat is a federally-listed endangered species, and is state-listed as endangered in both Ohio and Michigan. The Indiana bat occurs in forests and caves from the east coast to Midwestern United States, primarily inhabiting regions in the Midwest (USFWS, 2006). During the fall, from August through October, Indiana bats congregate at hibernation sites (i.e., hibernaculum) including caves and abandoned mine shafts, where bats engage in mating activities. During this time bats also forage the surrounding areas to build fat reserves needed for hibernation (USFWS, 2006). From October through April, Indiana bats hibernate in these areas, preferring cool, humid caves with stable temperatures under 50°F. There are hibernacula located within Ohio and Michigan, and potential for this species to be located within each of the counties crossed by this proposed Project (USFWS, 2006). Indiana bats emerge from hibernacula between mid-April and late-May and again forage in areas typically within 10 miles of hibernaculum sites. Small maternity colonies are then formed under exfoliating bark for the duration of the summer months (USFWS, 2006). Roosting colonies are commonly found in bottomland or riparian areas, but may also include some upland forests and pastures.

Roost trees commonly include mixed mesophytic hardwoods and mixed hardwood-pine stands (USFWS, 2014b). According to the USFWS, potential roosting habitats are those with at least 16 suitable trees per acre. Suitable trees include live shagbark hickory over 9 inches in diameter at breast height ("dbh"); dead, dying, or damaged trees of any species, over 9 inches dbh with at least 10 percent exfoliating bark; den trees, broken trees, or stumps over 9 inches dbh and over 9 feet in height; or live trees of any species over 26 inches dbh (USFWS, 2006).

Indiana bats often forage in both riparian and upland forests, as well as cropland borders and wooded fencerows. Preferred habitat includes streams and associated floodplain forests, and impounded bodies of water, including ponds and reservoirs. Indiana bats search for flying insects at or near the canopy at night and similar to other bat species, utilize openings in the forest, such as stream corridors and ROWs, to feed (USFWS, 2006).

The USFWS identified multiple county-specific determinations associated with the Indiana bat for Project areas within Ohio. USFWS recommended that in Columbiana, Stark and Summit counties, any unavoidable tree clearing should occur only from October 1 through March 31 (*see* agency correspondence in Resource Report 1, Appendix 1C2). Summer surveys were recommended for Wayne, Medina, Lorain, Erie, Sandusky, Wood, Lucas, and Fulton counties and all of the Michigan Counties. No additional summer surveys were required in areas where there have already been confirmed records of the Indiana bat. NEXUS will adhere to the seasonal clearing restrictions suggested by USFWS in areas with previously confirmed Indiana bat occupied habitat.

In response to USFWS's recommendation to perform surveys to identify any potential hibernacula or summer habitat for Indiana bat, NEXUS prepared a proposed survey plan following USFWS and ODNR Guidance. The approved survey methodology is described in the *Bat Survey Report for the NEXUS Gas Transmission Project* included as Appendix 3C. This survey plan was reviewed and approved by USFWS and ODNR. MDNR deferred to USFWS regarding the mist net survey protocols. Mist net surveys were initiated in Michigan on May 15, 2015 and surveys began after June 1 in Ohio as recommended by USFWS

and ODNR. Mist net surveys were completed on August 12, 2015, prior to survey window close to be consistent with agency guidance. Mist net surveys were completed at a total of 156 sites, and no Indiana bats were captured. NEXUS also conducted portal search surveys in areas identified through desktop analysis as high potential of portal presence. Factors such as previous mining extents, topographical conditions and current land use were used to identify portal search areas. To date, no portals have been found during search efforts, therefore, no portal surveys are required to assess potential hibernacula within the Project area. The *Bat Survey Report for the NEXUS Gas Transmission Project* is included as Appendix 3C for USFWS, ODNR and MDNR review.

NEXUS has avoided impacting greenfield forested areas to the extent practicable, this is evidenced by the 87 percent of the proposed Project route that is either co-located with existing utility corridor or located in active agricultural areas. Where possible, the proposed route has been designed to avoid isolated woodlots in areas with heavy agricultural land use. In several locations, the proposed pipeline has been routed away from existing utility corridors and into agricultural fields to avoid unnecessary impacts to forested areas. The routing, in conjunction with the seasonal clearing in confirmed occupied habitat, will prevent impacts to Indiana bats from the NEXUS Project.

Northern long-eared bat (Myotis septentrionalis)

The northern long-eared bat is a newly federally-listed threatened species and state-listed as threatened in Michigan and Ohio. Cumulative impacts of habitat destruction and white-nose syndrome placed this species under review for federal listing as a result of drastic population decline (USFWS, 2015b). The northern long-eared bat was historically found statewide in Ohio and Michigan with a range similar to that of the Indiana bat. The northern long-eared bat is similar to the Indiana bat in its use of caves and mines for hibernation. Unique to the northern long-eared bat, however, is the very high humidity associated with selected hibernaculum. After hibernation, both species are found in wooded or semi-wooded habitats for the duration of the summer months. The northern long-eared bat utilizes crevices and loose bark on trees for roosting, and it is believed to typically be less selective of roost trees than the Indiana bat (USFWS, 2015b).

NEXUS has considered impacts to both of Indiana bats and northern long-eared bats and their associated suitable habitat throughout the proposed Project. The USFWS indicated in correspondence with NEXUS (*see* agency correspondence in Resource Report 1, Appendix 1C2) that summer surveys are recommended for Wayne, Medina, Lorain, Erie, Sandusky, Wood, Lucas, and Fulton counties in Ohio and Lenawee, Monroe, and Washtenaw Counties in Michigan. Route adjustments led to additional survey in small portions of Henry County in Ohio and Wayne County in Michigan.

In response to USFWS's recommendation to perform surveys to identify any potential hibernacula or summer habitat for northern long-eared bat, NEXUS drafted a survey plan following USFWS and ODNR Guidance. MDNR deferred to USFWS in regards to the mist net survey protocols. The approved survey methodology is described in the *Bat Survey Report for the NEXUS Gas Transmission Project* included as Appendix 3C. This survey plan was reviewed and approved by the USFWS and ODNR. NEXUS conducted portal search surveys in areas identified through desktop analysis as high potential of portal presence. Factors such as previous mining extents, topographical conditions and current land use were used to identify portal search areas. To date, no portals have been found during search efforts, therefore no portal surveys are required to assess potential hibernacula within the Project area. Mist net surveys were initiated in Michigan on May 15, 2015 and began after June 1st in Ohio as recommended by the USFWS and ODNR. Mist net surveys were completed on August 12, 2015, before the survey window close to be consistent with all agency guidance. Mist net surveys were completed at a total of 156 sites. During the effort, four northern long-eared bats were captured and tagged. Telemetry efforts were successful in tracking three of the northern long-eared bats to roost trees. The *Bat Survey Report for the NEXUS Gas Transmission Project* is included as Appendix 3C for USFWS, ODNR and MDNR review.

NEXUS will apply 1.5-mile buffers around the confirmed northern long-eared bat roost trees and a 3-mile buffer around the capture site of the one northern long-eared bat that was not successfully tracked to a roost tree. NEXUS will clear trees between October 1 and March 31 to comply with the seasonal clearing restrictions outlined by USFWS within the occupied habitat buffer zones created based on 2015 field surveys, in addition to the previous capture zone identified by USFWS. NEXUS has adjusted the proposed pipeline route to avoid forested impacts along isolated woodlots, wherever practicable. The routing adjustments and the seasonal clearing restriction on occupied habitat will prevent impacts on the northern long-eared bat from the NEXUS Project.

3.5.1.4 Mussel Species

Northern riffleshell mussel (Epioblasma torulosa rangiana)

The northern riffleshell mussel species is considered a moderately sized mussel reaching 2 inches. The shell of the riffleshell is ovate to quadrate in shape and becomes thicker towards the anterior. The color of the shell can range from light greenish-yellow to an olive green, with narrow, dark, closed-spaced rays. The riffleshell is typically observed in well-oxygenated large streams or rivers with sand and coarse gravel. Fish hosts for the northern riffleshell are darters and sculpins (Watters et al., 2009). The northern riffleshell mussel has a historical record of occurrence in Macon Creek, a tributary of River Raisin, as well as occurrences in the Huron River in Michigan.

The northern riffleshell is federally-listed as endangered and is also listed as state endangered in Michigan. The USFWS identified this species as potentially occurring near the Project area in Michigan. Mussel surveys were completed in September 2015, including Macon Creek and the Huron River. No northern riffleshells were observed during the surveys, therefore no impacts to the species are expected. A copy of the survey report, *Ohio and Michigan Mussel Survey Report for the NEXUS Gas Transmission Project,* is included as Appendix 3D for USFWS review.

Rayed bean (Villosa fabalis)

The rayed bean is a small freshwater mussel about 1.5 inches long as an adult. The shell can be brown, green or yellow-greenish in coloration with wavy, dark-green lines. Sand or gravel and margins of water willow beds of headwater creeks and larger rivers make up the typical habitat of this species. The only published research identifies the Tippecanoe darter (*Etheostoma tippecanoe*) as a host fish for the rayed bean. Other rayed bean hosts are thought to include the greenside darter (*Etheostoma blennioides*), rainbow darter (*Etheostoma caeruleum*), mottled sculpin (*Cottus bairdi*), and largemouth bass (*Micropterus salmoides*) (USFWS, 2012b).

The rayed bean is currently federally-listed as endangered and also state-listed as endangered in both Ohio and Michigan. In Ohio, the rayed bean is known to occur in the Lake Erie basin including recent records in Swan Creek, which flows through Fulton and Lucas Counties, Ohio. Historically, it was widely distributed in the Sandusky River (Watters et al, 2009). In Michigan, the rayed bean mussel is known to occur in the Huron River and River Raisin.

In Ohio, NEXUS conducted mussel surveys in Swan Creek, Huron River and the Sandusky River between August and September 2015, and no live rayed bean were present within the Project corridor at these crossings. No impacts are anticipated to occur on the rayed bean where recent and historical records were within Swan Creek, Huron River and the Sandusky River. Surveys conducted in the Vermilion River indicated rayed bean occurred within the waterbody as shells were collected in the Project area; the Vermilion River is not historically known to harbor rayed bean therefore this finding indicates a new species record for this waterbody. The Vermilion River is proposed to be crossed using the HDD method; therefore, no impacts to rayed bean are anticipated.

Live individuals of the rayed bean were only present in one stream (in Michigan) surveyed in 2015. Surveys performed in the River Raisin documented live rayed bean individuals (eight) within the proposed Project corridor. The River Raisin is proposed for HDD and is currently being evaluated for hydrostatic testing

and water withdrawal feasibility. All standard protocols will be followed to prevent impacts to the mussel species during hydrostatic test water withdrawal as described in Section 3.2.6. Through crossing method selection and adherence to proper construction procedures, no impacts are expected to occur to the rayed bean. A copy of the survey report, *Ohio and Michigan Mussel Survey Report for the NEXUS Gas Transmission Project*, is included as Appendix 3D for USFWS review.

Snuffbox mussel (Epioblasma triquetra)

The snuffbox mussel is a thick-shelled and triangular shaped species that is about 2 inches in length, with males typically larger than females. Coloration is light yellowish with numerous dark-green rays that are broken intermediately. This mussel tends to inhabit small to medium sized rivers but can be found in larger waterbodies. The snuffbox mussel is associated with flowing waters with sand, gravel and cobble substrates. Juvenile snuffbox have successfully transformed on logperch (*Percina caprodes*), blackside darter (*Percina maculata*), rainbow darter, Iowa darter (*Etheostoma exile*), blackspotted topminnow (*Fundulus olivaceous*), mottled sculpin, largemouth bass, and brook stickleback (*Culaea inconstans*) in laboratory tests (USFWS, 2012b).

The snuffbox mussel is federally-listed as endangered and state-listed as endangered in Ohio and Michigan. The USFWS identified this species as potentially occurring in the Huron River near the Project area in Michigan. Surveys were completed in September 2015. No snuffbox or snuffbox habitat was observed during any of the surveys, including the Huron River, therefore no impacts to the species are expected. A copy of the survey report, *Ohio and Michigan Mussel Survey Report for the NEXUS Gas Transmission Project*, is included as Appendix 3D for USFWS review.

3.5.1.5 Plant Species

Eastern prairie fringed orchid (Platanthera leucophaea)

The eastern prairie fringed orchid is a perennial, upright, leafy stem plant that ranges from 8 to 40 inches in height. This plant has three to 8-inch lance-shaped leaves with one single flower cluster called an inflorescence. More specifically, the single flower spike is comprised of anywhere from five to forty creamy white flowers. The eastern prairie fringed orchid is primarily located in sandy or peaty lakeshores or bogs. The orchid thrives in low competition, grass and sedge dominated communities, where natural processes, such as seasonal flooding or disturbance, maintains the early successional stages (Penskar, 2000).

The eastern prairie fringed orchid is listed as federally-threatened under the ESA, endangered in the State of Michigan and threatened in the State of Ohio. Within the scope of the proposed Project, previous records place the orchid in Wayne and Sandusky Counties in Ohio and Monroe and Washtenaw Counties in Michigan. Eastern prairie fringed orchid surveys were completed in all areas identified as potential habitat along the proposed pipeline route. The *Eastern Prairie Fringed Orchid Survey Protocol for the NEXUS Gas Transmission Project*, included as Appendix 3E, details the habitat assessment and meander survey protocols for the eastern prairie fringed orchid. No individuals were located within the Project area, therefore no impacts are expected.

Lakeside daisy (Hymenoxys herbacea)

Lakeside daisies are clump-forming perennial plants that produce solitary, daisy-like flowers on stout, hairy stalks. During the flowering period, the stalk range from 10 to 40 cm in height. The daisies have narrow leaves ranging approximately 16 cm in length. The flowering plants of Lakeside daisy are rarely misidentified with other species, in-part due to the flowering period (MNFI, 2007). The Lakeside daisy inhabits rocky, dry prairies over limestone along the Great Lakes in the U.S. and Canada (USFWS, 2015c).

The Lakeside daisy is listed as federally-threatened under the ESA, and state-listed as endangered in Michigan and Ohio. Within the scope of the proposed Project, there are records of individuals in Erie County, Ohio but no records near the Project in Michigan. The Project size, location and type allowed USFWS to conclude that no impacts are anticipated to the Lakeside daisy (*see* Resource Report 1, Appendix

1C2). Furthermore, botanical surveys were conducted throughout the proposed Project and no individuals were identified. Through agency consultation and survey efforts, impacts to Lakeside daisies are not expected as a result of the NEXUS Project. The *Botanical Survey and Floristic Quality Assessment Index Report for the NEXUS Gas Transmission Project* is included as Appendix 3A.

Northern monkshood (Aconitum noveboracense)

The northern monkshood has very distinctive, blue hood-shaped flowers that are approximately 1 inch in length with a single stem may have many flowers. Stems range from about 1 to 4 feet in length. The leaves are broad with coarse, toothed lobes. They are typically found on shaded to partially shaded cliffs, algific talus slopes (cold air slopes created by fissures or sinkholes), or on cool, streamside sites. These areas have cool soil conditions, cold air drainage, or cold groundwater flowage that provide a unique environment to support the northern monkshood (USFWS, 2007).

The northern monkshood is listed as federally-threatened under the ESA, and state-listed as endangered in Ohio. Within the scope of the proposed Project, previous records place the monkshood in Summit County, however due to the Project size, location and type, USFWS does not anticipate impacts to the northern monkshood. Furthermore, botanical surveys were conducted throughout the proposed Project and no individuals were identified. Through agency consultation and survey efforts, impacts to northern monkshood are not expected as a result of the NEXUS Project. The *Botanical Survey and Floristic Quality Assessment Index Report for the NEXUS Gas Transmission Project* is included as Appendix 3A.

3.5.1.6 Reptile Species

Eastern massasauga (Sistrurus catenatus catenatus)

On September 30, 2015, the eastern massasauga was proposed as a threatened species by USFWS, previously the massasauga was listed as a federal candidate species since 1999. This species exists in disjunctive population segments near both wetland habitats and along forest edges in Michigan and Ohio (MNFI, 2007). The home range for this species varies for each individual population and is dependent on habitat quality. Populations in southern Michigan and Ohio typically use shallow, sedge or grass dominated wetlands, while those in northern Michigan prefer lowland coniferous forests. This species also requires sunny areas with scattered shade to exist with thermoregulation, so it will avoid heavily wooded or closed canopy areas. It is typical for the massasauga to hibernate from the end of October through April in the hummocked wetland landscapes and move to drier upland areas along fields and old wood edges for hunting purposes in the summer months (NYSDEC, 2015). It is also common in very warm months for the massasauga to become more active in mornings and evenings (USFWS, 2014b).

NEXUS performed a habitat analysis by a qualified herpetologist in June 2015 to determine if any suitable habitat for eastern massasauga rattlesnake will be impacted by the Michigan portion of the proposed Project. Ten sites were identified through desktop review as potential habitat and two sites were confirmed as suitable massasauga habitat during field habitat surveys. Fall season presence/absence surveys were conducted at the two sites with confirmed suitable habitat, and no individuals were observed. Survey efforts will continue during spring emergence at both locations. The *Eastern Massasauga Habitat Assessment and Survey Protocols for the NEXUS Gas Transmission Project*, included as Appendix 3F, describes the habitat assessment and survey protocol for the eastern massasauga.

3.5.2 Ohio State Threatened and Endangered Species

3.5.2.1 Amphibian Species

Blue-spotted salamander (Ambystoma laterale)

The blue-spotted salamander can be identified by its unique blue flecks that appear along its bluish-black body. This salamander typically grows between 4 to 6 inches in length and is associated with damp forested habitats with sandy soils. Blue-spotted salamanders will, however, utilize wet prairies and vernal pools for breeding. Nighttime breeding calls for migrations to these vernal pools can be heard during or after rainfall

in the late winter. Courtship, mating, and egg laying all will occur underwater. Eggs are attached singly or in small clusters to leaves and twigs, or are scattered along pond bottoms. The larvae hatch 3 to 4 weeks later and feed on aquatic invertebrates until metamorphosis occurs. Throughout its life, this amphibian will feed on worms, snails, slugs, insects, centipedes, spiders, and other invertebrates (Lipps, 2005).

The blue-spotted salamander is currently a state-listed endangered species in Ohio. This salamander is believed to have historically inhabited two counties within the proposed Project route; Henry and Lucas Counties in Ohio (Lipps, 2005). The proposed Project does not cross the areas where blue-spotted salamanders have been identified. Consultation with ODNR confirms that due to the location of the NEXUS Project, no adverse impacts to this species are anticipated (*see* Resource Report 1, Appendix 1C2).

Eastern hellbender (Cryptobranchus alleganiensis alleganiensis)

The eastern hellbender is currently state-listed as endangered in Ohio and occurs in areas of the Ohio River drainage in the eastern and southern portions of the state. This salamander is black, grayish or olive brown in color and has been documented at lengths up to 27 inches. However, lengths more commonly range between 11.5 and 20 inches (ODNR, 2012b). These amphibians are adapted to flourish in swift flowing stream environments, given their flat heads and bodies, short legs, small eyes and long rudderlike tails (Lipps, 2005). The hellbender possesses loose flaps of skin that run along the sides of the salamander's body to serve as a respiratory function. This characteristic also correlates to the salamanders need for cool and very clean, dissolved oxygen rich waters (Gottlieb, 1991). In addition to dissolved oxygen rich waters, these amphibians require a system that supports an abundance of crayfish, snails, minnows, insects, and worms. Recent population decline has been attributed to damming, pollution and sedimentation of streams and rivers (Lipps, 2005). Additional causes of population decline have been linked to decreasing numbers of successful reproduction.

NEXUS had a state approved herpetologist conduct a desktop analysis of potential habitat for the eastern hellbender and it was determined that populations could exist in the Tuscarawas River, provided that suitable habitat was within the Project area. Eastern hellbenders spend the majority of their time beneath large rocks, therefore they require rocky substrate with minimal amount of siltation. Surveys to determine if this species inhabits the section of the River crossed by the proposed Project were completed in the summer of 2015, the substrate of the Tuscarawas River was assessed during the mussel surveys. The river bottom was mainly composed of sand and silt, showing signs of high silt embeddedness, therefore it was determined that suitable habitat is not present within the Project area. Additionally, NEXUS plans to HDD the Tuscarawas River. No impacts to eastern hellbender populations are expected due to the NEXUS Project.

