Chapter 4 Environmental Consequences

4.1 Introduction

This chapter compares and contrasts the alternatives in Chapter 2, including the environmental consequences of the alternatives, the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources, which would be associated with the Proposed Action should it be implemented. The conclusions reached in this EIS are based on our analysis of impacts and the following assumptions:

- NiSource Covered Activities would occur at the same rate, location, and point in time for each of the alternatives;
- NiSource Covered Activities would be implemented as described in the MSHCP and Biological Assessment (BA); and
- NiSource would comply with all applicable laws and regulations.

Over the next 50 years, NiSource anticipates 904 acres of new disturbance and 18,505 acres of disturbance on previously disturbed land (most of which is vegetation maintenance) on an annual basis (see NiSource MSHCP Table 2.1). This equates to a total annual disturbance of approximately 0.2% of the total Covered Land (0.19% within the existing ROW and 0.0092% in areas outside of their existing ROWs). While the Covered Land boundary represents the area for which NiSource seeks incidental take coverage for its Covered Activities, only a very small portion of the Covered Land will actually be impacted by NiSource's Covered Activities. Table 2.1 in the MSHCP lists anticipated annual impacts within the Covered Land.

For purposes of analysis, activities were broken into four main categories: ROW Maintenance, O&M, Medium Capital Expansion Projects, and Large Capital Expansion Projects. ROW maintenance acreage estimates were based on historic and anticipated future budgets for this work, which translates into approximately 2,200 miles of ROW maintenance a year. O&M

acreage estimates were based on historic five-year average and anticipated future growth for this type of work across the pipeline system.

Four levels of impact durations were considered: temporary, short-term, long-term, and permanent. Temporary impacts generally occur during construction with the resource returning to preconstruction conditions almost immediately afterward. Short-term impacts would continue for up to 3 years following construction. Impacts were considered long-term if resources would require more than 3 years to recover. Permanent impacts would occur as a result of activities that modify resources to the extent that they would not return to pre-construction conditions during the life of a project, such as impacts to vegetation as a result of the construction and operations of an aboveground facility. We considered an impact to be significant if it would result in a substantial adverse change to the environment.

The nature of the Proposed Action, including the proposed Covered Land that comprise the affected environment, and the spatial and temporal uncertainty about future project locations, did not allow for site specific analyses. A comprehensive analysis of Covered Activities and their effect on species and species habitat was done for the MSHCP and for the appended Biological Assessment (BA). For the MSHCP, species and species habitat were evaluated using reasonable worst-case assumptions to predict the manner and extent of anticipated take, which we believe captures the range of possible effects into the future. Impacts associated with implementation of NiSource Covered Activities will be nearly identical under each of the alternatives, including the No Action Alternative. The scope of the analysis therefore covers the direct, indirect, and cumulative effect (i.e., impacts) of the proposed incidental take, and the avoidance, minimization and mitigation measures proposed from implementation of the MSHCP (Service MSHCP Handbook at 5-1 to 5-2).

As discussed in Chapter 1, neither the MSHCP nor ITP authorize the NiSource Covered Activities that may cause take. NiSource Covered Activities entail considerable involvement of other federal agencies in the authorization, approval, or permitting of Covered Activities. As such, the Cooperating Agencies will necessarily make separate and independent decisions regarding these future actions, consistent with their regulations and policies.

Further, as discussed in Section 1.5.3, the FERC has done a NEPA analysis on potential impacts of activities certificated under its Blanket Certificate Program, and the results were a "finding of no significant impact" (FONSI). As discussed elsewhere in this EIS, we adopt and incorporate FERC's NEPA analysis for its blanket certificate program by reference.

4.2 Impacts to Physical Resources

4.2.1 Surface Water

Analysis of surface water resources includes a discussion of potential impacts to natural water found above the ground surface as a result of NiSource Covered Activities, such as lakes, ponds, rivers, streams, springs, and other wetlands. All of the species in the MSHCP depend on surface water resources for some part of their life history, with the exception of the Madison cave isopod, a cave obligate species.