3.5.2.2 Avian Species

American bittern (Botaurus lentiginosus)

The American bittern is a species of heron described as a medium-sized, stocky, well-camouflaged, brown and tan colored bird with white stripes. This bird ranges between 24 and 33 inches in height and has a thick neck and bill. Nesting activity in Ohio begins in May and the eggs can be found from mid-May to mid-June. The bittern likes to keep hidden and often builds nests from dead vegetation over shallow waters. These birds require very large and undisturbed wetlands with thick vegetative cover and prefer scattered pools. The bittern primarily feeds on inspects, amphibians, and crayfish, but will also hunt smaller fish and mammals; all of which are abundant in wetland habitats (ODNR, 2012b).

The American bittern is currently a state-listed endangered species in Ohio. Historically, sightings of the bittern have been recorded in Lucas, Sandusky, and Summit Counties, Ohio. Utilizing information from agency consultation, desktop habitat assessment and field surveys, the NEXUS Project has been routed to avoid impacts to large, undisturbed wetland areas to the extent practicable. Through avoidance and compliance with construction timing restrictions, the NEXUS Project is not expected to impact the American bittern.

Barn owl (Tyto alba)

Barn owls have ear tufts, long legs, bright yellow eyes and light tan coloration on its upper sides and a white underside. Adult barn owls can reach 13 to 14 inches long, typically weigh 14 to 25 ounces, and have a wingspan of 3.5 to 4 feet (ODNR, 2012b). Due to the extensive farming of Ohio, there is little open grassland habitat available for the owl to hunt over. The decrease in grassland also decreases the number of meadow voles, which is the primary meal for these predators. Barn owls will use old buildings, barns, or chimneys for nesting, when a hollow tree is unavailable (Marti et al., 2005).

The barn owl is currently listed as a threatened species in Ohio. Consultation with ODNR has identified records of barn owls within 1 mile of the proposed Project. NEXUS will follow ODNR recommendations to prevent impacts to the barn owl by avoiding barns, silos and abandoned structures in areas with documented records of the owl, therefore no impacts to the barn owl are anticipated.

Black tern (Chlidonias niger)

The black tern is a small, dark tern that changes coloration between seasons (Dunn, 1995). During breeding season the black tern has dark feathers than the normal lighter gray coloration in the fall. Compared to other terns, the black tern has a shorter tail with a smaller fork. The tern's bill is very sharp and slender used for catching insects and sometimes fish. The black tern prefers large, undisturbed inland marshes. These marshes must possess fairly thick or dense vegetation with large areas of open water. The tern nests on floating mats of various kinds of marsh vegetation, but cattail marshes are generally favored (ODNR, 2012b).

This species is currently listed as state endangered in Ohio. Within the scope of the proposed Project, the black tern has records within Lucas, Erie, and Sandusky Counties of Ohio. Utilizing information from agency consultation, desktop habitat assessment and field surveys, the NEXUS Project has been routed to avoid impacts to large, undisturbed wetland areas to the extent practicable. Through avoidance and compliance with construction timing restrictions, the NEXUS Project is not expected to impact the black tern.

Common tern (Sterna hirundo)

The common tern has a light gray body with dark wing tips and has a white head with a black cap. The black-tipped, red-orange bill sets this bird apart from other similar terns. For their nesting sites, common terns prefer natural or man-made islands that are free of mammalian predators and human disturbance. They will also use mainland beaches and dredge disposal areas, but only when islands are unavailable. The common tern nests in colonies and will lay eggs in sandy depressions. The common tern is currently a state-listed endangered species in Ohio. This bird is a rare summer resident and an uncommon migrant in the region. The tern historically utilized areas all along Lake Erie but is now limited to the western basin of Lake Erie (ODNR, 2012b).

This species is currently listed as state endangered in Ohio. The range for this species is typically limited to the shores of Lake Erie, and therefore, is not expected within the Project area. The proposed NEXUS pipeline crosses underneath Missionary Island State Wildlife Preserve, an island within the Maumee River. The island is within the range of the common tern and could be used as a nesting location. This location is proposed to be crossed utilizing HDD construction methods, therefore no disturbance is expected to impact the island. Through avoidance and crossing method selection, the NEXUS Project is not expected to impact the common tern.

King rail (Rallus elegans)

The king rail is a large rail species that is between 15 and 19 inches long with a wingspan of 21 to 24 inches length. This bird has a rusty colored head, neck, shoulders, and belly. The flanks are barred with black and white (Meanley, 1992). These rails are found in many freshwater wetland habitat types, but most typically

are associated with dense confines of cattails and other thick marsh vegetation. The main reason for population decline is the destruction of these freshwater wetland ecosystems (ODNR, 2012b).

The king rail is currently a state-listed endangered species in Ohio. This bird has been documented in Lucas and Sandusky Counties. Utilizing information from agency consultation, desktop habitat assessment and field surveys, the NEXUS Project has been routed to avoid impacts to large, undisturbed wetland areas to the extent practicable. Through avoidance and compliance with construction timing restrictions, the NEXUS Project is not expected to impact the king rail.

Lark sparrow (Chondestes grammacus)

The lark sparrow has a long tail with white triangles at the corners, an alternating brown, white, and black pattern on the head, and a white breast with a black dot in the center. This sparrow nests in grassland habitats with scattered shrub layers, disturbed open areas, as well as patches of bare soil. In the Oak Openings area west of Toledo, lark sparrows may occupy open grass and shrubby fields along sandy beach ridges. They typically eat insects and seeds. These summer residents normally migrate out of Ohio shortly after their young fledge or leave the nest (ODNR, 2012b).

The lark sparrow is currently a state-listed endangered species in Ohio. This species has been documented within Fulton, Henry and Lucas Counties. The majority of the sandy areas within Fulton, Henry and Lucas Counties have been converted to active agriculture. Utilizing information from agency consultation, desktop habitat assessment and field surveys, the NEXUS Project has been routed to avoid undisturbed grasslands and meadows to the extent practicable. These areas were particularly avoided through the sensitive Oak Openings Region. Through avoidance and compliance with construction timing restrictions, the NEXUS Project is not expected to impact the lark sparrow.

Northern harrier (Circus cyaneus)

Northern harriers are slender, medium sized raptors with long wings and a long rounded tail. The male is mostly gray with black tipped wings and a white rump. The females and immature birds are mostly brown and streaked below. Harriers hunt low over grasslands, with wings held in a distinctive V-shape (MacWhirter and Bildstein, 1996). This is a common migrant and winter species; nesters are rare, although they occasionally breed in large marshes and grasslands. Harriers feed on small mammals and often nest in loose colonies. The female builds a nest out of sticks on the ground, often on top of a mound. Breeding occurs from April through July.

The northern harrier is currently a state-listed endangered species in Ohio, with documented occurrences along Lake Erie in Wood County (ODNR, 2012b). The majority of historic grasslands in the region were drained and converted to agricultural land use. Utilizing information from agency consultation, desktop habitat assessment and field surveys, the NEXUS Project has been routed to avoid any remaining large, undisturbed grasslands, marshes and meadows to the extent practicable. Through avoidance and compliance with construction timing restrictions, the NEXUS Project is not expected to impact the northern harrier.

Sandhill crane (Grus canadensis)

Sandhill cranes are wading herons that can be characterized by their long legs, necks, and bills. The crane ranges between 34 and 38 inches in height and has a six to seven-foot wingspan. The plumage of the adult sandhill crane is gray with a bald red skin patch on its forehead. Their eyes are yellow and their bill, legs, and feet are blackish. Immature sandhill cranes have a gray body with a brownish head and they lack the red skin patch. Peak breeding activity occurs in April and May. Sandhill cranes are primarily a wetland-dependent species. On their wintering grounds, they will utilize agricultural fields; however, they roost in shallow, standing water or moist bottomlands. On breeding grounds they require a rather large tract of wet meadow, shallow marsh, or bog for nesting (ONDR, 2012b).

The sandhill crane is a state-listed endangered species in Ohio. This species was identified by ODNR as potentially occurring within 1 mile of the Project area. The majority of wet meadows, shallow marshes and

bogs in the region were drained and converted to agricultural land use. Utilizing information from agency consultation, desktop habitat assessment and field surveys, the NEXUS Project has been routed to avoid impacts to large, undisturbed wetland areas to the extent practicable. Through avoidance and compliance with construction timing restrictions, the NEXUS Project is not expected to impact the sandhill crane.

Trumpeter swan (Cygnus buccinator)

Adult trumpeter swans have white plumage with a black bill and feet. The bill of a trumpeter swan may also have a red border on the lower jaw and has a seven foot wingspan. The long neck of the trumpeter swan is an adaptation that allows the bird to access food inaccessible to other species of waterfowl. The trumpeter can uproot plants in 4 feet of water. Trumpeter swans are year-round residents and prefer large marshes and lakes ranging in size from 40 to 150 acres. This swan also frequents areas with shallow wetlands with a diverse mix of plenty of emergent and submergent vegetation. The bulk of their diet consists of arrowhead, sage pondweed, wild celery tubers, and the stems and leaves of various plants. The swan will also occasionally feed on freshwater invertebrates, snails, worms, seeds, and grain (ODNR, 2012b).

The trumpeter swan is currently a state threatened species in Ohio and has most recent occurrences documented along Lake Erie in Sandusky County. Utilizing information from agency consultation, desktop habitat assessment and field surveys, the NEXUS Project has been routed to avoid impacts to large, undisturbed wetland areas to the extent practicable. NEXUS has not identified any deep open wetlands that would provide suitable habitat for the swan within the Project area. Through avoidance and compliance with construction timing restrictions, the NEXUS Project is not expected to impact the trumpeter swan.

Upland sandpiper (Bartramia longicauda)

The upland sandpiper has a long, slender neck and small head, is brown in color with a scaly-looking pattern on its upper feathers and barred appearance on its underside. The legs are long and yellowish. This bird breeds in grasslands, pastures, and unkempt agricultural land with a mosaic of old fields and crop lands, and sometimes the grassy expanses of airports (National Audubon Society, 2015). The sandpiper feeds on a wide variety of insects, including many grasshoppers, crickets, beetles and their larvae, moth caterpillars, and many others; also spiders, centipedes, earthworms, snails; and some seeds of grasses and weeds, and waste grain in fields. Nest site is on ground among dense grass, typically well hidden, with grass arched above it (ODNR, 2012b).

The upland sandpiper is currently listed as endangered in Ohio. This species has been documented in Erie, Lorain, Sandusky and Wood Counties. This species was identified by ODNR as potentially occurring within 1 mile of the proposed Project area. The majority of historic grasslands in the region were drained and converted to agricultural land use. The NEXUS Project does cross several pastures, however livestock disturbances keep the grasses low and not suitable for upland sandpiper nesting. Utilizing information from agency consultation, desktop habitat assessment and field surveys, the NEXUS Project has been routed to avoid any remaining large, undisturbed grasslands, marshes and meadows to the extent practicable. Through avoidance and compliance with construction timing restrictions, the NEXUS Project is not expected to impact the upland sandpiper.

3.5.2.3 Fish Species

Bigmouth shiner (Notropis dorsalis)

The bigmouth shiner belongs to the minnow and carp family (*Cyprinidae*) and they typically range from 2 to 3 inches. Bigmouth shiners have a large, horizontal mouth with the upper jaw extending farther than the lower one. The underside of the head appears flat and while the side of its head angles inward. This fish has a silver body that is darker on the back and lighter on the sides. Bigmouth shiners are found in pools where they swim in schools just above the sandy substrate. These fish prefer to eat various aquatic invertebrates, and terrestrial insects that fall in the water (ODNR, 2012b).

The bigmouth shiner is currently listed as a state threatened species in Ohio, primarily occurring within the Rocky and Black river drainages in Medina and Lorain Counties. ODNR has identified that the NEXUS Project is within the range of the bigmouth shiner. NEXUS has identified fisheries of concern that are proposed to be crossed by the project (*see* Table 3.2-3). All waterbodies identified as fisheries of concern are proposed to cross a utilizing either HDD, conventional bore or dry cut crossing methods (*see* Table 2.3-2 of Resource Report 2). Through selection of crossing methods and ongoing consultation with ODNR, no impacts to the bigmouth shiner are expected.

Channel darter (Percina copelandi)

The channel darter is described as a small, slender fish with yellowish-olive colored scales with a brown outline. In addition to the unique brown outline of its scales, this fish typically ranges from 1 to 3 inches in length and has 10 to 15 dark blotches along its sides. These blotches allow for proper identification from other darters. The channel darter has solid dashes on its sides, as opposed to the "w" or "x" shaped marks on other species. The darter is a bottom-dwelling species of fish, preferring habitats with large, coarse sand or fine gravel bars in large rivers or along lake shores. It is believed this fish migrate to waters of at least 3 feet in depth during the day and move back to shallow waters at night. Impounding of rivers and the introduction of non-native species in Lake Erie have led to a significant decline of known fish populations throughout Ohio (ODNR, 2012b).

The channel darter is a state threatened species in Ohio and within the scope of the proposed Project, may have remnant populations in the lower Sandusky and Maumee rivers. Both of the Sandusky and Maumee Rivers will be crossed by the Project utilizing HDD methods (*see* Table 2.3-3 of Resource Report 2). Through selection of crossing methods and ongoing consultation with ODNR, no impacts to the channel darter are expected.

Greater redhorse (Moxostoma valenciennesi)

The greater redhorse has a relatively large rounded head, small eyes, and a bright red tail. Adults typically grow between 18 to 24 inches in length, but can reach 30 inches. They usually weigh 2 to 5 pounds, but can reach 10 pounds. The greater redhorse can be found in medium to large rivers in the Lake Erie drainage system of Ohio. They are typically found in pools with a clean sand or gravel substrate. They are very intolerant of pollution and turbid (murky) water and are an indicator of good water quality. Their diet is made up of larval insects, snails, small mollusks, and other aquatic invertebrates (ODNR, 2012b). The greater redhorse is the rarest of the seven species of redhorse suckers found in Ohio. This fish is a large bottom-feeder that is often mistaken for carp. However, unlike carp, these fish are indicators of a healthy river system and are native to the Ohio River.

The greater redhorse is listed as a threatened species in Ohio and had been documented within Lucas and Sandusky Counties. Within the scope of the proposed Project the redhorse sucker is only found in portions of the Maumee and Sandusky River systems (ODNR, 2012b). Both of the Sandusky and Maumee Rivers will be crossed by the Project utilizing HDD methods (*see* Table 2.3-3 of Resource Report 2). Additionally, all other waterbodies identified as fisheries of concern are proposed to cross a utilizing either HDD, conventional bore or dry cut crossing methods (*see* Table 2.3-2 of Resource Report 2). Through selection of crossing methods and ongoing consultation with ODNR, no impacts to the greater redhorse are expected.

Iowa darter (Etheostoma exile)

This darter has a long, slender body shape and a very short, blunt snout. This fish is are typically 1.5 to 3 inches in length. They can also be identified by the 9 to 12 dark, square blotches along their sides. These spots are blue on breeding males and often less distinct or absent on females. Iowa darters have a light brown back and a white or cream colored belly and throat. In Ohio, the darters are primarily found in glacially formed natural lakes, often referred to as pothole or kettle lakes with very clear water and an abundance of aquatic vegetation. They feed on insect larvae, crustaceans, and other aquatic invertebrates (ODNR, 2012b).

The Iowa darter is listed as endangered in the state of Ohio and has documented occurrences in Stark and Summit Counties. The proposed Project does cross two identified natural areas that may be kettle lakes near the Portage Lakes that may have potential habitat for the Iowa Darter. NEXUS is proposing for both areas to be crossed utilizing HDD methods. Through selection of crossing methods and ongoing coordination with ODNR, no impacts for the Iowa darter are expected.

Lake chubsucker (Erimyzon sucetta)

The chubsucker is a small species of sucker fish, typically 6 to 10 inches long, with a dark, golden bronze colored back and upper sides with a light colored belly. The edges of their scales have dark margins giving them a cross hatched appearance over much of their body. Young chubsuckers have a distinct black stripe down their side and are often mistaken as small minnows. They are found in natural lakes and very sluggish streams or marshes with dense aquatic vegetation and clear waters. In Ohio they are primarily found in glacially formed natural lakes that have very clear water and an abundance of aquatic vegetation. They feed on various aquatic invertebrates (ODNR, 2012b).

The lake chubsucker is currently listed as a state threatened species in Ohio. This fish has documented occurrences in Wayne and Summit County. Near the Portage Lakes, the proposed Project crosses two natural areas that have characteristics of natural kettle lakes which may have potential habitat for the lake chubsucker. NEXUS is proposing for both areas to be crossed utilizing HDD methods. Through selection of crossing methods and ongoing coordination with ODNR, no impacts for the lake chubsucker are expected.

Lake sturgeon (Acipenser fulvescens)

The lake sturgeon has no scales and the skin is very coarse, instead this fish has numerous body plates on its back, sides, and belly. The mouth is located on the underside of the snout and is an extendible tube-like structure. It usually measures 4 to 6 feet in length (sometimes up to 8 feet), and it typically weighs 50 to 100 pounds (can reach over 300 pounds). These fish will stir up mud and silt on the river and lake bottom when searching for mussels and snails to eat. The sturgeon will also eat a wide variety of invertebrates, some fish, and some plant material. The lake sturgeon requires large bodies of water with connections to much smaller streams for spawning. They were historically very abundant in both the Ohio River and Lake Erie and would make spawning runs far up tributaries of both of these. Today there are still small numbers of them present in Lake Erie but none have been found in the Ohio River since 1971 (ODNR, 2012b).

The lake sturgeon is state-listed as endangered in Ohio. Large rivers that could support the sturgeon within the Project area are proposed to be crossed using the HDD crossing method. Through selection of crossing methods and ongoing coordination with ODNR, no impacts for the lake sturgeon are expected.

Pugnose minnow (Opsopoeodus emiliae)

Pugnose minnows are small fish typically ranging between 1 to 2 inches in length, but sometimes reaching up to 2.5 inches. Adults have a generally dark pigmentation, with a small "window" that lacks any dark pigment in the center of their dorsal fin. They have a thin dusky stripe down their side running from the tip of their snout across the eyes and extending to the tail. It is the only minnow in Ohio with nine dorsal fin rays. The minnow prefers high quality, clear water with aquatic vegetation and organic debris or sand based substrate. Historically they were found in slow moving streams and rivers of Northwest Ohio. They were also found in several glacial lakes around the state and in the mashes and bays of Lake Erie. Today there are very few of these fish left in the state (ODNR, 2012b).

The pugnose minnow is considered a state endangered species, on the verge of extirpation in Ohio. The majority of the waterbodies crossed by the proposed Project are impaired by current and historical land use with various pollutants, sedimentation and excess nutrients (*see* Table 2.3-7 for the impaired waterbodies crossing table). The pugnose minnow is extremely rare and would be found in high quality, clear waterbodies which are unlikely to be crossed by the proposed Project. NEXUS has identified fisheries of concern that are proposed to be crossed by the project (*see* Table 3.2-3). All waterbodies identified as

fisheries of concern are proposed to cross a utilizing either HDD, conventional bore or dry cut crossing methods (*see* Table 2.3-2 of Resource Report 2). Through assessment of waterbody impairments, selection of crossing methods and ongoing consultation with ODNR, no impacts to the pugnose minnow are expected.

Spotted gar (Lepisosteus oculatus)

The spotted gar has very strong, diamond shaped scales with many spots on its body and fins. These spots make this particular species of gar seem darker colored than other gar species. The mouth is filled with sharp needle-like teeth, which allows it to prey on smaller fish species. They are typically 20 to 30 inches long and 2 to 4 pounds. Spotted gar are found in clear waters with profuse amounts of aquatic vegetation in natural lakes, backwaters of larger rivers, and large permanent swamps or marshes. In Ohio this species has only ever been found in Lake Erie where it was once relatively common in marshes and bays. Today it has become a very rare species there and very few individuals have been found in recent years (ONDR, 2012b).

The spotted gar is a state-listed endangered species in Ohio. The proposed NEXUS pipeline has been routed to avoid large permanent swamps and marshes. The pipeline runs parallel to Lake Erie, mainly Sandusky and Erie County, but is not closer than 3 miles from the shoreline. No large wetland complexes crossed by the proposed Project are within the range closest to Lake Erie. NEXUS is proposing to cross all large rivers that drain directly to Lake Erie utilizing HDD methods. Through route avoidance, selection of crossing methods and ongoing consultation with ODNR, no impacts to the spotted gar are expected.

Western banded killifish (Fundulus diaphanus menona)

The native Western banded killifish is 1.5 to 2.5 inches in length and has 12 to 15 vertical bands along its side. These bands are a silvery blue color on breeding males, and are dark vertical lines on females and non-breeding males. Western banded killifish are found in areas with an abundance of rooted aquatic vegetation, clear waters, and with substrates of clean sand or organic debris free of silt. This fish mostly eats insect larvae such as mosquito and midge fly, zooplankton, and other invertebrates. They were historically found in natural glacial lakes and slow moving streams in the northern part of the state and in the bays and mashes along the Lake Erie shoreline (ODNR, 2012b).

This species is currently limited to the western portion of the state and is listed as state endangered in Ohio. The killifish can be still be found in some tributaries of the Portage River in Wood County (ODNR, 2012b). NEXUS has identified fisheries of concern that are proposed to be crossed by the project (*see* Table 3.2-3). All waterbodies identified as fisheries of concern are proposed to be crossed using the HDD, conventional bore, or dry cut crossing methods (*see* Table 2.3-2 of Resource Report 2). The proposed Project crosses the Portage River and its tributaries within Sandusky County. The tributaries to Portage Creek that are crossed by the Project have been classified as intermittent or ephemeral, and NEXUS is proposing to cross the Portage River using HDD crossing method. Through selection of crossing methods and ongoing consultation with ODNR, no impacts to the western banded killifish are expected.

3.5.2.4 Insect Species

Canada darner (Aeshna canadensis)

The Canada darner is a blue and brown colored dragonfly, with the males typically brighter in color than the females. The darner reaches approximately one and a half centimeters in length. This species inhabits both terrestrial and freshwater environments, including bogs, beaver ponds, lakes and other freshwater areas with an abundance of forest vegetation types surrounding the wetlands. They will utilize the forested areas for both feeding and breeding, especially forest edges and small clearings. Generally, these dragonflies aggregate around wet areas that are shallow with floating vegetation (Yoon, 2012).

This species of dragonfly is currently state-listed as threatened and has documented occurrences in Lucas County in high quality wetlands. NEXUS has routed the proposed pipeline to the extent practicable to avoid

high quality, large wetland complexes. The majority of the land use crossed by the Project is agriculture. The emergent and scrub-shrub wetland areas that are proposed to be impacted will have temporary reduction in habitat during construction, but will be allowed to restore to previous function. Through avoidance of wetland communities, particularly with open ponded areas, and consultation with ODNR no permanent impacts are expected to the Canada darner.

Chalk-fronted corporal (Ladona julia)

This dragonfly is medium in size, with a length of just over 1 inch. The wings are clear except for a patch of brown at their bases. Both mature males and females have a powdery-appearing coating on the thorax and the first part of the abdomen. In males this coating is bluish white and on the females it is grayish. The rest of the abdomen is blackish brown, possibly fading to orange brown along each side. The dragonfly is typically found in natural bogs, large open swamps, lakes and slow streams. This species also prefers acidic waters, which is uncharacteristic of most dragonflies (Dunkle, 2000).

The chalk-fronted corporal is a state threatened dragonfly with known occurrences in Summit County. NEXUS has routed the proposed pipeline to the extent practicable to avoid high quality, large wetland complexes. The majority of the land use crossed by the proposed Project is agriculture. The emergent and scrub-shrub wetland areas that are proposed to be impacted will have temporary reduction in habitat during construction, but will be allowed to restore to previous function. Through avoidance of wetland communities, temporary habitat disturbances, and consultation with ODNR no permanent impacts are expected to the chalk-fronted corporal.

Elfin skimmer (Nannothemis bella)

The elfin skimmer is the smallest dragonfly species in the North America, averaging only ¾ of an inch long. The elfin skimmer is black and yellow with males being covered in a powdery coat of frosty blue while the females are mainly yellow. This dragonfly has a white face and a very slender abdomen. One other distinguishable trait are their clear wings. Habitat for this dragonfly is primarily stagnant pools in marshy places, such as bogs. Skimmers are weak flyers and therefore never fly over open water. Elfin skimmers diet consists only of insects (McShaffrey and Glotzhober, 2007).

Elfin skimmer dragonflies are considered state endangered with only three records in Ohio, one of these which is the Singer Lake Bog Preserve in Summit County. The NEXUS Project does not cross the Singer Lake Bog Preserve. NEXUS has avoided impacts on the large wetland complexes and bogs where practicable. The emergent and scrub-shrub wetland areas that are proposed to be impacted will have temporary reduction in habitat, but will be allowed to restore to previous function post-construction. Through avoidance of wetland communities specifically within Singer Lake Bog Preserve, temporary habitat disturbances, and consultation with ODNR no permanent impacts are expected to the elfin skimmer.

Frosted elfin (Incisalia irue)

The frosted elfin is best identified by its coloration; a frosted or gray ventral hindwing and a brown streaked upper side. This butterfly has a short tail on the hindwing and a dark spot above the tail, at the base of the hindwing. The frosted elfin wing span is typically 1 inch in length. The flight season for this species is May and June. The frosted elfin only inhabits oak savannas with blue lupine, the butterflies host species (ODNR, 2012b).

The frosted elfin is currently listed as state endangered in the Ohio and only exists in Lucas County. Similar to other endangered butterflies, conservation efforts have increased stands of its larval host, wild lupine. NEXUS routed the pipeline to avoid rare community types within the Oak Openings Region (*see* Section 3.3.2.1). NEXUS completed botanical surveys and confirmed that neither oak savanna nor the associated wild lupine is located within the proposed Project. Through avoidance of oak savanna communities and consultation with ODNR, no impacts on the frosted elfin are expected to occur.

Marsh bluet (Enallagma ebrium)

The marsh bluet is a small damselfly ranging from about 1 to 1.5 inches in length. The males are predominately blue on the sides of the abdomen while females are typically a greenish-yellow to brown abdomen. This damselfly occurs at lakeshores, vegetated ponds, and marshes. They are typically not found in acidic conditions (Wisconsin Odonata Survey, 2015).

The marsh bluet is a state threatened damselfly in Ohio, with records in Summit County. NEXUS has routed the proposed pipeline to the extent practicable to avoid high quality, large wetland complexes. The majority of the land use crossed by the proposed Project is agriculture. The emergent and scrub-shrub wetland areas that are proposed to be impacted will have temporary reduction in habitat during construction, but will be allowed to restore to previous function post-construction. Through avoidance of wetland communities, temporary habitat disturbances, and consultation with ODNR no permanent impacts are expected to the marsh bluet.

Persius duskywing (Erynnis persius)

The persius duskywing is a small butterfly with wing lengths less than 1 inch. This particular species of butterfly can be identified by the characteristic straight row of white spots on the tip of the dorsal forewings. Adults rest on low vegetation with their wings held outstretched. This duskywing flies in May and June and inhabits oak savannas and blue lupine. The butterfly feeds on blue lupine, similar to many other butterflies currently protected in Ohio (ODNR, 2012b).

The persius duskywing is currently state-listed as endangered in Ohio. This species has two populations documented, both occurrences are in Lucas County. NEXUS has routed the pipeline to avoid rare community types within the Oak Openings Region (*see* Section 3.3.2.1). NEXUS completed botanical surveys and confirmed that neither oak savanna nor the associated wild lupine is located within the proposed Project. Through avoidance of oak savanna communities and consultation with ODNR, no impacts on the persius duskywing are expected to occur.

Plains clubtail (Gomphus externus)

The plains clubtail is a medium to large sized dragonfly, measured at just over 2 inches in length. A brownish black is the primary body color with a yellow head and stripes that run down each side of the thorax. The abdomen is also black with a line of yellow dashes along the top. This species has a large range across the central United States. Habitat supportive of this dragonfly throughout all areas of its range are typically large, slow flowing and muddy streams and rivers (Wisconsin Odonata Survey, 2015).

The plains clubtail is a state endangered dragonfly in Ohio with records in Erie County. The proposed Project pipeline does cross large, slow flowing rivers, including the Huron River in Erie County. NEXUS is proposing to cross the Huron River utilizing HDD methods, therefore no instream work is expected. Instream crossing methods may reduce habitat temporarily. Through selection of crossing methods and ongoing consultation with ODNR, no impacts to the plains clubtail are expected.

Purplish copper (Lycaena helloides)

The purplish copper is medium sized butterfly, typically 1.5 inches in length. The upper side of a male purplish copper is orange-brown with a purplish sheen. The females tend to be more orange. The hindwing of both sexes has a broad orange band at the margin. This species inhabits a variety of disturbed moist areas, such as fallow fields with poor drainage, sedge meadows, wet prairies, wet ditches and low, damp areas in cultivated fields. The purplish copper can be found scattered throughout the western half of the state, but it is most often encountered in northwestern Ohio (ODNR, 2012b).

ODNR lists this species as state endangered and based on documented records, may only occur in Lucas County. NEXUS has avoided crossing wetland where practicable, and the majority of the land use crossed by the proposed Project is agriculture. The emergent and scrub-shrub wetland areas that are proposed to be impacted will have temporary reduction in habitat during construction, but will be allowed to restore to

previous function post-construction. Through avoidance of wetland communities, temporary habitat disturbances, and consultation with ODNR no permanent impacts are expected to the purplish copper.

Racket-tailed emerald (Dorocordulia libera)

This dragonfly is a small, hairy species with a distinctive swollen club-like feature at the end of its abdomen. The racket-tailed emerald reaches about 1.5 inches in length and has a metallic green thorax with brown hairs, black legs, and clear wings. This species is fairly confined to bogs, ponds and lake edges (Wisconsin Odonata Survey, 2015).

The racket-tailed emerald is listed as a state endangered species in Ohio. Documented records for this species occur at Singer Lake Bog, in Summit County. The NEXUS Project does not cross the Singer Lake Bog Preserve. NEXUS has avoided impacts on the large wetland complexes and bogs where practicable. The emergent and scrub-shrub wetland areas that are proposed to be impacted will have temporary reduction in habitat, but will be allowed to restore to previous function post-construction. Through avoidance of wetland communities specifically within Singer Lake Bog Preserve, temporary habitat disturbances, and consultation with ODNR no permanent impacts are expected to the racket-tailed emerald.

3.5.2.5 Mammal Species

Black bear (Ursus americana)

The black bear has an extensive list of ecosystem types it can successfully inhabit. Black bears have been located in swamps and wetlands to dry upland coniferous or deciduous landscapes. Primarily, this species thrives in heavily wooded forests, although these habitats vary greatly in the other types of vegetative and wildlife species present. Black bear are nomadic mammals with a home range of up to 120 square miles. This species is most active early mornings and late evenings when feeding occurs. A variety of foods are suitable for this omnivorous species and often includes fruits and grasses, insects and meats. The bear's omnivorous diet allows them to grow in sizes up to 3 feet tall (at the shoulder when on all fours) and up to 700 pounds, although 300 pounds is a more average weight. Despite this large mammal's adaptable nature, suitable habitat has been significantly depleted in Ohio. Much of the eastern forested regions of the state have been cleared for agricultural purposes. In addition to eliminating the habitat, overhunting of this species has contributed to population decline. As a result, the black bear has been state-listed as an endangered species (ODNR, 2012b).

The black bear is state-listed as endangered in all counties of Ohio and may currently utilize areas within the Project corridor. As bears are a highly mobile species they are not expected to be impacted. During construction, black bears will likely avoid the Project area. Post-construction, black bears are anticipated to utilize the ROW during operation for foraging and as a travel corridor. No permanent impacts to black bears are expected due to the NEXUS Project.

3.5.2.6 Mussel Species

Black sandshell (Ligumia recta)

The black sandshell has an elongate shape and reaches up to 7 inches in length. This species is very elongate and is green with numerous broad continuous rays when young becoming progressively darker to almost black with age. This mussel primarily inhabits Lake Erie and the Lake Erie tributaries, in gravel and firm sand substrates (Watters et al., 2009).

The black sandshell is a state-listed threatened species in Ohio with occurrences in Erie, Lorain, and Lucas Counties. Survey for these mussels were recommended by the ODNR and were conducted between July 2015 and September 2015. One live black sandshell was observed in the Maumee River in Lucas County. The Maumee River is proposed for HDD; therefore, impacts to this species will be avoided. A copy of the survey report, *Ohio and Michigan Mussel Survey Report for the NEXUS Gas Transmission Project*, is included as Appendix 3D for ODNR review.

Eastern pondmussel (Ligumia nausta)

The eastern pondmussel has an elongate shape and reaches up to 4 inches in length. This species has a distinct posterior ridge and is typically tan to dark green in color becoming darker brown with age, and occasionally has fine green rays. This mussel primarily inhabits Lake Erie and the Lake Erie tributaries, and slow moving streams, lakes and ponds with sandy bottoms (Watters et al., 2009).

The eastern pondmussel is a state-listed endangered species in Ohio with occurrences in Erie, Lorain, Lucas, and Sandusky Counties. NEXUS conducted mussel surveys in September 2015. No live eastern pondmussels were observed in waterbodies surveyed in Erie, Lorain, Lucas, and Sandusky Counties. Shell material of the eastern pondmussel was observed in Muddy Creek in Sandusky County indicating the species historically occurred nearby. Muddy Creek is proposed for dry cut crossing method. Only one live mussel (commonly collected Wabash pigtoe) and shell of other common species were observed in Muddy Creek. Habitat was generally suitable for mussel colonization. Relocation surveys for Muddy Creek are scheduled to occur prior to construction; therefore, impacts to any eastern pondmussels present but not observed during the survey will be avoided. A copy of the survey report, *Ohio and Michigan Mussel Survey Report for the NEXUS Gas Transmission Project,* is included as Appendix 3D for ODNR review.

Fawnsfoot (Truncilla donaciformis)

The fawnsfoot is a small mussel rarely exceeding 2 inches. In appearance the shell is pale yellow, green, tan, or grey. The shell is most often with a characteristic pattern of dark green rays of varying widths; rays can be continuous, wavy, or in a chevron like pattern. This species is typically found in large rivers in compact sand or gravel (Watters et al., 2009).

The fawnsfoot is a state threatened mussel in Ohio with occurrences in Erie, Lucas, and Sandusky Counties. Mussel surveys were recommended by the ODNR and were undertaken in July and August 2015. One live individual was observed in the Sandusky River which is proposed for HDD crossing methods; therefore, no impacts to fawnsfoot are anticipated. A copy of the survey report, *Ohio and Michigan Mussel Survey Report for the NEXUS Gas Transmission Project,* is included as Appendix 3D for ODNR review.

Threehorn wartyback (Obliquaria reflexa)

The threehorn wartyback mussel is around 3 inches in length and a yellow, green or brown color. The inner shell is a pearly white color. The shell is moderately thick and rounded with three, sometimes four, horn-like bumps along the center of the shell. This species is typically found in large rivers and lakes in silty sand, gravel, or cobble (Watters et al., 2009).

The threehorn wartyback is a state threatened mussel in Ohio with occurrences in Erie, Lorain, Wood, Lucas, and Sandusky Counties. Mussel surveys were recommended by the ODNR and were undertaken in July and August 2015. One live individual was found in each of the Sandusky and the Maumee Rivers. Both of these waterbodies are proposed for HDD crossing methods, so no impacts to threehorn wartyback mussels are anticipated. A copy of the survey report, *Ohio and Michigan Mussel Survey Report for the NEXUS Gas Transmission Project,* is included as Appendix 3D for ODNR review.

3.5.2.7 Plant Species

ODNR identified three state-listed T&E plant species that may be within 1-mile of the Project area; eastern prairie fringed orchid, Lakeside daisy and northern monkshood. All three of these species are also federally-listed as threatened under the ESA. Table 3.5-1 describes the plant species within or adjacent to the proposed Project with potential suitable habitat. Botanical surveys were completed in areas identified as potential suitable habitat, and no Ohio state-listed plants were located within the Project area. The *Botanical Survey and Floristic Quality Assessment Index Report for the NEXUS Gas Transmission Project* is included as Appendix 3A. Through agency consultation with USFWS and ODNR, in addition to botanical survey efforts, impacts to state-listed plant species are not expected as a result of the NEXUS Project.

3.5.2.8 Reptile Species

Blanding's turtle (Emydoidea blandingi)

Blanding's turtle is a medium to large turtle with adult shell ranging from 6 to 11 inches in length. This turtle has a bright yellow chin and throat, and a very long neck. The upper part of the shell (carapace) is usually black and has yellow spots and streaks. The turtles head is also a darker shade with brown or yellow spots along it (Harding, 1997). This turtle inhabits clean, shallow waters that contain an abundance of aquatic vegetation. This species habitats are also associated with areas of soft muddy substrates. Therefore, this species is typically found in ponds, marshes, swamps, bogs, wet prairies, and river backwaters. The Blanding's turtle can also occur in slow-moving rivers, protected coves, lake shallows, and inlets. These turtles can inhabit upland ecosystems in the spring and summer during nesting and mating seasons (ODNR, 2012b).

In Ohio, Blanding's turtle is limited primarily to the northern counties along Lake Erie. This turtle is currently listed as threatened in Ohio and has documented occurrences in Erie, Fulton, Henry and Lorain Counties. The proposed NEXUS Project pipeline has been routed to avoid impacts to high quality wetland complexes to the extent practicable. The majority of the proposed route traverses agricultural land and open upland areas where potential suitable habitat for Blanding's turtles does not exist. In the few areas where suitable habitat may be present, the wetland data collected during ongoing field surveys is being evaluated to assess likelihood of habitat suitability. NEXUS is currently consulting with ODNR to determine the need for presence/absence surveys based on the wetland information and it's suitability for Blanding's turtle habitat as it becomes available from survey. Presence/absence surveys will be conducted during spring 2016 as deemed necessary through ODNR coordination.

Spotted turtle (Clemmys guttata)

The spotted turtle is a small turtle with lengths ranging from 3.5 to 5.5 inches. This turtle can be easily identified by the round yellow spots on its broad, smooth, black or brownish black carapace. Spots may fade in older individuals, and some individuals are spotless. This species inhabits clean, shallow, slow moving bodies of water with muddy or mucky bottoms and some aquatic and emergent vegetation (Ernst, 1976). Spotted turtles utilize a variety of shallow wetlands including shallow ponds, wet meadows, tamarack swamps, bogs, fens, sedge meadows, wet prairies, shallow cattail marshes, sphagnum seepages, small woodland streams and roadside ditches (ODNR, 2012b).

The spotted turtle is currently a state threatened species in Ohio. This turtle has been documented within Erie, Fulton, Lorain and Summit Counties. The proposed NEXUS Project pipeline has been routed to avoid impacts to high quality wetland complexes to the extent practicable. The majority of the proposed route traverses agricultural land and open upland areas where potential suitable habitat for spotted turtles does not exist. In the few areas where suitable habitat may be present, the wetland data collected during ongoing field surveys is being evaluated to assess likelihood of habitat suitability. NEXUS is currently consulting with ODNR to determine the need for presence/absence surveys based on the wetland information and the suitability for spotted turtle habitat as it becomes available from survey. Presence/absence surveys will be conducted during spring 2016 as deemed necessary through ODNR coordination.

3.5.3 Michigan Threatened and Endangered Species

3.5.3.1 Amphibian Species

Blanchard's cricket frog (Acris crepitans blanchardi)

The Blanchard's cricket frog inhabits ecosystems along edges of permanent ponds, bogs, lakes, and slow-moving streams or rivers. This species can also be seen on aquatic vegetation such as floating algae mats and water lily leaves, or along muddy or sandy shorelines. Cricket frogs prefer warmer temperatures and breed from mid to late May through July (Harding, 1997). This species feeds on a large variety of small

terrestrial and aquatic insects and other invertebrates. The frog will feed on shore, at the water's surface, or while submerged (Lee, 2000).