Alternative 1

For all alternatives, construction-related direct and indirect impacts to surface water resources could occur from future Covered Activities, especially earth-disturbing activities on Covered Land prone to erosion, and activities directly associated with wetlands, rivers and streams. As a result, there may be direct, indirect, and cumulative effects to species included in the MSHCP that rely on these resources. Examples of such activities include disturbance associated with clearing and grading of stream banks, in-stream trenching, trench dewatering, blasting, backfilling, and hydrostatic testing.

Impacts from such activities may arise due to reduced shading from tree clearing, which can increase water temperatures; temporary suspension of sediments from grading, trenching, and in-stream blasting, which can cause turbidity and affect dissolved oxygen concentrations and stream bottoms; and potential release of drilling fluids during Horizontal Directional Drilling (HDD), which could contaminate receiving waters. Uncontrolled erosion from rights-of-way treated with herbicides, fertilizers or pesticides could introduce these substances into receiving

waters. Similarly, leaks or spills of fuels and lubricants during right-of-way construction and maintenance could adversely affect surface water quality.

Depending on the season that NiSource conducts hydrostatic testing, withdrawal of test water from natural low flowing surface sources could alter stream velocities or flow, affecting organisms and/or water use downstream. Similarly, if commercial or private water sources are used it could limit supplies available for other uses. Discharging test water into a body of water significantly different in temperature and/or salinity could have temporary adverse effects on the receiving water. Improper storage of chemically pretreated test water or test water contaminated by oil and/or grease residues from the pipe could contaminate surface water, groundwater, and soils, and impacts certain bird and bat species. Inadequate use/installation of erosion control devices during the discharge of hydrostatic test water could erode soils in the immediate vicinity of the release. If such a failure occurs at or near a stream crossing, it could temporarily contaminate the stream.

NiSource's ECS (see Appendix B of the MSHCP) and individual project EM&CPs, outline specific requirements to minimize water-related impacts from construction and ROW maintenance, as well as construction of other facilities including wells, compressor stations, HDD locations, and measurement/regulation stations. These include:

- installation of equipment bridges,
- use of sediment traps for impounded water (or something similar) prior to trenching,
- use of sediment fence/filters for trench spoil,
- restricting use of herbicides or pesticides within 100-feet of a water body or wetland,
- spill prevention, containment and control measures which prohibit field storage of fuel within 100-feet of water bodies, and
- seasonal restrictions (related to cold water, cool water, and warm water fishery streams to include agency notification) during construction of water crossings.

In addition, NiSource is required to obtain and comply with other federal permits, as well as state and local authorizations, to protect surface water resources. As mandated by law, all required permits and authorizations must be in place before NiSource initiates its Covered Activities. For example, the USACE administers the Section 404 permit program that restricts the discharge of dredged or fill material into waters of the U.S., including wetlands, and establishes mitigation requirements for authorized impacts. The *National Pollutant Discharge Elimination System (*NPDES) stormwater program requires construction site operators engaged in clearing, grading, and excavating activities that disturb one acre or more to obtain coverage under an NPDES permit for their stormwater discharges. NiSource must submit a Storm Water Pollution Prevention Plan (SWPPP) to the appropriate state agency (or EPA if no state program exists) for concurrence that the plan for construction activities are completed in a manner that minimizes erosion and runoff into receiving waters. Other permits that may apply include locally-administered floodplain development permits under the National Flood Insurance Program and various other local and state permits that may exist related to protecting water quality, surface water resources, and wetlands.