The Blanchard's cricket frog is a state threatened species which had been identified in regions near the proposed Project. Records from MNFI indicate that this species has been documented found near the Belleville Lake adjacent to the crossing of the proposed Project. The proposed NEXUS pipeline crosses the Huron River that connects Ford Lake and Belleville Lake. NEXUS is proposing to utilize HDD methods to cross the Huron River. NEXUS has routed the proposed pipeline to the extent practicable to avoid high quality, large wetland complexes and to cross waterbodies at the minimum crossing distances. Through avoidance of wetland communities, particularly with open ponded areas, in addition to crossing methods, no impacts are expected to the Blanchard's cricket frog.

3.5.3.2 Insect Species

Regal fritillary (Speyeria idalia)

The regal fritillary is a butterfly described by its wingspan 3 to 4 inches. The upper surface of the forewing is reddish orange with black and white spots. The hindwing is black with white spots in females and reddish sub marginal spots in males. The undersurface of the hindwing is blackish gray with white spots (not metallic silver). The caterpillar is velvety black with yellowish orange blotches and is covered with orange-based silver spines tipped in black. The species has been found in prairies or open environments frequently in sandy regions, including meadows, old fields, and floodplain forest openings and edges. The regal fritillary depends on host plants within southern wet meadows, oak barrens, mesic sand prairies or dry sand prairies (MNFI, 2007).

The regal fritillary is currently listed as state endangered butterfly in Michigan. Historical documentation lists this species as potentially occurring in Lenawee and Washtenaw Counties in Michigan. Botanical surveys were completed for the proposed Project and no community types required by the fritillary were located, therefore no impacts are expected.

3.5.3.3 Mammal Species

Evening bat (Nycticeius humeralis)

The evening bat is a dark brown fur covered mammal that reaches an average length of 3.5 inches, with both forearm and tail measuring about 1.5 inches. The wings, tail, muzzle and ears are thick with a leathery texture and black coloration. This bat is distinguished from other similar species by its rounded, forward curving tragus (skin flap at front of ear) and number of upper incisors. The evening bat forages above water and in forest clearings and edges for insects both high and low to the ground. Its flight pattern is slow and steady. This species can be found roosting in old and mature forests, frequently moving between large snags located near one another, and in spacious cavities during the maternity period (MNFI, 2007). Where such conditions are not available, evening bats will roost in wooden structures, such as attics and barns.

The evening bat is a state threatened species in Michigan. Mist net surveys were conducted between May 15 and August 15, 2015 to determine if evening bats are using forests in the Project survey area. In Michigan, a total of 40 survey blocks were identified with potential suitable habitat for bat roosts. Five sites were removed from survey because of lack of suitable roosting habitat, two sites had single trees and could not support mist-net surveys, and three were inaccessible. Mist-net surveys were completed on a total of 35 sites; and two evening bats were captured during these surveys. The two captured bats were tagged with transmitters, but neither bat was successfully tracked to a roost tree. The *Bat Survey Report for the NEXUS Gas Transmission Project* is included as Appendix 3C for MDNR review. Based on the capture locations, several pipeline route adjustments were made to avoid woodlots in Michigan. Consequently, the current proposed route avoids the large woodlots that were previously crossed in eight of the 35 surveyed bat sites. The majority of the wooded areas that remain within the proposed Project corridor are narrow wooded strips between agricultural fields and densely wooded corridors with thick understories surrounding small waterbodies. The forested areas that are proposed to be crossed are mainly successional, middle-aged

woodlots with low roost potential for evening bats. This may be supported by the inability to track the tagged evening bats to roost trees near the proposed Project. Impacts to suitable roost trees in the Project corridor has been minimized by avoidance and the early successional nature of the remaining woodlots crossed.

Least shrew (Cryptotis parva)

The least shrew is one of the smallest shrews inhabiting Michigan, with a body length averaging 3 inches and a short tail just under 1 inch long. Like many shrews, it has an elongated head, pointed nose, tiny eyes, and short grayish brown fur. The least shrew is found in dry upland meadows with dense coverage of grasses and forbs. This species can also be found in marshy areas, fencerows, and woodland edges. Nests are often found tucked under rocks, logs, discarded lumber, metal sheeting, and hay bales left in fields over winter (MNFI, 2007).

The least shrew is currently a state threatened species with occurrences documented in Washtenaw County, Michigan. According to the botanical surveys performed in Michigan, NEXUS does not cross any upland meadows that typically provide habitat for the least shrew. The Project may cross lower quality habitat for the least shrew, however the shrew is a highly mobile species that is expected to avoid the Project area during construction. Any impacts to the species will be temporary, as the construction area will be restored to original conditions.

3.5.3.4 Mussel Species

Black sandshell (Ligumia recta)

Species description and habitat of the black sandshell is described in Section 3.5.2.6 as it is also state-listed in Ohio. The black sandshell is a state-listed endangered species in Michigan with occurrences in Lenawee, Monroe, and Washtenaw Counties. Survey for mussels was recommended by the MDNR and were conducted in September 2015. No live black sandshell were observed in Michigan streams; one shell was observed in the River Raisin. The River Raisin is proposed for HDD; therefore no impacts to black sandshell are anticipated. A copy of the survey report, *Ohio and Michigan Mussel Survey Report for the NEXUS Gas Transmission Project*, is included as Appendix 3D for MDNR review.

Eastern pondmussel (Ligumia nausta)

Species description and habitat of the eastern pondmussel is described in Section 3.5.2.6 as it is also listed in Ohio. The eastern pondmussel is a state-listed endangered species in Michigan and is documented as occurring in Monroe County. Survey for mussels was recommended by the MDNR and were conducted in September 2015. No eastern pondmussels were observed in Michigan streams; therefore no impacts to eastern pondmussels are anticipated. A copy of the survey report, *Ohio and Michigan Mussel Survey Report for the NEXUS Gas Transmission Project*, is included as Appendix 3D for MDNR review.

Fawnsfoot (Truncilla donaciformis)

Species description and habitat of the fawnsfoot is described in Section 3.5.2.6 as it is also listed in Ohio. The fawnsfoot is a state-listed threatened species in Michigan and is documented as occurring in Monroe County. Survey for mussels was recommended by the MDNR and were conducted in September 2015. No fawnsfoot were observed in Michigan streams; therefore no impacts to fawnsfoot are anticipated. A copy of the survey report, *Ohio and Michigan Mussel Survey Report for the NEXUS Gas Transmission Project*, is included as Appendix 3D for MDNR review.

Hickorynut (Obovaria olivaria)

The hickorynut is described as having an egg shaped shell that is moderately thick and inflated. The average size is approximately 2 to 3 inches long, although individuals have been found up to 4 inches in length. This mussel is found along the margins of medium to large rivers and along lake shores. The round hickorynut generally is found in silt, sand, and gravel substrates in rivers or lakes (Watters et al., 2009).

The hickorynut is a state endangered mussel species in Michigan. This mussel has been documented within Monroe and Washtenaw Counties along the Project corridor. Surveys were conducted in September 2015 to determine if this species occurs in streams crossed by the proposed Project. No live individuals or shell material of hickorynut was observed during the survey effort; therefore, no impacts to round hickorynut are anticipated. A copy of the survey report, *Ohio and Michigan Mussel Survey Report for the NEXUS Gas Transmission Project*, is included as Appendix 3D for MDNR review.

Lilliput (Toxolasma parvus)

The lilliput is a small mussel, growing up to 2 inches in length with an inflated and oblong shell. The shell has a curved ventral margin with a beak sculpture composed of 4-6 ridges. The shell of the lilliput is yellowish-tan of green to brownish gray and the nacre is primarily white with light blue to purple iridescence (MNFI, 2007). The lilliput mainly occurs in small waterbodies, but can also be found in large rivers, lakes and impoundments (Watters et al., 2009). It is most often found in muddy or clay substrates.

This species of mussel is currently listed as endangered in Michigan. Within the scope of this Project, occurrences of the lilliput have been documented in Lenawee and Monroe Counties. Surveys were conducted in September 2015 to determine if this species occurs in streams crossed by the proposed Project. No live individuals or shell material of lilliput was observed during the survey effort; therefore, no impacts to lilliput are anticipated. A copy of the survey report, *Ohio and Michigan Mussel Survey Report for the NEXUS Gas Transmission Project*, is included as Appendix 3D for MDNR review.

Purple lilliput (Toxolasma lividus)

The purple lilliput is a small mussel, growing up to 1.5 inches in length with an inflated and oblong shell. The shell has a curved ventral margin with a beak sculpture composed of irregular concentric ridges. The shell of the purple lilliput is velvet like, yellowish-tan of green to brown and black in older individuals. The interior of the shell is dark purple (Watters et al., 2009). The purple lilliput mainly occurs in small creeks in compact sand or gravel substrates.

This species of mussel is currently listed as endangered in Michigan. Within the scope of this proposed Project, occurrences of the purple lilliput have been documented in Monroe County. Surveys were conducted in September 2015 to determine if this species occurs in streams crossed by the proposed Project. No live individuals or shell material of the purple lilliput were observed during the survey effort; therefore, no impacts to purple lilliput are anticipated. A copy of the survey report, *Ohio and Michigan Mussel Survey Report for the NEXUS Gas Transmission Project*, is included as Appendix 3D for MDNR review.

Purple wartyback (Cyclonaias tuberculata)

The wartyback has a rough circular outline with numerous bumps along the majority of the outside of its shell. These mussels are yellow-brown or green-brown in young individuals and change to a dark brown as they age. Nacre color ranges from white with a hint purple to deep purple. The shell is overall very thick and heavy (MNFI, 2007).The purple wartyback is found in medium to large rivers with gravel or mixed sand and gravel substrates (Cummings and Mayer, 1992). The species range is limited to eastern North America, and within Michigan, is generally found along Lake Erie tributaries.

The purple wartyback is a threatened mussel species in Michigan with occurrence records in Lenawee, Monroe, and Washtenaw Counties. Surveys were conducted in September 2015 to determine if this species occurs in streams crossed by the proposed Project. No live individuals or shell material of purple wartyback was observed during the survey effort; therefore, no impacts to purple wartyback are anticipated. A copy of the survey report, *Ohio and Michigan Mussel Survey Report for the NEXUS Gas Transmission Project*, is included as Appendix 3D for MDNR review.

Round hickorynut (Obovaria subrotunda)

The round hickorynut is described as a near perfectly circular shell, which is moderately thick and inflated. The average size has been documented as around 1 inch long, although individuals have been

found up to 2 inches in length. This mussel is found along the margins of medium to large rivers and along lake shores. The round hickorynut generally is found in sand and gravel substrates in areas with moderate flow (Carman, 2001).

The round hickorynut is a state endangered mussel species in Michigan. This mussel has been documented within Lenawee County and in Lake St. Clair and Lake Erie drainages (MNFI, 2007). Surveys were conducted in September 2015 to determine if this species occurs in streams crossed by the proposed Project. Shell material of the round hickorynut was observed in the River Raisin; no live round hickorynut were observed during the survey effort. The River Raisin is proposed for HDD crossing; therefore, no impacts to round hickorynut are anticipated. A copy of the survey report, *Ohio and Michigan Mussel Survey Report for the NEXUS Gas Transmission Project,* is included as Appendix 3D for MDNR review.

Salamander mussel (Simpsonaias ambigua)

The salamander mussel is a small thin shelled, elongated and broadly rounded mussel rarely exceeding 2 inches in length. The shell is somewhat inflated in shape. Shell color ranges from yellow, tan, to olive becoming brown to grey in older individuals (Watters et al., 2009). This mussel occurs in small to medium streams and is typically observe under large rocks. The host for the salamander mussel is the mudpuppy and is the only mussel that utilizes a salamander as its host (Watters et al., 2009)

The salamander mussel is listed as endangered in Michigan and has known occurrences in Lenawee and Monroe Counties. Surveys were conducted in September 2015 to determine if this species occurs in streams crossed by the proposed Project. No live individuals or shell material of salamander mussels were was observed during the survey effort; therefore, no impacts to salamander mussel are anticipated. A copy of the survey report, *Ohio and Michigan Mussel Survey Report for the NEXUS Gas Transmission Project,* is included as Appendix 3D for MDNR review.

Slippershell (Alasmidonta viridis)

The slippershell is a small mussel averaging around 1.5 inches long. The posterior end of the shell is square while the anterior end is rounded. The shell is generally smooth, except for growth lines. The exterior coloration of the shell is yellowish-brown and is marked with fine green rays (MNFI, 2007). In Michigan, this mussel could be confused with the elktoe, however, the elktoe has ribs on its posterior ridge. Similar to the other mussel species listed, the slippershell mussel is found in creeks and headwaters of rivers, but has also been reported in larger rivers and in lakes (Carman, 2002). Typically, this mussel usually occurs in sand or gravel substrate, but occasionally has been found in mud. Suitable habitat for fish host species must be present in order for slippershell mussel reproduction to be successful. The slippershell mussel has been referred to commonly as the brook wedge mussel and has been found in the Lake Michigan, Lake Huron, Lake St. Clair and Lake Erie drainages (MNFI, 2007).

The slippershell is a state threatened mussel species. This mussel is known to occur in Lenawee, Monroe, and Washtenaw Counties in Michigan. Surveys were conducted in September 2015 to determine if this species occurs in streams crossed by the proposed Project. Two live individuals were observed in Macon Creek which is proposed for dry cut crossing method. Impacts to slippershell will be avoided by conducting a relocation effort prior to construction within the Project area. A copy of the survey report, *Ohio and Michigan Mussel Survey Report for the NEXUS Gas Transmission Project,* is included as Appendix 3D for MDNR review.

Threehorn wartyback (Obliquaria reflexa)

Species description and habitat of the threehorn wartyback is described in Section 3.5.1.2.6 as it is also listed in Ohio. The threehorn wartyback is a state-listed endangered species in Michigan and is documented in Monroe County. Survey for mussels was recommended by the MDNR and were conducted in September 2015. No shell material or live threehorn wartybacks were observed in Michigan streams; therefore no impacts to threehorn wartyback are anticipated. A copy of the survey report, *Ohio and Michigan Mussel Survey Report for the NEXUS Gas Transmission Project,* is included as Appendix 3D for MDNR review.

Wavyrayed lampmussel (Lampsilis fasciola)

The wavyrayed lampmussel has a rounded to ovate, moderately thick shell and is usually under 3.5 inches in length. The shell is compressed to inflated (females) in shape. Shell color ranges from yellow to yellowish green with numerous thin wavy green rays (Watters et al., 2009). This mussel occurs in small to medium sized shallow streams, in and near riffles, with good current. The substrate preference is sand and/or gravel (MNFI, 2007).

The wavyrayed lampmussel is listed as threatened in the Michigan and has known occurrences within Lenawee, Monroe, and Washtenaw Counties. Surveys were conducted in September 2015 to determine if this species occurs in streams crossed by the proposed Project. No live individuals or shell material of wavyrayed lampmussel was observed during the survey effort; therefore, no impacts to wavyrayed lampmussel are anticipated. A copy of the survey report, *Ohio and Michigan Mussel Survey Report for the NEXUS Gas Transmission Project*, is included as Appendix 3D for MDNR review.

3.5.3.5 Plant Species

MNFI identified Michigan two state-listed T&E plant species that may be within 1-mile of the proposed Project area; eastern prairie fringed orchid and purple milkweed (*Asclepias purpurascens*). Several additional Michigan T&E plant species were identified to have potential suitable habitat near the proposed Project, including Canadian milk vetch (*Astragalus canadensis*), cup plant (*Silphium perfoliatum*), compass plant (*Silphium laciniatum*), ginseng (*Panax quinquefolius*), hairy wild petunia (*Ruellia humilis*), water willow (*Justicia americana*), weak stellate sedge (*Carex seorsa*), and white gentian (*Gentiana flavida*). Table 3.5-1 describes the plant species within or adjacent to the proposed Project with potential suitable habitat. Botanical surveys were completed in areas identified as potential suitable habitat, and no Michigan state-listed plants were identified within the Michigan Project area. During the botanical surveys individuals of cup plant and ginseng were found in Ohio. The *Botanical Survey and Floristic Quality Assessment Index Report for the NEXUS Gas Transmission Project* is included as Appendix 3A. Through agency consultation with USFWS and MDNR, in addition to botanical survey efforts, impacts to state-listed plant species are not expected as a result of the NEXUS Project.

3.5.4 State Species of Special Concern – Ohio and Michigan

Ohio and Michigan have several species designated as species of special concern. These are species that are documented as rare or uncertain population sizes. The level of protection they are afforded varies by state and by species group as some are protected and others are not. While those species listed as special concern not afforded protection such as special concern mussel species in Michigan, NEXUS considered impacts of Ohio and Michigan listed special concern species that may be within or adjacent to the Project corridor.

3.5.4.1 Avian Species

Grasshopper sparrow (Ammodramus savannarum)

The grasshopper sparrow is a small sparrow with a white belly and flat head with a white stripe running from the bill to the back of the head. Grasshopper sparrows may be found in a wide variety of grassland habitats, cultivated fields, hayfields and old fields, specifically this species selects dry sites where vegetation is grassy, dense and relatively tall. They also tend to be found in areas with moderately deep litter and a low percentage of woody vegetation. Grasshopper sparrows typically prefer large expanses of suitable habitat, with areas ranging from 25 to 75 acres in size. Breeding season begins in May and usually lasts through July (MNFI, 2007).

The grasshopper sparrow is currently a species of special concern in Michigan and therefore is not afforded any legal protection. This bird has been documented in Lenawee, Monroe, and Washtenaw Counties in Michigan. The Midwest has seen drastic decline of natural prairies and grasslands in the last 50 years, mostly due to conversion of these natural areas to agriculture. To avoid additional land use conversion,

NEXUS Project has been routed to be co-located with existing utilities or be located within agricultural fields wherever practicable. NEXUS has avoided unnecessary impacts to high quality grasslands where practicable. Any impacts to potential grasshopper sparrow habitat will be temporary during construction. Post-construction, all agricultural fields, pastures and fallow fields will be allowed to restore to original conditions. Through avoidance and restoration, no permanent impacts are expected to the grasshopper sparrow.

3.5.4.2 Fish Species

Orangethroat darter (Etheostoma spectabile)

The orangethroat darter is a slender fish averaging 3 inches in length, with a large head of a blunt triangular shape and large eyes. There are two separated dorsal fins and a single anal fin, all translucent and of a general fan shape. This species has very unique coloration, with yellow to pale olive-colored body and six to ten dark green dorsal saddles. In adult males, the vertical bars are separated by bright orange, yellow or red pigmentation, dorsal fins are orange and blue banded, anal fins are pale blue to green, and the throat is often bright orange. As the name suggests, these fish move with a rapid darting motion. This darter occurs in small creeks to medium-sized streams with substrates of sand or gravel and slow to moderately swift currents, where it is most often found among riffles (MNFI, 2007).

The orangethroat darter is a species of special concern in Michigan with occurrences in Monroe and Washtenaw Counties. The majority of medium or intermediate waterbodies will be crossed utilizing dry cut crossing. Any impacts to the orangethroat darter are expected be temporary in nature, as all original conditions will be restored post-construction.

3.5.4.3 Insect Species

Laura's snaketail (Stylurus laurae)

Laura's snaketail is dragonfly species approximately 2.5 inches in length, with a greenish-yellow head. The snaketail has a distinct black cross stripe on the face. The thorax is yellowish green with a dark middle section. This species typically inhabits well established sandy-bottomed streams and adults generally appear in the river/stream or riparian/floodplain corridor of an ecosystem. More specifically, this species is drawn to shallow, well shaded, rivers and streams with cobble, sand or mud substrate. The snaketail is sensitive to decreased water quality, including siltation, agricultural pollutants, and channelization (MNFI, 2007).

Laura's snaketail is species of special concern in Michigan, within the scope of the Project the snaketail has been documented in Washtenaw County. The majority of streams along the proposed Project route are impaired by adjacent land use pollutants, particularly agricultural runoff. Therefore, it is unlikely that suitable conditions are available to support the snaketail. Any impacts to Laura's snaketail are expected be temporary in nature, as all original conditions will be restored post-construction.

Pipevine swallowtail (Battus philenor)

The pipevine swallowtail is a butterfly with a wingspan ranging between 3 and 4.5 inches. The coloration of this species is black with blue-green iridescence on the upper side of the hindwings. Additionally, there are small, white sub marginal spots on both wings and the undersides are an iridescent blue, with a sub marginal row of large round orange spots ringed with black. This species can be found in open fields and railroad embankments near oak-hickory woods or in open areas near deciduous woodlands. The eggs are laid in small clusters on Virginia snakeroot (*Aristolochia serpentaria*), wild ginger (*Asarum sp.)*, or Dutchman's pipe (*Aristolochia macrophylla*) (MNFI, 2007).

This species is currently listed within Michigan as a species of special concern. The pipevine swallowtail has been historically documented in Lenawee and Washtenaw Counties in Michigan. All habitat along railroads will be avoided by the proposed Project due to conventional bore crossing methods. Any impacts

to potential pipevine swallowtail habitat is expected be temporary in nature, as all original conditions will be restored post-construction.

Swamp metalmark (Calephelis mutica)

The swamp metalmark is a butterfly with a wingspan of approximately 1 inch in length, and wings of a red-brown color. The wings also have small black and metallic spots along the edges and fine black lines toward the center of the wing. This insect occurs in prairie fens and southern wet meadows that support its main host plant, swamp thistle (*Cirsium muticum*). The swamp metalmark has a single brood in Michigan, with flight beginning in July, and two broods in the southern portion of its range, where it flies in May and late August (MNFI, 2007).

The swamp metalmark is a species of special concern in Michigan and has been recorded occurring locally within its preferred habitats (MNFI 2007). Within the scope of the NEXUS Project, Lenawee is the only Michigan County with recent documentation of this butterfly. Botanical surveys were completed for the proposed Project and no community types required by the swamp metalmark were located, therefore no impacts are expected.

Wild indigo duskywing (Erynnis baptisiae)

The wild indigo duskywing has a wingspan just over 1 inch and is chocolate brown in color, typically with three or four small white spots on the forewing. The undersurface of the hindwing is brown with two irregular rows of dull yellowish spots. This butterfly species commonly occurs in open oak barrens, shrubby fields, prairies and roadsides. Its main food source, wild indigo (*Baptisia tinctoria*), generally occurs in sandy soils in southern forests and dry sand prairies (MNFI, 2007).

The wild indigo duskywing is a species of special concern in Michigan. This species has occurrences documented in Monroe and Washtenaw Counties in Michigan. NEXUS completed botanical surveys and confirmed that the communities required for wild indigo are not present. Through avoidance of sand prairies and southern dry forest communities, no impacts of wild indigo duskywing are expected to occur.

3.5.4.4 Mussel Species

Ohio

All native freshwater mussels are protected by the State of Ohio under Section 1533.324 of the Ohio Revised Code regardless of their status. The State of Ohio requires surveys for mussels and/or potential mussel habitat if impacts on streams cannot be avoided; ODNR requested surveys be completed according to the Ohio Mussel Survey Protocol. In addition to the state-listed endangered and threatened mussels listed above, several additional species are state species of special concern. These species include: elktoe (*Alasmidonta marginata*), purple wartyback (*Cyclonaias tuberculata*), creek heelsplitter (*Lasmigona compressa*), kidneyshell (*Ptychobranchus fasciolaris*), round pigtoe (*Pleurobema sintoxia*), wavyrayed lampmussel (*Lampsilis fasciola*) and deertoe (*Truncilla truncata*). Surveys performed in July through September 2015 indicated presence (live or shell) of several of these state-listed species of concern. Where present, impacts to these species will be avoided by performing relocation efforts prior to construction. A copy of the survey report, *Ohio and Michigan Mussel Survey Report for the NEXUS Gas Transmission Project*, is included as Appendix 3D for ODNR review.

Michigan

State-listed mussels in Michigan are protected under the Natural Resources and Environmental Protection Act, Act 451 Article III Ch. 1 Endangered Species, Section 324.36505. The Natural Resources and Environmental Protection Act is administered by the MDNR. There are seven (7) species listed as special concern within the counties crossed by the proposed Project. Special concern species have low or declining numbers in the state but are not afforded protection under Michigan law. The seven species listed as special concern in Michigan are elktoe (*Alasmidonta marginata*), round pigtoe (*Pleurobema sintoxia*), kidneyshell (*Ptychobranchus fasciolaris)*, deertoe (*Truncilla truncata*), paper pondshell (*Utterbackia imbecillis*),

ellipse (*Venustaconcha ellipsiformis*), and rainbow mussel (*Villosa iris*). Surveys performed in September 2015 indicated presence (live or shell) of several of these state-listed species of concern. Where present, impacts to these species will be avoided by performing relocation efforts prior to construction. A copy of the survey report, *Ohio and Michigan Mussel Survey Report for the NEXUS Gas Transmission Project,* is included as Appendix 3D for MDNR review.

3.5.4.5 Plant Species

Ohio and Michigan have several plant species under the designation of special concern that may have suitable habitat within or adjacent to the Project area, including Davis's sedge (*Carex davisii*), green violet (*Hybanthus concolor*), hairy angelica (*Angelica venenosa*), pale avens (*Geum virginianum*), twinleaf (*Jeffersonia diphylla*), and white or prairie false indigo (*Baptisia lacteal*). Table 3.5-1 describes the plant species within or adjacent to the Project identified as having potential suitable habitat. Botanical surveys were completed in areas identified as potential suitable habitat for any listed species. No state-listed plant species of special concern were identified during the botanical surveys. The *Botanical Survey and Floristic Quality Assessment Index Report for the NEXUS Gas Transmission Project* is included as Appendix 3A. Through agency consultation with ODNR and MDNR, habitat avoidance and botanical survey efforts, impacts to plant species of special concern are not expected as a result of the NEXUS Project.

3.6 Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act

Migratory birds are defined as species which nest in the United States and Canada during summer months, and migrate south to the tropical regions of Mexico, Central or South America, and the Caribbean for the non-breeding season. These migratory birds are protected under the Migratory Bird Treaty Act ("MBTA") (16 U.S. Code 703-711). Additionally, bald eagles and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S. Code 668-668d). Executive Order 13186 (["EO"] 13186) (66 Federal Register 3853) directs federal agencies to identify areas where unintentional take is likely to have a measurable negative effect on migratory bird populations. This EO also promotes conservation of migratory birds through enhanced collaboration with the USFWS. EO 13186 states that emphasis should be placed on species of concern, priority habitats, and key risk factors. Particular focus should be given to addressing population-level impacts.

3.6.1 Migratory and Breeding Birds - Ohio

The Birds of Conservation Concern ("BCC") list of 2008 identified an array of potentially impacted species throughout the three regions traversed by the proposed Project in Ohio. These Bird Conservation Regions ("BCRs") are within USFWS Region 3 and more specifically, the Lower Great Lakes/St. Lawrence Plain (BCR 13), the Eastern Tallgrass Prairie (BCR 22) and the Appalachian Mountains (BCR 28) (USFWS, 2012c).

The proposed Project crosses the Lower Great Lakes/St. Lawrence Plain BCR between MP 0 to 95.3 and MP 109 to 120. Within the Lower Great Lakes/St. Lawrence Plain BCR there were 27 bird species identified. The majority of birds listed have only been confirmed along Lake Erie, which is well outside any Project areas. Additionally, ten of these species are listed as non-breeding within the BCR. Four species were found to have potential of occurrence within the Project areas, these include the bald eagle (*Haliaeetus leucocephalus*), wood thrush (*Hylocichla mustelina*), blue-winged warbler, and red-headed woodpecker (*Melanerpes erythrocephalus*). All of these species prefer well-developed deciduous forest habitats, with the warbler preferring the edges of woodlands and clearings (Cornell Lab of Ornithology, 2009).

The proposed Project crosses the Eastern Tallgrass Prairie BCR between MP 95.3 to 109 and 120 and 208.3 in Ohio. The Eastern Tallgrass Prairie BCR encompassed 39 species of bird, with 12 listed as non-breeding within the BCR and eight no longer identified by the Ohio Breeding Bird Atlas (Cornell Lab of Ornithology, 2009). Four of these species had confirmed occurrences within the state, but none within close proximity to any Project areas. The northern flicker (*Colaptes auratus*), field sparrow and the red-headed woodpecker

all have confirmed occurrences with high potential to be in or near the proposed Project. Both the northern flicker and the red-headed woodpecker inhabit forested areas with large trees and venture to more open areas to forage. The field sparrow is commonly found in early successional habitats, and frequent abandoned fields (Cornell Lab of Ornithology, 2009).

The proposed Project mainline route does not cross the Appalachian Mountains BCR, however the entire 0.9 TGP Interconnecting Pipeline is within the BCR which has 25 bird species associated with its listing, 16 of which are not within any areas in close proximity to the proposed Project route. There were nine species identified with the BCC listing that appear to potentially occur within the Project areas. These species include the forest dwelling bald eagle, black-capped chickadee (*Poecile atricapillus*), Cerulean warbler (*Setophaga cerulea*), Louisiana waterthrush (*Parkesia motacilla*), peregrine falcon (*Falco peregrinus*), red-headed woodpecker, and the wood thrush. The blue-winged warbler was only species with potential occurrence within the Project areas that inhabits shrubby fields or early successional ecosystems, and the sedge wren (*Cistothorus platensis*) was the only marsh or wetland resident identified. The sedge wren is also listed as not breeding within this BCR. See Table 3.6-1 for a list of BCC for these regions.

3.6.2 Migratory and Breeding Birds – Michigan

The BCC list of 2008 identified an array of potentially impacted species throughout the two regions traversed by the Project in Michigan. These BCRs are the Eastern Tallgrass Prairie (BCR 22) and the Prairie Hardwood Transition (BCR 23) (USFWS, 2012c).

In Michigan, the proposed Project crosses Eastern Tallgrass Prairie BCR between MP 208.3 to 242 and MP 243.3 to 245.5. Within the Eastern Tallgrass Prairie BCR of Michigan, 39 species of bird were identified. Similar to this BCR in Ohio, 12 species were listed as non-breeding and multiple species were no longer identified by the Michigan Breeding Bird Atlas ("MBBA" II, 2012). The red-headed woodpecker and bald eagle were the only two species listed with occurrences in Project counties, but none within the specific Project areas. Both the woodpecker and the eagle inhabit forested areas with large trees. The woodpecker will venture to more open areas to forage, and the eagle will head to large open waters to hunt (MBBA II, 2012).

The proposed Project crosses the Prairie Hardwood Transition BCR between MP 242 to 243.3 and 245.5 to 255.2. The Prairie Hardwood Transition BCR has a listing of 30 species to be evaluated for impact potential and their proximity to the Project. Of these species, 11 are non-breeding within the BCR, eight were not listed in the Michigan database and eight were not reported or confirmed as occurring near any Project areas. The majority of species located would not be impacted by the proposed Project, as they only had confirmed occurrences along shores of, or in close proximity to, Lake Erie. The willow flycatcher (*Empidonax traillii*), brown thrasher (*Toxostoma rufum*), and bobolink (*Dolichonyx oryzivorus*) were all found to be potentially occurring within Project areas. The brown thrasher specifically was documented near the Project in Monroe County and typically is found in shrubby fields or shrubby forest edges. The bobolink inhabits grasslands and pastures and had confirmed occurrences in both Lenawee and Washtenaw Counties near the Project area. The flycatcher can thrive in multiple ecosystem types, but is typically associated with nesting in thickets of shrubby vegetation. See Table 3.6-1 for a list of BCC for these regions.

3.6.3 Migratory Bird Impacts and Mitigation

On March 30, 2011, the USFWS and the Commission entered into a Memorandum of Understanding that focuses on the avoidance or minimization of adverse effects on migratory birds and the strengthening of conservation through enhanced collaboration between the two agencies. This voluntary Memorandum of Understanding does not waive any legal requirements under the MBTA, Bald and Golden Eagle Protection Act, ESA, Federal Power Act, Natural Gas Act, or any other statutes, and does not authorize the take of migratory birds. NEXUS has designed the proposed Project and implemented mitigation measures to minimize potential impacts to migratory birds during Project construction and operation. These measures include:

- routing Project facilities to avoid sensitive resources where possible;
- maximizing the use of actively cultivated agricultural lands or existing utility ROWs;
- limiting the construction and operation ROW widths to the minimum necessary;
- implementing mitigation for impacts to sensitive resources (e.g., wetlands) through agency permit conditions;
- adherence to the measures outlined in the NEXUS E&SC Plan and the FERC Plan and the FERC Procedures during construction of the Project facilities; and
- limiting routine ROW maintenance clearing and prohibiting clearing during the migratory bird nesting season (April 15 to August 1).

NEXUS avoided impacts to forested areas wherever practicable, particularly in potential nesting areas for migratory birds. Through ongoing consultation with the USFWS, NEXUS conducted tree inventory surveys to assess forest composition and structure within the Project corridor. This information is used by Region 3 of USFWS to quantify forested impacts and to determine if mitigation is warranted. The methodology used for these assessments is referred to as a Habitat Equivalency Analysis, which is a metric based on the total number of years that habitat is lost or degraded due to temporary or permanent conversions. Mitigation totals can be determined by applying values to services lost due to conversion of habitat within various ranges of existing forest quality (NOAA, 2015). NEXUS will continue consultation with USFWS to minimize potential impacts to migratory birds (*see* Resource Report 1, Appendix 1C2). Given the limited amount of disturbance, mitigation of affected habitat and the predominance of open areas associated with construction of the proposed Project facilities, it is unlikely that construction will have adverse impacts to migratory birds. Furthermore, post-construction revegetation measures may be applied to increase suitable habitat for migratory birds by planting native grass seed mixes to the maintained permanent easement.

3.6.4 Bald Eagle (*Haliaeetus leucocephalus*)

Since its de-listing in 2007, the bald eagle has become more common in the northeastern United States. Specifically in Ohio and Michigan, the bald eagle's stronghold is within the marsh region of western Lake Erie. For the bald eagle, the ideal site is one where water with ample food (fish) is located within 2 miles of the nesting site. Eagles also show a preference for somewhat secluded homesites (USFWS, 2015d). Bald eagles utilize habitats consisting of mature forest less than 0.5 miles away from large bodies of water.

In the spring of 2015, NEXUS performed aerial surveys along the proposed pipeline route searching for nests within suitable habitat. No nests were located within the 660 foot buffer of the Project area, as recommended by eagle guidance. The *Bald Eagle Aerial Nest Survey Protocol and Nest Location Mapping for the NEXUS Gas Transmission Project*, included as Appendix 3G, contains a copy of the survey protocols used to conduct the nest search in addition to mapped locations of active nests found. There were seven nest areas located as a result of these surveys; all located outside of the 660 foot buffer. One nest observed in Lorain County is at a distance of approximately 750 feet from the edge of the construction corridor. This section of pipeline corridor crosses active open agricultural fields, and one waterbody with a wooded buffer on each side. This waterbody and wooded buffer will be crossed using the HDD construction method and no forested habitat will be impacted.

USFWS recommended that any work completed within 660 feet of active nests be conducted outside of the eagle's nesting period. The NEXUS Project will avoid impacts to bald eagles by avoiding any construction activities within 660 feet of active nests.

3.7 References

Carman, S.M. 2001. Special Animal Abstract for *Obovaria subrotunda* (Round Hickorynut). Michigan Natural Features Inventory. Lansing, MI. 2 pp. Accessed on October 4, 2015 at: mnfi.anr.msu.edu/abstracts/zoology/Obovaria_subrotunda.pdf

Carman, S.M. 2002. Special Animal Abstract for *Alasmidonta viridis* (Slippershell mussel). Michigan Natural Features Inventory, Lansing, MI. 3pp. Accessed on October 8, 2015 at: http://mnfi.anr.msu.edu/abstracts/zoology/Alasmidonta_viridis.pdf

Cornell Lab of Ornithology. 2009. Ohio Breeding Atlas II. Accessed online October 8, 2015 at: http://bird.atlasing.org/Atlas/OH/

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-79/31, Washington, D.C.

Cummings, K.S., and C.A. Mayer. 1992. Field guide to freshwater mussels of the Midwest. Illinois Natural History Survey Manual 5. 194pp.

Dodge, K.E. 1998. River Raisin Assessment. State of Michigan Department of Natural Resources, Fisheries Division, Fisheries Special Report 23. Ann Arbor, Michigan.

Dunkle, S.W. 2000. Dragonflies Through Binoculars: A Field Guide to Dragonflies of North America. Oxford University Press, Oxford.

Dunn, E. H., and D. J. Agro. 1995. Black Tern (*Chlidonias niger*). In The Birds of North America, No. 147 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C. Accessed on October 4, 2015 at: http://www.allaboutbirds.org/guide/Black_Tern/lifehistory

[EPA] – U.S. Environmental Protection Agency. 2012. Great Lakes Ecosystems Oak Openings. Accessed 5/8/2015 at: http://www.epa.gov/ecopage/upland/oak/oakopen.html

EPA. 2014. Best Management Practices, Riparian/Forested Buffer Accessed on October 3, 2015 at: http://water.epa.gov/polwaste/npdes/swbmp/Riparian-Forested-Buffer.cfm

Ernst, C.H. 1976. Ecology of the spotted turtle, *Clemmys guttata* (*Reptilia, Testudines, Testudinidae*), in southeastern Pennsylvania. J. Herpetol. 10(1):25-33.

Faber-Langendoen, D., editor. 2001. Plant communities of the Midwest: Classification in an ecological context. Association for Biodiversity Information, Arlington, VA. 61 pp. + appendix (705 pp.).

Gottlieb, J.A. 1991. A Population Study of the Hellbender Salamander, *Cryptobranchus alleganiensis*, in the Allegheny River Drainage of New York State. Master Thesis, St. Bonaventure University, Olean, New York.

Harding, J.H. 1997. Amphibians and Reptiles of the Great Lakes Region. Univ. of Mich. Press, Ann Arbor, MI. 378 pp.

Harrington, S. 1999. Occurrence and distribution of fish species in the Great and Little Miami River Basins, Ohio. U.S. Geological Survey Water Resources Investigations Report 99-4198. Columbus Ohio.

Hay-Chmielewski, E.M., P.W. Seelbach, G.E. Whelan and D.B. Jester. 1995. State of Michigan Department of Natural Resources, Fisheries Division, Fisheries Special Report 23. Ann Arbor, Michigan.

Kost, M.A., D.A. Albert, J.G. Cohen, B.S. Slaughter, R.K. Schillo, C.R. Weber and K.A. Chapman. 2010. Natural Communities of Michigan: Classification and Description. Version 1.2. Michigan Natural Features Inventory, Lansing, MI.

Lee, Y., D.A. Hyde and J. Legge. 2000. Special animal abstract for *Acris crepitans blanchardi* (Blanchard's cricket frog). Michigan Natural Features Inventory. Lansing, MI. 4 pp. Accessed online on October 6, 2015 at: http://mnfi.anr.msu.edu/abstracts/zoology/Acris_crepitans_blanchardi.pdf

Lipps, Greg. Ohio Amphibians. Blue-Spotted Salamander (*Ambystoma laterale*). 2005. Accessed 02 October 2015 online at: http://ohioamphibians.com/salamanders/Blue-Spotted_Salamander.html

MacWhirter, R. B., and K. L. Bildstein. 1996. Northern Harrier (*Circus cyaneus*). In The Birds of North America, No. 210 (A. Poole and F. Gill, eds.). The birds of North America Online, Ithaca, New York. Accessed on October 5, 2015 at: http://www.allaboutbirds.org/guide/Northern_Harrier/lifehistory

Marti, C.D., A.F. Poole, and L.R. Bevier. 2005. Barn Owl (*Tyto alba*). In The Birds of North America, No. 1 (A. Poole, ed.). The Birds of North America Online, Ithaca, New York.