Finally, in locations where T&E species overlap with NiSource Covered Activities and surface water resources (primarily rivers and streams), NiSource already implements ESA-related measures (under Section 7 of the ESA) for protecting surface water quality. These ESA-related measures (i.e., best management practices, RPMs, terms and conditions) were developed for the purpose of protecting surface water quality for dependent T&E species (e.g., mussels, Nashville crayfish, Indiana bat, bog turtle, etc). While many of these protective measures are similar in design and outcome as the AMMs in the MSHCP, the extent and intensity of where and how they are implemented may not be the same, as the process used in the MSHCP involved using a reasonable worst-cast scenario from a T&E conservation perspective, and assumed species presence in suitable habitats. Therefore, surface water-dependent species would receive less protection under Alternative 1 (status quo) than under Alternatives 2 and 3, and no mitigation would be implemented.

Alternative 2

Under Alternative 2, additional species-specific AMMs were developed as part of the MSHCP process to further protect surface water-related species (e.g., bog turtle, mussels, Nashville crayfish)(see Chapter 6 of the MSHCP and the appended BA). These measures may have the incidental benefit of reducing or avoiding impacts to surface water resources above and beyond those provided in the ECS, or required by other regulatory agencies. We recognize, however, that these additional benefits may only accrue in those areas where the ESA-listed species occur or are presumed to occur. These AMMs, which may incidentally benefit surface water resources, can be summarized as follows:

- Avoiding construction of culverts or graveled ford across water bodies or riparian occupied habitat;
- Use of flumes to minimize flow disruption in stream habitat;
- Ensuring that upland work does not result in impacts to adjacent water habitats;
- Use of HDD techniques, where feasible, or other trenchless methods for pipeline construction

  or replacement across water habitats;
- Installing pipelines to a minimum depth at least 10-feet horizontally outside the high water line

  in riparian areas;
- Avoiding installation of pipelines or performing in-channel repairs within occupied water

  habitats;
- Working from a lay barge or temporary work bridge rather than operating heavy equipment

  in-stream;
- Removing equipment bridges as soon as practicable;
- Inspecting for and correcting bank destabilization associated with the pipeline within occupied

  water habitats;

- Ensuring that work within streams does not result in impacts to adjacent habitats or karst features;
- Avoiding work in channelizing streams; and
- Crossing perennial streams only during specified periods.

Compliance with NiSource's pre-existing ECS, the regulatory requirements related to USACE's Section 10 and/or 404 permits, the NPDES permit for construction projects, other state and local permits, along with the range of AMMs identified in the MSHCP (for both Alternatives 2 and 3), would minimize the potential for impacts to surface water resources associated with future Covered Activities.

NiSource mitigation measures, including long-term protection and restoration of riparian buffers on rivers and streams with Covered Species (e.g., clubshell mussel, fanshell mussel, sheepnose mussel, James spinymussel) and the Nashville crayfish; floodplain forest habitat for the benefit of Indiana bat; and wetland habitat for the benefit of bog turtle (see Tables 8.2.2-1 and 8.2.2-2 in MSHCP), should produce a net conservation benefit to surface water quality, resulting in benefits to a variety of terrestrial and aquatic organisms, including Covered Species. Riparian restorations that meet minimum NRCS standards for water quality and riparian corridors (see Appendix L of the MSHCP) will be designed to moderate surface water temperatures, reduce nutrient inputs, and reduce sediments and other contaminants along occupied streams, thereby improving the quality of the water and associated habitat for Covered Species and other organisms. Floodplain forest restoration for Indiana bats should improve surface water quality when developed land (e.g., agricultural production land) is converted back into forest habitat. Upland buffers placed around wetlands that support bog turtles should protect and improve the water quality in those wetlands and positively impact associated flora and fauna.

Alternative 3

Like Alternative 2, implementation of additional AMMs included as part of Alternative 3 will further protect water-dependent species (e.g., bog turtle, mussels, etc) and may have the

incidental benefit of reducing or avoiding impacts to surface water resources above and beyond those provided in the ECS or required by other regulatory agencies. Again, we recognize, however, that these additional benefits may only accrue in areas where the ESA-listed species occur. Compliance with NiSource's pre-existing ECS, the regulatory requirements related to USACE's Section 10 and/or 404 permits, the NPDES permit for construction projects, other state and local permits, along with the range of AMMs identified in the MSHCP, would minimize the potential for impacts to surface water resources associated with future pipeline activities.