Mayfield, Harold F. 1992. Kirtland's Warbler (*Dendroica kirtlandii*). In The Birds of North America, No. 19 (A. Poole, P. Stettenheim, and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, DC: The American Ornithologists' Union. Accessed online October 4 2015 at: http://www.allaboutbirds.org/guide/Kirtlands_Warbler/sounds

McShaffrey, Dave and Robert C Glotzhober. 2007. Dragonflies and Damselflies of Ohio. Division of Wildlife, Ohio Department of Natural Resources. Publication 5320 R812. 76 pp.

[MBBA II] – Michigan Breeding Bird Atlas II. 2012. WowWebWorks. Accessed 29 April 2015 at www.mibirdatlas.org

Meanley, B. 1992. King Rail (*Rallus elegans*). In The Birds of North America, No. 3 (A. Poole, P. Stettenheim, and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, DC.: The American Ornithologists' Union. Access online October 4, 2015 at: http://www.allaboutbirds.org/guide/King_Rail/lifehistory

[MNFI] – Michigan Natural Features Inventory. 2007. Species search. Michigan State University Extension. Accessed online Oct at: http://mnfi.anr.msu.edu/explorer/search.cfm

MNFI. 2009. Invasive Species Guide. Michigan State University Extension. Accessed on October 8, 2015 at: http://mnfi.anr.msu.edu/invasive-species/InvasivePlantsFieldGuide.pdf

National Audubon Society. 2015. Guide to North American Birds: Upland Sandpiper (*Bartramia longicauda).* Accessed October 5, 2015 online at: http://www.audubon.org/field-guide/bird/upland-sandpiper

[NMFS] – National Marine Fisheries Service. 2014. NOAA Habitat Conservation-Habitat Protection-Essential Fish Habitat Mapper v3.0. Accessed October 8, 2015 at: http://www.habitat.noaa.gov/protection/efh/efhmapper/index.html

[NOAA] – National Oceanic and Atmospheric Administration. 2015. Damage Assessment, Remediation and Restoration Program: Habitat Equivalency Analysis. Accessed October 8, 2015. Available at https://darrp.noaa.gov/economics/habitat-equivalency-analysis

[NYSDEC] – New York State Department of Environmental Conservation. 2015. Eastern Massasauga (*Sistrurus catenatus*) Fact Sheet. Accessed on October 8, 2015 at: http://www.dec.ny.gov/animals/7154.html

[ODNR] – Ohio Department of Natural Resources: Division of Wildlife. 2012a. State-Listed Species Accessed October 8, 2015 at: http://wildlife.ohiodnr.gov/portals/wildlife/pdfs/publications/information/pub356.pdf

ODNR. Division of Wildlife. 2012b. Species and Habitats [website]. Accessed October 8, 2015 at: http://ohiodnr.gov/species-and-habitats

ODNR. 2015. Invasive Species accessed on October 8, 2015 at: http://ohiodnr.gov/invasiveplants

Ohio Nature. 2013. The Oak Openings Region "One of America's Last Great Places". Accessed October 8, 2015. Available at http://www.ohio-nature.com/Oak-Openings.html

Ohio Invasive Plants Council. 2015. Legislative Update. Accessed online on November 2, 2015 at: http://www.oipc.info/legislative-update.html

Omernik, J., & Griffith, G. 2012. Ecoregions of the United States-Level III (EPA). Access October 3, 2015. Retrieved from http://www.eoearth.org/view/article/152242

Penskar, M.R. and P.J. Higman. 2000. Special plant abstract for *Platanthera leucophaea* (eastern prairie fringed-orchid). Michigan Natural Features Inventory, Lansing, MI. 3 pp. Accessed on October 20, 2015 at: http://mnfi.anr.msu.edu/abstracts/botany/Platanthera_leucophaea.pdf

Piper, R.G., I.B. McElwain, L.E. Orme, J.P. McCraren, L.G. Fowler, and J.R. Leonard. 1982. Fish Hatchery Management. U.S. Department of Interior Fish and Wildlife Service, Washington, D.C.

Rafferty, S.D., Lybrook, J. K. Kaczmarek, M. Lethaby, and R. Wellington. 2012. An Evaluation of the Pennsylvania Lake Erie Watershed Fish Community: 2011. Pennsylvania Sea Grant. Available online http://pib.psu.edu/LEWatershedFishReport-Final04-09-12.pdf. Accessed October 8, 2015.

Sanders, R.E., C. Staudt, D. Mishine, M. Smith, E.T. Rankin, C.O. Yoder, R. Thoma, D. Altfater, C. Boucher, K. Capuzzi, R. Miltner, B. Alsdorf, D. L. Rice, and T.M. Cavender. 1999. The frequency of occurrence and relative abundance of Ohio stream fishes: 1979 through 1995. Ohio Biological Survey Notes 2: 53-62.

[TNC] – The Nature Conservancy. 2015. Letter to Ms. Kimberly D. Bose. Docket Nos. PF15-10-000: NEXUS Gas Transmission, LLC; NEXUS Gas Transmission Project; Comments on potential environmental issues.

Trautman, M.B. 1981. The Fishes of Ohio, Revised Edition. Ohio State University Press. 782 p.

[USDA] – U.S. Department of Agriculture. 2010. Federal Noxious Weed List. Accessed 27 April 2015. http://www.aphis.usda.gov/plant_health/plant_pest_info/weeds/downloads/weedlist.pdf

[USFWS] – U.S. Fish and Wildlife Service. 1999. Mitchell's Satyr Fact Sheet. Last modified January 1999. Accessed October 4, 2015 at: http://www.fws.gov/midwest/Endangered/insects/misa_fctsht.html

USFWS. 2006. Indiana Bat Fact Sheet. Last modified December 2006. Accessed 23 April 2015 at: http://www.fws.gov/midwest/endangered/mammals/inba/inbafctsht.html

USFWS. 2007. Northern Monkshood Fact Sheet. Last modified November 2007. Accessed November 1, 2015 at:

http://www.fws.gov/midwest/Endangered/plants/monkshoo.html

USFWS. 2008. Karner Blue Butterfly Fact Sheet. Last modified January 2008. Accessed October 8, 2015 at:

http://www.fws.gov/midwest/endangered/insects/kbb/kbb_fact.html

USFWS. 2012a. Invasive species [website]. Last modified October 17, 2012. Accessed on October 8, 2015 at: http://www.fws.gov/invasives/

USFWS. 2012b. Endangered and Threatened Wildlife and Plants; Listing the Rayed Bean and Snuffbox as Endangered; Proposed Rule. Federal Register Vol. 75, No. 211. Washington, DC. Pages 67552 – 67583.

USFWS. 2012c. Migratory Bird Program. Accessed online October 8, 2015 at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BirdManagement.html

USFWS. 2014a. Poweshiek Skipperling Fact Sheet. Last modified October 2014. Accessed October 8, 2015 at: http://www.fws.gov/midwest/endangered/insects/posk/PoweshiekSkipperlingFactSheet.html

USFWS. 2014b. Eastern Massasauga Fact Sheet. July 16, 2014. Accessed October 21, 2015 at: http://www.fws.gov/midwest/endangered/reptiles/eama/eama-fct-sht.html

USFWS. 2015a. Piping Plover Fact Sheet. Last modified April 2015. Accessed October 4, 2015 at: http://www.fws.gov/midwest/endangered/pipingplover/pipingpl.html

USFWS. 2015b. Northern Long-Eared Bat Fact Sheet. Last modified October 2015. Accessed October 21, 2015 at: http://www.fws.gov/midwest/endangered/mammals/nleb

USFWS. 2015c. Lakeside Daisy Fact Sheet. Last modified April 2015. Accessed November 2, 2015 at: http://www.fws.gov/midwest/endangered/plants/lakeside.html

USFWS. 2015d. Bald Eagle Conservation Midwest Region. Accessed October 8, 2015 online at: http://www.fws.gov/midwest/eagle/conservation/baea_nhstry_snstvty.html

Watters, G. Thomas, Michael A. Hoggarth, and David H. Stansbery. 2009. The Freshwater Mussels of Ohio. The Ohio State University Press, Columbus. 421 pp.

Widmann, R.H., and D. Balser, C. Barnett, B.J. Butler, D.M. Griffith, T.W. Lister, W.K. Moser, C.H. Penney, R. Riemann, and C.W. Woodall. 2006. Ohio Forests. Research Bulletin NRS-36, 2009. USDA, US Forest Service, Northern Research Station.

Wiken, Ed, Francisco Jiménez Nava, and Glenn Griffith. 2011. North American Terrestrial Ecoregions Level III. Commission for Environmental Cooperation, Canada. Accessed on October 3, 2015 at: http://www.cec.org/Atlas/Files/Terrestrial_Ecoregions_L1/TerrestrialEcoregions_L1_GeoPDF.zip

Wisconsin Odonata Survey. 2015. Wisconsin Dragonfly and Damselfly Species. Accessed online on October 6, 2015 at: http://wiatri.net/inventory/Odonata/SpeciesAccounts/

Yoon, Esther. *Aeshna canadensis*. December 10, 2012. Animal Diversity Web. University of Michigan: Museum of Zoology. Accessed online October 5, 2015 at: animaldiversity.org/accounts/Aeshna_canadensis/

TABLES

TABLE 3.2-1

Representative Fish Species Known to Occur in the NEXUS Project Area in Ohio

Common Name	Scientific Name
Black Bullhead	*Ameiurus melas*
Black Crappie	*Poxomis nigromaculatus*
Bluntnose Minnow	*Pimephales notatus*
Central Stoneroller	*Campostoma anomalum*
Common Carp	*Cyprinus carpio*
Creek Chub	*Semotilus atromaculatus*
Gizzard Shad	*Dorosoma cepedianum*
Green Sunfish	*Lepomis cyanellus*
Johnny Darter	*Etheostoma nigrum*
Largemouth Bass	*Micropterus salmoides salmoides*
Logperch Darter	*Percina caprodes*
Mottled Sculpin	*Cottus bairdii*
Northern Hogsucker	*Hypentelium nigricans*
Pumpkinseed Sunfish	*Lepomis gibbosus*
Rock Bass	*Ambloplites rupestris*
Smallmouth Bass	*Micropterus dolomieu*
Spotfin Shiner	*Cyprinella spiloptera*
Stonecat Madtom	*Noturus flavus*
Striped Shiner	*Luxilus chrysocephalus*
Sunfish Bluegill	*Lepomis macrochirus*
White Crappie	*Poxomis annularis*
White Sucker	*Catostomus commersonii*
Yellow Bullhead	*Ameiurus natalis*
Yellow Perch	*Perca flavescens*

TABLE 3.2-2

Representative Fish Species Known to Occur in the NEXUS Project Area in Michigan

Common Name	Scientific Name
Bluntnose Minnow	*Pimephales notatus*
Black Crappie	*Poxomis nigromaculatus*
Blacknose Dace	*Rhinichthys atratulus*
Blacknose Shiner	*Notropis heterolepis*
Common Shiner	*Luxilus cornutus*
Creek Chub	*Semotilus atromaculatus*
Emerald Shiner	*Notropis atherinoides*
Grass pickerel	*Esox americanus vermiculatus*
Hornyhead Chub	*Nocomis biguttatus*
Largemouth Bass	*Micropterus salmoides salmoides*
Rock Bass	*Ambloplites rupestris*
Smallmouth Bass	*Micropterus dolomieu*
Spotfin Shiner	*Cyprinella spiloptera*
Stonecat Madtom	*Noturus flavus*
Sunfish Bluegill	*Lepomis macrochirus*
White Crappie	*Poxomis annularis*
White Sucker	*Catostomus commersonii*
Yellow Perch	*Perca flavescens*

TABLE 3.2-3

Fisheries of Special Concern Occurring in the Project Vicinity

State	County	MP	Waterbody ID	Stream Name	Concern
OH	Stark	21.8	A14-25-S1	Middle Branch Nimishillen Creek	Potential Occurrence of Protected Species
OH	Summit	48.1	C15-28-S1	Tuscarawas River	Potential Occurrence of Protected Species
OH	Wayne	55.3	A15-41-S1	Mill Creek	Salmonid Stream
OH	Medina	57.6	B15-51-S1	Styx River	Potential Occurrence of Protected Species
OH	Medina	70.8	C15-42-S1/ AS-ME-46	The Inlet	Potential Occurrence of Protected Species
OH	Medina	73.4	C15-24-S1-3	Mallet Creek	Potential Occurrence of Protected Species
OH	Lorain	86.7	A14-50-S1	East Branch Black River	Potential Occurrence of Protected Species
OH	Lorain	91.8	C15-35-S1	Wellington Creek	Potential Occurrence of Protected Species
OH	Lorain	92.4	C15-8-S4	West Branch Black River	Potential Occurrence of Protected Species
OH	Lorain	92.6	C15-9-S1	Tributary to West Branch Black River	Potential Occurrence of Protected Species
OH	Lorain	99.3	C15-66-S1	East Fork Vermilion River	Potential Occurrence of Protected Species
OH	Huron	104.4	C15-56-S4, C15-56-S4B	Vermilion River	Potential Occurrence of Protected Species/Salmonid Stream
OH	Huron	104.6	C15-56-S4A	Tributary to Vermilion River	Potential Occurrence of Protected Species
OH	Erie	113.1	A14-187-S1	Old Woman Creek	Potential Occurrence of Protected Species
OH	Erie	116.9	A14-186-S1/ AS-ER-19	Huron River	Potential Occurrence of Protected Species
OH	Erie	125.9	E14-95-S1	Pipe Creek	Potential Occurrence of Protected Species
OH	Erie	129.3	E14-94-S1/ AS-ER-200	Mills Creek	Potential Occurrence of Protected Species
OH	Sandusky	136.0	D14-6-S1	Fuller Creek	Potential Occurrence of Protected Species
OH	Sandusky	138.0	E14-105-S1	Pickerel Creek	Potential Occurrence of Protected Species
OH	Sandusky	139.9	D14-8-S1	Raccoon Creek	Potential Occurrence of Protected Species
OH	Sandusky	140.5	E14-103-S1	South Creek	Potential Occurrence of Protected Species
OH	Sandusky	141.7	D14-11-S1	Green Creek	Potential Occurrence of Protected Species
OH	Sandusky	143.7	D14-40-S1	Bark Creek	Potential Occurrence of Protected Species
OH	Sandusky	145.8	AS-SA-204	Sandusky River	Potential Occurrence of Protected Species/Percid Stream
OH	Sandusky	149.4	D15-52-S1	Little Muddy Creek	Potential Occurrence of Protected Species
OH	Sandusky	153.4	E14-43-S1	Muddy Creek	Potential Occurrence of Protected Species
OH	Sandusky	158.6	D14-25-S1	Sugar Creek	Potential Occurrence of Protected Species
OH	Sandusky	162.5	D15-26-S1	Portage River	Potential Occurrence of Protected Species/Percid Stream
OH	Wood	167.3	E14-175-S1	Toussaint Creek	Potential Occurrence of Protected Species/Percid Stream
OH	Wood	171.1	E14-40-S1	Packer Creek	Potential Occurrence of Protected Species
OH	Wood	177.3	E15-7-S1	Tributary to Maumee River	Potential Occurrence of Protected Species
OH	Wood	180.0	D15-101-S1	Tributary to Maumee River	Potential Occurrence of Protected Species

TABLE 3.2-3

Fisheries of Special Concern Occurring in the Project Vicinity

State	County	MP	Waterbody ID	Stream Name	Concern
OH	Wood	181.4	E14-55-S1	Maumee River	Protected Occurrence of Protected Species/Percid Stream
OH	Lucas	181.7	E14-55-S1	Maumee River	Potential Occurrence of Protected Species/Percid Stream
OH	Lucas	190.9	E15-14-S1	Blue Creek	Potential Occurrence of Protected Species
OH	Fulton	195.2	E15-36-S1	Fewless Creek	Potential Occurrence of Protected Species
OH	Fulton	196.4	D15-17-S1	Swan Creek	Confirmed Occurrence of Protected Species
OH	Fulton	200.8	E14-4-S1	Ai Creek	Potential Occurrence of Protected Species
OH	Fulton	207.9	D14-45-S1	Tenmile Creek	Potential Occurrence of Protected Species
MI	Lenawee	215.2	E14-140-S1	River Raisin	Confirmed Occurrence of Protected Species
MI	Lenawee	222.5	E14-76-S1	Swamp Raisin Creek	Potential Occurrence of Protected Species
MI	Lenawee	226.4	AS-LE-204	South Branch Macon Creek	Potential Occurrence of Protected Species
MI	Lenawee	226.7	E14-126-S1/ AS-LE-205	Tributary to South Branch Macon Creek	Potential Occurrence of Protected Species
MI	Lenawee	226.8	E14-74-S1	Schreeder Brook	Potential Occurrence of Protected Species
MI	Lenawee	227.0	E14-75-S1	Tributary to Wahoo Prairie Drain	Potential Occurrence of Protected Species
MI	Lenawee	229.5	E14-87-S1	Macon Creek	Potential Occurrence of Protected Species
MI	Monroe	236.0	AS-MO-4	North Branch Macon Creek	Potential Occurrence of Protected Species
MI	Washtenaw	237.6	E14-157-S1	Saline River	Potential Occurrence of Protected Species
MI	Washtenaw	246.3	E14-164-S1/ AS-WA-6	Paint Creek	Potential Occurrence of Protected Species
MI	Washtenaw	250.9	D15-21-S1	Huron River	Confirmed Occurrence of Protected Species

TABLE 3.3-1

Acres of Vegetation Affected by the NEXUS Project

	Forested Land a/				Open Land b/											
	Upland Forest		Wetland Forest		Upland Open Land		Emergent Wetlands		Scrub-Shrub Wetlands		Agricultural c/		Other d/		TOTAL	
	Construction e/	Operation f/	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation
Ohio																
Pipeline Right-of-Way																
Mainline	237.1	124.3	43.3	29.8	203.0	102.1	29.0	19.3	13.5	9.2	1846.9	934.2	60.8	37.4	2433.6	1256.3
Mainline ATWS	43.2	0.0	5.6	0.0	88.4	0.0	7.6	0.0	3.1	0.0	897.1	0.0	28.5	0.0	1073.5	0.0
TGP Interconnect	0.8	0.2	0.0	0.0	4.1	2.3	0.0	0.0	0.0	0.0	5.6	2.8	0.2	0.1	10.7	5.4
TGP ATWS	0.5	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.1	0.0	4.3	0.0
Ware Yards																
Ware Yard 1-1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.9	0.0	0.0	0.0	48.9	0.0
Ware Yard 2-1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	56.6	0.0	0.0	0.0	56.6	0.0
Ware Yard 3-1a	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	22.3	0.0	0.4	0.0	23.0	0.0
Ware Yard 3-1b	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	37.3	0.0	0.0	0.0	38.1	0.0
Ware Yard 3-2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.3	0.0	0.0	0.0	75.3	0.0
Staging Areas																0.0
Staging Area-1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.1	0.0	2.4	0.0
Staging Area-2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	0.0	0.0	0.0	2.7	0.0
Staging Area-3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	0.0	0.0	0.0	4.5	0.0
Staging Area-4	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Staging Area-5	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Staging Area-7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0
Staging Area-8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Staging Area-9	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0

TABLE 3.3-1

Acres of Vegetation Affected by the NEXUS Project

	Forested Land a/				Open Land b/						Agricultural c/		Other d/		TOTAL	
	Upland Forest		Wetland Forest		Upland Open Land		Emergent Wetlands		Scrub-Shrub Wetlands							
	Construction e/	Operation f/	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation
Staging Area-10	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Staging Area-11	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Staging Area-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0
Staging Area-13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0
Staging Area-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.4	0.0
Staging Area-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	1.8	0.0
Staging Area-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2	0.0
Staging Area-18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0
Staging Area-19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0
Staging Area-20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0
Staging Area-21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Staging Area-22	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Staging Area-24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Staging Area-25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	<0.1	0.0	0.4	0.0
Staging Area-26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0
Staging Area-28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0
Staging Area-29	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
Staging Area-30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0
Staging Area-31	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Staging Area-32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Staging Area-33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.5	0.0

TABLE 3.3-1

Acres of Vegetation Affected by the NEXUS Project

	Forested Land a/				Open Land b/											
	Upland Forest		Wetland Forest		Upland Open Land		Emergent Wetlands		Scrub-Shrub Wetlands		Agricultural c/		Other d/		TOTAL	
	Construction e/	Operation f/	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation
Staging Area-34	0.0	0.0	0.0	0.0	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	4.4	0.0
Staging Area-37	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2	0.0
Staging Area-38	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0
Staging Area-41	0.0	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	0.1	0.0
Staging Area-51	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Staging Area-52	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Staging Area-53	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0
Staging Area-54	<0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Staging Area-55	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0
Staging Area-56	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0
Staging Area-57	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Staging Area-59	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
Staging Area-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0
Staging Area-61	<0.1	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
Staging Area-62	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Staging Area-63	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Staging Area-64	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Staging Area-65	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Staging Area-66	0.0	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	<0.1	0.0	0.2	0.0
Staging Area-67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0
Staging Area-69	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2	0.0

TABLE 3.3-1

Acres of Vegetation Affected by the NEXUS Project

	Forested Land a/				Open Land b/											
	Upland Forest		Wetland Forest		Upland Open Land		Emergent Wetlands		Scrub-Shrub Wetlands		Agricultural c/		Other d/		TOTAL	
	Construction e/	Operation f/	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation
Staging Area-70	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0
Staging Area-71	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0
Staging Area-72	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Staging Area-73	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0
Staging Area-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Staging Area-75	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0
Staging Area-76	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Staging Area-78	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0
Staging Area-79	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0
Staging Area-80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0
Staging Area-81	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0
Staging Area-82	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	0.2	0.0
Staging Area-84	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Staging Area-85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0
Staging Area-86	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Staging Area-87	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2	0.0
Staging Area-88	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Staging Area-89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Staging Area-91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	1.4	0.0
Staging Area-93	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1	0.0	0.0	0.0	3.1	0.0
Staging Area-94	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0	<0.1	0.0	3.5	0.0

TABLE 3.3-1

Acres of Vegetation Affected by the NEXUS Project

	Forested Land a/				Open Land b/						Agricultural c/		Other d/		TOTAL	
	Upland Forest		Wetland Forest		Upland Open Land		Emergent Wetlands		Scrub-Shrub Wetlands							
	Construction e/	Operation f/	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation
Staging Area-96	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Staging Area-97	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Access Roads																
Access Roads	0.9	0.0	0.0	0.0	18.5	0.6	0.1	0.0	0.0	0.0	28.4	1.2	7.4	0.0	55.3	1.8
Aboveground Facilities																
Compressor Stations																
Hanoverton Compressor Station (CS1)	0.2	0.0	0.0	0.0	9.5	2.2	0.0	0.0	0.0	0.0	86.5	21.7	0.0	0.0	96.2	23.9
Wadsworth Compressor Station (CS2)	0.0	0.0	0.0	0.0	14.8	0.0	0.0	0.0	0.0	0.0	43.6	19.8	5.6	0.0	64.0	43.6
Clyde Compressor Station (CS3)	0.0	0.0	0.0	0.0	0.7	0.5	0.0	0.0	0.0	0.0	59.6	47.6	0.4	0.0	60.7	59.6
Waterville Compressor Station (CS4)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	37.5	34.1	0.1	0.0	37.7	37.5
Meter Stations																
MR01 (TGP)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	10.2	2.0	0.1	0.0	10.4	10.2
MR02&03 (Kensington/ Texas Eastern)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.2	4.3	0.1	0.0	10.4	10.2
MR05 (Dominion East Ohio)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.8	1.9	0.0	0.0	8.8	8.8
Ohio Subtotal:	**283.0**	**124.5**	**48.9**	**29.8**	**352.2**	**107.7**	**36.7**	**19.3**	**16.5**	**9.2**	**3303.5**	**1069.6**	**105.7**	**37.5**	**4146.5**	**1397.6**

TABLE 3.3-1

Acres of Vegetation Affected by the NEXUS Project

	Forested Land a/				Open Land b/											
	Upland Forest		Wetland Forest		Upland Open Land		Emergent Wetlands		Scrub-Shrub Wetlands		Agricultural c/		Other d/		TOTAL	
	Construction e/	Operation f/	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation
Michigan																
Pipeline Right-of-Way																
Mainline	25.6	13.1	4.3	2.6	48.8	25.1	2.4	1.9	0.1	0.2	453.9	228.1	22.5	12.5	557.6	283.4
Mainline ATWS	14.8	0.0	0.2	0.0	50.8	0.0	0.3	0.0	0.0	0.0	192.9	0.0	7.0	0.0	266.0	0.0
Ware Yards																
Ware Yard 4-1	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	40.9	0.0	1.8	0.0	44.4	0.0
Ware Yard 4-2	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	0.0
Ware Yard 4-3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.3	0.0	0.0	0.0	13.4	0.0
Staging Areas																
Staging Area-6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.9	0.0	0.0	0.0	5.9	0.0
Staging Area-42	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0
Staging Area-43	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0
Staging Area-44	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0
Staging Area-46	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Staging Area-47	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0
Staging Area-49	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0
Staging Area-50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.4	0.0
Staging Area-92	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0
Staging Area-98	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0

TABLE 3.3-1

Acres of Vegetation Affected by the NEXUS Project

	Forested Land a/				Open Land b/						Agricultural c/		Other d/		TOTAL	
	Upland Forest		Wetland Forest		Upland Open Land		Emergent Wetlands		Scrub-Shrub Wetlands							
	Construction e/	Operation f/	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation
Access Roads																
Access Roads	0.7	0.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0	3.6	0.2	1.3	0.2	8.3	0.2
Aboveground Facilities																
Meter Stations																
MR04 (DTE/Willow Run)	0.0	0.0	0.0	0.0	0.4	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.4	0.4	1.0	0.7
Michigan Subtotal:	**45.4**	**13.1**	**4.5**	**2.6**	**105.3**	**25.4**	**2.9**	**1.9**	**0.1**	**0.2**	**713.1**	**228.3**	**33.0**	**13.1**	**904.3**	**284.5**
Project Total:	***328.4***	***137.6***	***53.4***	***32.4***	***457.5***	***133.1***	***39.6***	***21.2***	***16.6***	***9.4***	***4016.6***	***1297.9***	***138.7***	***50.6***	***5050.8***	***1682.1***

Note: Minor discrepancies due to rounding.
a/ Upland and wetland forest excluding areas with HDD implementation.
b/ Utility right-of-ways ("ROWs"), open fields, pasture, vacant land, herbaceous and scrub-shrub uplands, non-forested lands, emergent wetland, scrub-shrub wetland, golf courses, and municipal land.
c/ Active hayfields and cultivated land, including wetland areas within active agricultural land uses.
d/ Industrial, commercial, and residential land uses as defined in Resource Report 8. Also includes "open water" land use, i.e. water crossings greater than 100 feet wide and streams visible on aerial photography but less than 100 feet in width.
e/ Land affected during construction for pipeline facilities is comprised of temporary workspace, generally 100-foot wide except for wetlands areas with a 75-foot wide ROW.
f/ Land affected during operation of the pipeline includes only the 50-foot wide permanent ROW easement.

TABLE 3.5-1

Federal and State Listed Species Potentially Occurring Within or Near the Project Area

	Species Name		Federal	State	County	Habitat	Survey Status
	Common	**Scientific**					
Amphibians	Blanchard's cricket frog	*Acris crepitans blanchardi*	Not listed	MI-Threatened	Washtenaw	Open edges of permanent ponds, lakes, floodings, bogs, seeps and slow-moving streams and rivers.	No survey proposed. HDD crossing methods selected to avoid potential habitat.
	Blue-spotted salamander	*Ambystoma laterale*	Not listed	OH-Endangered	Henry and Lucas	Occurs in damp forested areas with sandy soils. Typically found burrowing under rotting logs.	No survey required due to lack of potential habitat.
	Eastern hellbender	*Cryptobranchus alleganiensis alleganiensis*	Not listed	OH-Endangered	Summit	Habitat is limited to cool and very clean, dissolved oxygen rich waters with gravel and bedrock substrate. Often occurrences are associated with Ohio River drainages.	Habitat assessments were conducted. No presence/absence survey required due to lack of habitat.
Avian	American bittern	*Botaurus lentiginosus*	Not listed	OH-Endangered	Lucas, Sandusky and Summit	Occurs in large and undisturbed wetlands with thick vegetative cover and areas with small sections of open water.	No survey proposed. Avoidance of potential habitat where practicable.
	Barn owl	*Tyto alba*	Not listed	OH-Threatened	Columbiana and Wayne	Utilizes hallow trees or man-made sheds, etc. for nesting but are found in areas of large open grasslands.	No survey proposed, NEXUS will avoid removal of abandoned buildings.
	Black tern	*Chlidonias niger*	Not listed	OH-Endangered	Lucas, Erie, and Sandusky	The black tern prefers large, undisturbed inland marshes with fairly dense vegetation and pockets of open water. They nest in various kinds of marsh vegetation, but cattail marshes are generally favored.	No survey proposed. Avoidance of potential habitat where practicable.
	Common tern	*Sterna hirundo*	Not listed	OH-Endangered	Erie, Lorain and Lucas	Limited to the shores or islands of Lake Erie.	No survey proposed. HDD crossing methods selected to avoid potential habitat.
	Grasshopper sparrow	*Ammodramus savannarum*	Not listed	MI-Special Concern	Lenawee, Monroe and Washtenaw	Habitat includes grasslands, cultivated fields, hayfields and old fields.	No survey proposed. Avoidance of potential habitat where practicable.
	Kirtland's warbler	*Setophaga kirtlandii*	Endangered	OH-Endangered	Lorain, Erie, Sandusky and Lucas	Kirtland's warblers are known to migrate along the Lake Erie shoreline through Ohio in late April-May and late August-early October.	No survey proposed. The Project is currently further than 3 miles from Lake Erie.

TABLE 3.5-1

Federal and State Listed Species Potentially Occurring Within or Near the Project Area

	Species Name		Federal	State	County	Habitat	Survey Status
	Common	**Scientific**					
	King rail	*Rallus elegans*	Not listed	OH-Endangered	Lucas and Sandusky	Occurs in freshwater wetland habitats with dense confines of cattails and other marsh vegetation.	No survey proposed. Avoidance of potential habitat where practicable.
	Lark sparrow	*Chondestes grammacus*	Not listed	OH-Endangered	Fulton, Henry, and Lucas	Occupy open grass and shrubby fields along sandy beach ridges.	No survey proposed. Avoidance of open natural areas within Oak Openings Region.
	Northern harrier	*Circus cyaneus*	Not listed	OH-Endangered	Wood	Inhabits large marshes and grasslands.	No survey proposed. Avoidance of potential habitat where practicable.
	Piping plover	*Charadrius melodus*	Endangered	OH-Endangered	Lorain, Erie, Sandusky and Lucas	Beaches along shorelines of the Great Lakes.	No survey proposed. The Project is currently further than 3 miles from Lake Erie.
	Sandhill crane	*Grus canadensis*	Not listed	OH-Endangered	Lorain	Dependent on wetland habitats, including large tracts of wet meadow, shallow marsh or bogs for breeding.	No survey proposed. Avoidance of potential habitat where practicable.
	Trumpeter swan	*Cygnus buccinator*	Not listed	OH-Threatened	Sandusky	Occur in large marshes and lakes (typically 40 to 150 acres). Utilize shallow wetlands with a diverse mix of plenty of emergent and submergent vegetation and open water.	No survey proposed. Avoidance of potential habitat where practicable.
	Upland sandpiper	*Bartramia longicauda*	Not listed	OH-Endangered	Erie, Fulton, Lorain, Sandusky, Summit, and Wood	Native prairie and other dry grasslands, including airports and some croplands.	No survey proposed. Avoidance of potential habitat where practicable.
Fish	Bigmouth shiner	*Notropis dorsalis*	Not listed	OH-Threatened	Medina and Lorain	Lake Erie drainages; found in pools with sandy substrates.	No survey proposed. Stream crossing methods selected to avoid impacts.
	Channel darter	*Percina copelandi*	Not listed	OH-Threatened	Columbiana, Erie, and Lorain	Occur in large, coarse sand or fine gravel bars in large rivers or along lake shores.	No survey proposed. Stream crossing methods selected to avoid impacts.
	Greater redhorse	*Moxostoma valenciennesi*	Not listed	OH-Threatened	Fulton, Lucas, and Sandusky	Found in clean sand or gravel substrate of medium to large rivers within the Lake Erie drainage.	No survey proposed. Stream crossing methods selected to avoid impacts.

TABLE 3.5-1

Federal and State Listed Species Potentially Occurring Within or Near the Project Area

	Species Name		Federal	State	County	Habitat	Survey Status
	Common	**Scientific**					
	Iowa darter	*Etheostoma exile*	Not listed	OH-Endangered	Stark and Summit	Found in natural lakes and very sluggish streams or marshes with dense aquatic vegetation and clear waters.	No survey proposed. Stream crossing methods selected to avoid impacts.
	Lake chubsucker	*Erimyzon sucetta*	Not listed	OH-Threatened	Wayne and Summit	Found in natural lakes and very sluggish streams or marshes with dense aquatic vegetation and clear waters.	No survey proposed. Stream crossing methods selected to avoid impacts.
	Lake sturgeon	*Acipenser fluvescens*	Not listed	OH-Endangered	Erie, Lorain and Lucas	Found in larger rivers and lakes with mud and sand substrates.	No survey proposed. Stream crossing methods selected to avoid impacts.
	Orangethroat darter	*Etheostoma spectabile*	Not listed	MI-Special Concern	Monroe and Washtenaw	Occurs in small creeks to medium-sized streams with substrates of sand or gravel and slow to moderately swift currents, where it is most often found among riffles.	No survey proposed. Stream crossing methods selected to avoid impacts.
	Pugnose minnow	*Opsopoeodus emiliae*	Not listed	OH-Endangered	Summit	Lake Erie in bays and marshes with extremely clear waters and profuse amounts of submerged aquatic vegetation.	No survey proposed. Stream crossing methods selected to avoid impacts.
	Spotted gar	*Lepisosteus oculatus*	Not listed	OH-Endangered	Erie, Lorain, Sandusky, and Lucas	Found in Lake Erie.	No survey proposed. The Project is currently further than 3 miles from Lake Erie.
	Western banded killifish	*Fundulus diaphanus menona*	Not listed	OH-Endangered	Sandusky and Wood	Occurs in areas with an abundance of rooted aquatic vegetation, clear waters, and substrates of clean sand or organic debris free of silt.	No survey proposed. Stream crossing methods selected to avoid impacts.
Insects	Canada darner	*Aeshna canadensis*	Not listed	OH-Threatened	Lucas	Inhabits both terrestrial and freshwater environments, including bogs, beaver ponds, lakes and other freshwater areas.	No survey proposed. Avoidance of impacts to potential habitat proposed.
	Chalk-fronted corporal	*Ladona julia*	Not listed	OH-Threatened	Summit	Nutrient poor lakes, bogs and marshes.	No survey proposed. Avoidance of potential habitat where practicable.
	Elfin Skimmer	*Nannothemis bella*	Not listed	OH-Endangered	Summit	Primarily inhabits stagnant pools and marshy places, such as bogs.	No survey proposed. Avoidance of potential habitat where practicable.

TABLE 3.5-1

Federal and State Listed Species Potentially Occurring Within or Near the Project Area

Species Name		Federal	State	County	Habitat	Survey Status
Common	**Scientific**					
Frosted elfin	*Incisalia irue*	Not listed	OH-Endangered	Lucas	Inhabits oak savannas with blue lupine.	No survey proposed. Avoidance of open natural areas within Oak Openings Region.
Karner blue butterfly	*Lycaeides melissa samuelis*	Endangered	OH-Endangered MI-Threatened	OH - Lucas MI- Lenawee	Pine barrens and oak savannas on sandy soils and containing wild lupines *(Lupinus perennis).*	No survey required. Botanical surveys were conducted and no lupine was identified.
Laura's snaketail	*Stylurus laurae*	Not listed	MI-Special Concern	Washtenaw and Wayne	Occurs in shallow, well shaded rivers and streams with cobble, sand or mud substrate.	No survey proposed. Stream crossing methods selected to avoid impacts.
Marsh bluet	*Enallagma ebrium*	Not listed	OH-Threatened	Summit	Occurs at lowland lakes, ponds, and marshes, and has a definite preference for alkaline waters.	No survey proposed. Avoidance of potential habitat where practicable.
Mitchell's satyr butterfly	*Neonympha mitchellii mitchellii*	Endangered	MI-Endangered	Lenawee, Washtenaw and Wayne	Fens; wetlands characterized by calcareous soils which are fed by carbonate-rich water from seeps and springs.	No survey required. Avoidance of impacts to potential habitat proposed.
Persius duskywing	*Erynnis persius*	Not listed	OH-Endangered	Lucas	Inhabits oak savannas and blue lupine.	No survey proposed. Avoidance of open natural areas within Oak Openings Region.
Pipevine swallowtail	*Battus philenor*	Not listed	MI-Special Concern	Lenawee and Washtenaw	This species can be found in open fields and railroad embankments near oak-hickory woods or in open areas near deciduous woodlands.	No survey proposed. Avoidance of potential habitat where practicable.
Plains clubtail	*Gomphus externus*	Not listed	OH-Endangered	Erie	Occur along large, slow flowing and muddy streams and rivers.	No survey proposed. Stream crossing methods selected to avoid impacts.
Poweshiek skipperling	*Oarisma poweshiek*	Endangered	MI-Threatened	Lenawee and Washtenaw	Wet prairies and fens.	No survey required. Avoidance of impacts to potential habitat proposed.
Purplish copper	*Lycaena helloides*	Not listed	OH-Endangered	Lucas	Inhabits a variety of disturbed moist areas, such as fallow fields with poor drainage, sedge meadows, wet prairies, wet ditches and low, damp areas in cultivated fields.	No survey proposed. Avoidance of potential habitat where practicable.

TABLE 3.5-1

Federal and State Listed Species Potentially Occurring Within or Near the Project Area

	Species Name		Federal	State	County	Habitat	Survey Status
	Common	**Scientific**					
	Racket-tailed emerald	*Dorocordulia libera*	Not listed	OH-Endangered	Summit	Species confined to boggy ponds and lake edges.	No survey proposed. Avoidance of potential habitat where practicable.
	Regal fritiallary	*Speyeria idalia*	Not listed	MI-Endangered	Lenawee, Washtenaw	Prairie or open environments frequently in sandy regions. Meadows, old fields, and floodplain forest openings and edges.	No survey required. Avoidance of impacts to potential habitat proposed.
	Swamp metalmark	*Calephelis mutica*	Not listed	MI-Special Concern	Lenawee	Occurs in prairie fens and southern wet meadows that support its main host plant, swamp thistle (*Cirsium muticum*).	No survey required. Avoidance of impacts to potential habitat proposed.
	Wild indigo dustwing	*Erynnis baptisiae*	Not listed	MI-Special Concern	Monroe, Washtenaw and Wayne	Commonly occurs in open oak barrens, shrubby fields, prairies and roadsides or areas where its main food source, the wild indigo (*Baptisia australis*) grows.	No survey required. Avoidance of impacts to potential habitat proposed.
Mammals	Black bear	*Ursus americanus*	Not listed	OH-Endangered	All	Primarily inhabit heavily wooded forests, but can thrive in wetlands and swamps to dry coniferous or deciduous forests.	No survey proposed. Impacts not anticipated.
	Evening bat	*Nycticeius humeralis*	Not listed	MI-Threatened	Lenawee	Inhabits old and mature forests, this species prefers to roost behind loose bark during the nonbreeding season.	Mist-net surveys were conducted in 2015 and two evening bats were captured.
	Indiana bat	*Myotis sodalis*	Endangered	OH-Endangered MI-Endangered	All	Inhabits caves and abandoned mines which provide cool and stable temperatures during the winter and then inhabit under loose bark of exfoliating trees or in tree hollows in the summer.	Mist-net surveys were conducted in 2015 and no Indiana bats were captured.
	Least shrew	*Cryptotis humeralis*	Not listed	MI-Threatened	Washtenaw	Dry upland meadows with dense coverage of grasses and forbs. Nests are often found tucked under rocks, logs, discarded lumber, metal sheeting, and hay bales left in fields over winter.	No survey proposed. Impacts not anticipated.
	Northern long-eared bat	*Myotis septentrionalis*	Threatened	OH-Threatened MI-Threatened	All	Hibernation sites used during the winter (caves, mines) and roosting sites for reproduction (tree cavities) during the summer.	Mist-net surveys were conducted in 2015 and four northern long-eared bats were captured.