Over the long-term, mitigation associated with Alternative 3 should produce many of the same benefits as Alternative 2, although to a slightly lesser degree. Under Alternative 2, NiSource would front-load all of their mitigation for O&M activities within the first seven years of MSHCP implementation (see Table 8.2.2-1 in MSHCP). Under Alternative 3, O&M mitigation will not be front-loaded. As a result of the front-loading mitigation, conservation benefits associated with mitigation will start accruing earlier, and over the long-term, exceed those benefits expected from Alternative 3.

Other types of mitigation may not get implemented at all, as NiSource may be unwilling to commit mitigation upfront for the reduced planning horizon (i.e., 10-years) or decide to pursue the status quo approach to ESA compliance (i.e., Section 7), where species avoidance and minimization would be about the same, but mitigation would cease, as mitigation under Section 7 of the ESA is not a legal requirement. If this were the case, mitigation and the associated conservation benefits under both Alternative 2 and 3 would be greatly diminished over what was proposed in the MSHCP.

4.2.2 Ground Water

Analysis of ground water resources includes a discussion of impacts to natural water found underneath the ground surface within the Covered Land, including aquifers, water supply wells, springs, and wellhead protection areas. MSHCP species dependent on ground water include the Madison cave isopod, Indiana bat, and bog turtle. Implementation of any of the alternatives,

including the No Action Alternative, is expected to result in minimal direct or indirect effects to local ground water resources in the Covered Land.

Alternative 1

In general, groundwater impacts associated with most NiSource Covered Activities would only occur where the local water table is near the surface. All such impacts would be temporary and localized. However, future NiSource activities, particularly construction activities and storage field operations, do have the potential to directly and indirectly impact local ground water resources, and NiSource's ECS (see Appendix B) currently outline strategies for minimizing these potential impacts. For instance, blasting that occurs during construction could potentially impact water quality and water quantities in wells and springs near construction work areas. Other potential impacts to groundwater may include variations in groundwater levels or turbidity due to trench excavation and dewatering in areas with shallow groundwater systems; or clearing and grading activities that might impact overland water flow and/or surface-to-groundwater infiltration rates. Such construction-related impacts are typically temporary as NiSource's standard practice (through ECS compliance) implements procedures for erosion controls, restoration of ground contours, and re-vegetation. Further, the majority of construction would involve shallow, temporary, and localized excavation. These potential impacts would be avoided or minimized by the use of construction techniques and mitigation described in NiSource ECS and individual project EM&CPs.

A NiSource activity that does have the potential to impact groundwater resources is hydraulic fracturing associated with storage well installation, operations, and maintenance. Hydraulic fracturing involves high pressure injection of water-based slurry into a well or wells to break up the underlying geologic formation and expand or recondition the storage capacity of a storage field (well). This technique is used by NiSource to enhance or recondition existing storage wells within the Covered Land. Typical depths of NiSource's storage field well fracturing is between 2,000-6,000-feet (NiSource 2010c), well under the groundwater supply commonly used for domestic or otherwise potable water supply. Because the impacts occur at these depths

below the surface, there is no anticipated impact to endangered species that live on or near the surface.

Hydraulic fracturing has been the subject of some public scrutiny in parts of the country that have experienced negative environmental consequences when the water is inadequately treated at disposal facilities and released into the environment. The injection water is high in salinity and total dissolved solids and must be properly treated prior to release. NiSource water disposal is completed at one facility in Lawrence County, Pennsylvania, for activities that would fall within the Covered Activities. This facility releases its treated water into the Shenango River and it has been determined that the affected stretch of river does not contain threatened or endangered mussels. It is important to note that there is a significant difference between utilizing the technique for enhancement of existing storage wells, as NiSource does, and the use of the technique for exploration of potential natural gas sources. The public interest and controversy has emerged due to activities associated with hydraulic fracturing for exploration, which has more potential for negative environmental effects due to its use of a much greater volume of water to form the slurry used to create the required pressure.