TABLE 3.5-1

Federal and State Listed Species Potentially Occurring Within or Near the Project Area

	Species Name		Federal	State	County	Habitat	Survey Status
	Common	**Scientific**					
Mussels	Black sandshell	*Ligumia recta*	Not listed	OH-Threatened MI-Endangered	OH- Erie, Lorain, Lucas MI-Lenawee, Monroe, Washtenaw	Occupies rivers with strong currents and lakes with a firm substrate of gravel.	Surveys were conducted and one live individual was found in Ohio (Maumee River).
	Creek heelsplitter	*Lasmigona compressa*	Not listed	OH-Special Concern	OH-Columbiana, Wayne, Lorain, Huron, Wood, Lucas, and Henry	Most common in headwater streams with firm substrates, but can be found in larger rivers.	Surveys were conducted and live individuals were found in Ohio (Ai Creek, Swan Creek, Wellington Creek) and Michigan (Macon Creek, River Raisin).
	Deertoe	*Truncilla truncata*	Not listed	OH-Special Concern MI-Special Concern	OH-Erie, Sandusky, Wood, Lucas, and Henry MI-Lenawee and Monroe	Prefers habitats of firm sand or gravel substrates in rivers and lakes with a moderately swift current.	Surveys were conducted and live individuals were found in Ohio (Maumee River, Portage River, Sandusky River).
	Eastern pondmussel	*Ligumia nasuta*	Not listed	OH-Endangered MI-Endangered	OH-Lorain, Erie, Sandusky and Lucas MI-Monroe	Occurs in slow moving streams or ponds/lakes with sandy substrate. Limited to Lake Erie and Lake Erie tributaries.	Surveys were conducted, no live individuals were found.
	Elktoe	*Alasmidonta marginata*	Not listed	MI-Special Concern	All	Found in clean small to large sized streams and rivers and prefers swifter currents over packed sand and gravel substrates.	Surveys were conducted and live individuals were found in Michigan (River Raisin).
	Ellipse	*Venustaconcha ellipsiformis*	Not listed	MI-Special Concern	Washtenaw	The ellipse occurs in the swift currents of riffles or runs of clear, small to medium sized streams in gravel or sand and gravel substrates.	Surveys were conducted, no live individuals were found.
	Fawnsfoot	*Truncilla donaciformis*	Not listed	OH-Threatened MI-Threatened	OH-Eric, Lucas and Sandusky MI- Monroe	Large rivers in compact sand and gravel substrates.	Surveys were conducted and one live individual was found in Ohio (Sandusky River).

TABLE 3.5-1

Federal and State Listed Species Potentially Occurring Within or Near the Project Area

Species Name		Federal	State	County	Habitat	Survey Status
Common	**Scientific**					
Hickorynut	*Obovaria olivaria*	Not listed	MI-Endangered	Monroe and Washtenaw	Occurs in medium to large stream with silt, sand and gravel substrates.	Surveys were conducted, no live individuals were found.
Kidneyshell	*Ptychobranchus fasciolaris*	Not listed	OH-Special Concern MI-Special Concern	OH-None listed MI-Lenawee, Monroe and Washtenaw	The kidney shell occurs in high water quality creeks, rivers and lakes with moderate to swift currents and a sand or gravel substrate.	Surveys were conducted and live individuals were found in Ohio (Vermilion River).
Lilliput	*Toxolasma parvus*	Not listed	MI-Endangered	Lenawee, Monroe, and Wayne	Small streams with muddy or clay substrates. Occasionally found in large rivers, lakes and impoundments.	Surveys were conducted, no live individuals were found.
Northern riffleshell mussel	*Epioblasma torulosa rangiana*	Endangered	MI-Endangered	Lenawee, Monroe and Wayne	Large streams and small rivers in firm sand of riffle areas; also occurs in Lake Erie.	Surveys were conducted, no live individuals were found.
Paper pondshell	*Utterbackia imbecillis*	Not listed	MI-Special Concern	Monroe, Washtenaw and Wayne	The paper pondshell is most often observed in lakes, ponds and impoundments with soft mud or sand substrates.	Surveys were conducted and live individuals were found in Ohio (Chappel Creek).
Purple lilliput	*Toxolasma lvidus*	Not listed	MI-Endangered	Monroe	Small streams with compact sand or gravel substrates.	Surveys were conducted, no live individuals were found.
Purple wartyback	*Cyclonaias tuberculata*	Not listed	OH-Special Concern MI-Threatened	OH-Erie and Lucas MI -Lenawee, Monroe, Washtenaw	Found in medium to large rivers with gravel or mixed sand and gravel substrates.	Surveys were conducted, no live individuals were found.
Rainbow	*Villosa iris*	Not listed	MI-Special Concern	All	The rainbow occurs in coarse sand or gravel in small to medium streams.	Surveys were conducted, no live individuals were found.
Rayed bean	*Villosa fabalis*	Endangered	OH-Endangered MI-Endangered	OH- Lucas MI-Lenawee, Monroe, and Wayne	Small headwater creeks, but they are sometimes found in large rivers.	Surveys were conducted and live individuals were found in Michigan (River Raisin).
Round hickorynut	*Obovaria subrotunda*	Not listed	MI-Endangered	Lenawee	Found along the shores of medium to large rivers and lakes. The round hickorynut generally is found in sand and gravel substrates in areas with moderate flow.	Surveys were conducted, no live individuals were found.

TABLE 3.5-1

Federal and State Listed Species Potentially Occurring Within or Near the Project Area

	Species Name		Federal	State	County	Habitat	Survey Status
	Common	**Scientific**					
	Round pigtoe	*Pleurobema sintoxia*	Not listed	OH-Special Concern MI-Special Concern	OH-Lucas MI-All	Occurs in mud, sand, or gravel substrates of medium to large rivers.	Surveys were conducted, no live individuals were found.
	Slippershell	*Alasmidonta viridis*	Not listed	MI-Threatened	Lenawee, Monroe, Washtenaw and Wayne	Found in creeks and headwaters of rivers, but has also been reported in larger rivers and in lakes. Typically, this mussel usually occurs in sand, mud or gravel substrate.	Surveys were conducted and live individuals were found in Michigan (River Raisin).
	Snuffbox	*Epioblasma triquetra*	Endangered	OH-Endangered MI-Endangered	Monroe, Washtenaw and Wayne	Small to medium-sized creeks in areas with a swift current and some larger rivers.	Surveys were conducted, no live individuals found.
	Threehorn wartyback	*Obliquaria reflexa*	Not listed	OH-Threatened MI-Endangered	OH-Erie, Lucas, Lorain, and Sandusky MI-Monroe	Large rivers in sand or gravel; may be locally abundant in impoundments.	Surveys were conducted and live individuals were found in Ohio (Sandusky River, Maumee River).
	Wavy-rayed lampmussel	*Lampsilis fasciola*	Not listed	OH-Special Concern MI-Threatened	OH- Lorain Columbiana MI-Monroe, Lenawee, Washtenaw	Occurs in small to medium sized shallow streams, in and near riffles, with good current. The substrate preference is sand and/or gravel.	Surveys were conducted, no live individuals were found.
Plants	Canadian milk vetch	*Astragalus canadensis*	Not listed	MI-Threatened	Lenawee, Monroe and Washtenaw	Dry prairie, moist shores, river banks, marshy ground, and partly shaded ground.	Botanical surveys were conducted. No individuals found within the Project corridor.
	Compass plant	*Silphium laciniatum*	Not listed	MI-Threatened	Washtenaw	Mostly in southwestern Michigan; adventive along railroads and depauperate prairies.	Botanical surveys were conducted. No individuals found within the Project corridor.
	Cup plant	*Silphium perfoliatum*	Not listed	MI-Threatened	Washtenaw	Found in river floodplains in forest openings and edges.	Botanical surveys were conducted. Cup plant was found in Ohio, but not in Michigan.

TABLE 3.5-1

Federal and State Listed Species Potentially Occurring Within or Near the Project Area

Species Name		Federal	State	County	Habitat	Survey Status
Common	**Scientific**					
Davis's sedge	*Carex davisii*	Not listed	MI-Special Concern	Lenawee, Monroe and Washtenaw	First and second bottoms of floodplain forests in southern Lower Michigan, especially in canopy gaps and artificial clearings including riparian thickets and fields.	Botanical surveys were conducted. No individuals found within the Project corridor.
Eastern prairie fringed orchid	*Plantanthera leucophaea*	Threatened	OH-Threatened MI-Endangered	OH- Wayne, Sandusky MI-Monroe, Washtenaw	Wet prairies, sedge meadows, and moist roadside ditches. Typically restricted to sandy or peaty lakeshores or bogs.	Botanical surveys were conducted. No individuals found within the Project corridor.
Ginseng	*Panax quinquefolius*	Not listed	MI-Threatened	Monroe and Washtenaw	Rich, swampy hardwoods, especially on slopes or ravines.	Botanical surveys were conducted. Ginseng was found in Ohio, but not in Michigan.
Green violet	*Hybanthus concolor*	Not listed	MI-Special Concern	Lenawee, Washtenaw and Wayne	Found in floodplain forests, usually in lower bottoms, as well as mesic forests and rich hardwoods.	Botanical surveys were conducted. No individuals found within the Project corridor.
Hairy angelica	*Angelica venenosa*	Not listed	MI-Special Concern	All	Open, upland oak forests, savanna and prairie remnants and open, sandy woodlots.	Botanical surveys were conducted. No individuals found within the Project corridor.
Hairy wild petunia	*Ruellia humilis*	Not listed	MI-Threatened	Washtenaw	Dry to moist prairies and oak openings.	Botanical surveys were conducted. No individuals found within the Project corridor.
Lakeside daisy	*Hymenoxys herbacea*	Threatened	OH-Endangered	Erie	Found in full sun, calcareous sites, and dry prairies.	Botanical surveys were conducted. No individuals found within the Project corridor.
Northern monkshood	*Aconitum noveboracense*	Threatened	OH-Endangered	Summit	On sandstone in cool, shaded ravines in close proximity to running water, seeps, talus slopes, rock shelters, vertical cliff faces.	Botanical surveys were conducted. No individuals found within the Project corridor.

TABLE 3.5-1

Federal and State Listed Species Potentially Occurring Within or Near the Project Area

	Species Name		Federal	State	County	Habitat	Survey Status
	Common	**Scientific**					
	Pale avens	*Geum virginianum*	Not listed	MI-Special Concern	Lenawee, Washtenaw and Wayne	Found in openings and banks in woods.	Botanical surveys were conducted. No individuals found within the Project corridor.
	Purple milkweed	*Asclepias purpurascens*	Not listed	MI-Threatened	Lenawee, Monroe and Washtenaw	Occurs in dry woodlands (especially oak), dry thickets, shores, and in prairies.	Botanical surveys were conducted. No individuals found within the Project corridor.
	Twinleaf	*Jeffersonia diphylla*	Not listed	MI-Special Concern	Lenawee, Washtenaw and Wayne	Found in mesic forests with rich, loamy soils and in floodplain forests.	Botanical surveys were conducted. No individuals found within the Project corridor.
	Water willow	*Justicia americana*	Not listed	MI-Threatened	Monroe and Washtenaw	Local colonies along the banks of the Huron and Raisin Rivers and nearby lakes and streams.	Botanical surveys were conducted. No individuals found within the Project corridor.
	Weak Stellate Sedge	*Carex seorsa*	Not listed	MI-Threatened	Washtenaw	Found on hummocks in hardwood or hardwood-conifer swamps, margins of bogs, and buttonbush depressions.	Botanical surveys were conducted. No individuals found within the Project corridor.
	White gentian	*Gentiana flavida*	Not listed	MI-Endangered	Washtenaw	Dry or moist prairies and open oak savanna; nearly extirpated in Michigan.	Botanical surveys were conducted. No individuals found within the Project corridor.
	White or prairie false indigo	*Baptisia lactea*	Not listed	MI-Special Concern	Lenawee, Monroe and Washtenaw	Dry to mesic prairies and savannas, dry open roadsides, along railroads, and in fencerows.	Botanical surveys were conducted. No individuals found within the Project corridor.
Reptiles	Blanding's turtle	*Emydoidea blandingii*	Not listed	OH-Threatened	Erie, Lorain, Henry and Fulton	Species is typically found in clean, aquatically diverse areas with muddy substrates. Common systems include ponds, marshes, swamps, bogs, wet prairies, and river backwaters.	Potential suitable habitat avoided where practicable. Consultation with ODNR will determine need for presence/absence surveys.

TABLE 3.5-1

Federal and State Listed Species Potentially Occurring Within or Near the Project Area

Species Name		Federal	State	County	Habitat	Survey Status
Common	**Scientific**					
Eastern massasauga	*Sistrurus catenatus catenatus*	Proposed Threatened	OH-Candidate for Endangered MI-Special Concern	OH -Wayne, Huron, and Sandusky MI -Lenawee, Monroe, Washtenaw and Wayne	Wet prairies, sedge meadows, and early successional fields, preferred wetland habitats are marshes and fens.	Fall presence/absence surveys were conducted with no individuals found. Spring emergence surveys will be conducted.
Spotted turtle	*Clemmys guttata*	Not listed	OH-Threatened MI-Threatened	OH-Summit, Erie, Lorain, and Fulton MI-Lenawee, Washtenaw and Wayne	Slow-moving bodies of water with muddy or mucky bottoms and some aquatic and emergent vegetation, including shallow ponds, wet meadows, bogs, fens, sedge meadows, shallow cattail marshes, small woodland streams and roadside ditches.	Potential suitable habitat avoided where practicable. Consultation with ODNR will determine need for presence/absence surveys.

TABLE 3.6-1

Birds of Conservation Concern in Regions Traversed by the NEXUS Pipeline Project

Habitat	Common Name	Scientific Name	Bird Conservation Regions a/			
			Region 13	Region 22	Region 23	Region 28
Forest-Deciduous	Acadian flycatcher	*Empidonax virescens*		X		
	Bald eagle	*Haliaeetus leucocephalus*	X	X	X	X
	Black-capped chickadee	*Poecile atricapillus*				X
	Canada warbler	*Cardellina canadensis*	X	X	X	X
	Cerulean warbler	*Setophaga cerulea*	X	X		X
	Kentucky warbler	*Geothlypis formosa*		X		X
	Louisiana waterthrush	*Parkesia motacilla*				X
	Northern saw-whet owl	*Aegolius acadicus*				X
	Olive-sided flycatcher	*Contopus cooperi*				X
	Northern flicker	*Colaptes auratus*		X		
	Peregrine falcon	*Falco peregrinus*	X	X	X	X
	Red crossbill	*Loxia curvirostra*				X
	Red-headed woodpecker	*Melanerpes erythrocephalus*	X	X	X	X
	Rusty blackbird	*Euphagus carolinus*		X	X	X
	Eastern whip-poor-will	*Caprimulgus vociferus*		X		X
	Wood thrush	*Hylocichla mustelina*		X		X
	Worm-eating warbler	*Helmitheros vermivorum*				X
	Yellow-bellied sapsucker	*Sphyrapicus varius*				X
Forest-Shrub	Bewick's Wren	*Thryomanes bewickii*		X		X
	Black-billed cuckoo	*Coccyzus erythropthalmus*	X	X	X	
	Willow flycatcher	*Empidonax traillii*			X	
Shrubby Fields	Bell's vireo	*Vireo bellii*		X		
	Blue-winged warbler	*Vermivora cyanoptera*	X	X	X	X
	Brown thrasher	*Toxostoma rufum*			X	
	Golden-winged warbler	*Vermivora chrysoptera*	X	X	X	X
	Prairie warbler	*Setophaga discolor*				X
	Grasshopper sparrow	*Ammodramus savannarum*		X		
	Field sparrow	*Spizella pusilla*		X		
Grasslands/Pastures	Bobolink	*Dolichonyx oryzivorus*			X	
	Dickcissel	*Spiza americana*		X	X	
	Henslow's sparrow	*Ammodramus henslowii*	X	X	X	X
	Smith's longspur	*Calcarius pictus*		X		
	Upland sandpiper	*Bartramia longicauda*	X	X	X	X
Flooded Fields/Mudflats	Lesser yellowlegs	*Tringa flavipes*	X	X		
	Red knot	*Calidris canutus*	X	X	X	
	Whimbrel	*Numenius phaeopus*	X	X	X	

TABLE 3.6-1

Birds of Conservation Concern in Regions Traversed by the NEXUS Pipeline Project

Habitat	Common Name	Scientific Name	Bird Conservation Regions a/			
			Region 13	Region 22	Region 23	Region 28
Flooded Swamplands	Swainson's warbler	*Limnothlypis swainsonii*				X
Marshes/Wetlands	American bittern	*Botaurus lentiginosus*	X	X	X	
	Black-crowned night heron	*Nycticorax nycticorax*	X	X		
	Least bittern	*Ixobrychus exilis*	X	X		
	Marsh wren	*Cistothorus palustris*			X	
	Pied-billed grebe	*Podilymbus podiceps*	X	X	X	
	Prothonotary warbler	*Protonotaria citrea*		X		
	Sedge wren	*Cistothorus platensis*				X
	Short eared owl	*Asio flammeus*	X	X	X	
	Solitary sandpiper	*Tringa solitaria*	X	X	X	
	Wood thrush	*Hylocichla mustelina*	X	X		X
	Yellow rail	*Coturnicops noveboracensis*			X	
Open Water/Shores	Black tern	*Chlidonias niger*	X	X	X	
	Buff-breasted sandpiper	*Tryngites subruficollis*	X	X	X	
	Common tern	*Sterna hirundo*	X	X	X	
	Horned grebe	*Podiceps auritus*	X	X	X	
	Hudsonian godwit	*Limosa haemastica*	X	X	X	
	Marbled godwit	*Limosa fedoa*	X	X	X	
	Semipalmated sandpiper	*Calidris pusilla*	X	X		
	Short-billed dowitcher	*Lumnodromus griseus*		X	X	

a/ Bird Conservation Regions in the Project: Region 13-Lower Great Lakes/St. Lawrence Plain; Region 22-Eastern Tallgrass Prairie; Region 23-Prairie Hardwood Transition; Region 28-Appalachian Mountains.

APPENDIX 3A

Botanical Survey and Floristic Quality Assessment Index Report for the NEXUS Gas Transmission Project

PRIVILEGED AND CONFIDENTIAL

BOUND SEPARATELY IN VOLUME III

APPENDIX 3B

Mitchell's Satyr, Poweshiek Skipperling, Karner Blue Butterfly Survey Protocol for the NEXUS Gas Transmission Project

PRIVILEGED AND CONFIDENTIAL

BOUND SEPARATELY IN VOLUME III

APPENDIX 3C

Bat Survey Report for the NEXUS Gas Transmission Project

PRIVILEGED AND CONFIDENTIAL
BOUND SEPARATELY IN VOLUME III

APPENDIX 3D

Freshwater Mussel Report for the NEXUS Gas Transmission Project

PRIVILEGED AND CONFIDENTIAL
BOUND SEPARATELY IN VOLUME III

APPENDIX 3E

Eastern Prairie Fringed Orchid Survey Protocol for the NEXUS Gas Transmission Project

PRIVILEGED AND CONFIDENTIAL

BOUND SEPARATELY IN VOLUME III

APPENDIX 3F

Eastern Massasauga Habitat Assessment and Survey Protocols for the NEXUS Gas Transmission Project

PRIVILEGED AND CONFIDENTIAL

BOUND SEPARATELY IN VOLUME III

APPENDIX 3G

Bald Eagle Aerial Nest Survey Protocol and Nest Location Mapping for the NEXUS Gas Transmission Project

PRIVILEGED AND CONFIDENTIAL

BOUND SEPARATELY IN VOLUME III