At issue with respect to groundwater is the potential for cross-contamination of shallow potable aquifer systems from deep well injection and flowback water. To address this potential, NiSource wells are constructed with steel casing grouted within the borehole annulus through these shallow aquifer zones to avoid any potential for interaction of deeper, poor quality formation water migrating up through the borehole annulus and into the potable aquifer. In addition, disposal of injection water used to accomplish the fracturing is done in accordance with federal, state, and local regulations. Most states associated with the Covered Land have comprehensive regulatory standards for hydraulic fracturing and provide a general prohibition against pollution of any surface or subsurface fresh water from well completion activities. Wells are regulated by state authorities and/or federal EPA underground injection rules, and fracturing activities must be in compliance with associated permits relative to use and disposal of injection water. The Service has concluded that the type of hydraulic fracturing that NiSource employs

will have no adverse impacts to listed species that occur within the Covered Land and therefore, no incidental take is authorized for this activity.

Alternative 2

Under Alternative 2, AMMs developed during the MSHCP process should further protect ground water resources above those currently employed under Alternative 1. For instance, AMMs were developed to protect potential recharge areas of cave streams and other karst features important to Indiana bats. These measures are in addition to relevant NGTS ECS standards such as Section III, Stream and Wetland Crossings, and Section IV, Spill Prevention, Containment and Control. For example, drilling within 0.5 mile of known or presumed occupied hibernacula will be conducted in a manner that will not compromise the structural integrity or alter the karst hydrology of the hibernacula (e.g., outer drilling tube filled with concrete to ensure no modification to any karst encountered) (see related adaptive management discussion in Chapter 7 of the MSHCP). Equipment servicing and maintenance areas will be sited at least 300 feet away from streambeds, sinkholes, fissures, or areas draining into sinkholes, fissures, or other karst features.

As mitigation, NiSource will permanently protect important caves/karsts serving as Indiana bat hibernacula, including establishing a .25-mile buffer of protected habitat around the cave/karst opening (see Section 6.2.1.6 of the MSHCP). Ground water quality improvements could be realized as a result of conversion of previously developed land (e.g., croplands) to natural habitats (e.g., wetlands, prairies, savannas, forests) where ground water infiltration would be expected to increase. Restoring and developing wetlands and certain uplands for bog turtle and other species could increase water filtration and ground water recharge capabilities as well.

NiSource minimization and mitigation measures for Madison cave isopod should improve ground water resources, at least locally. Madison cave isopod sites containing surface karst features will be protected and restored (see Section 6.2.3.6 of the MSHCP). Protected sites must contain either a cave or spring known to provide habitat for the Madison cave isopod and

its immediate recharge area, or a minimum of five surface karst features and a 300-foot buffer around each feature.

Alternative 3

For Alternative 3, issuance of an ITP with a 10-year duration would produce no effects different than those in Alternative 2, other than mitigation benefits not being realized up-front as a result of NiSource implementing their O&M mitigation within the first seven years. Again, if NiSource were to decide not to renew their ITP after 10 years and decide to comply with ESA status quo, ground water benefits associated with mitigation would be reduced, as compensatory mitigation under the status quo is not a legal or regulatory requirement under the ESA.

4.2.3 Geology

Discussion of geologic resources includes surface and subsurface materials and their inherent properties, including topography, seismic characteristics, and soil stability within the Covered Land. MSHCP species potentially affected when impacts to geologic resources occur include the Indiana bat and Madison cave isopod.

Alternative 1

Potential disturbance and minimization of impacts to geologic resources would be similar under all alternatives. Long-term, NiSource Covered Activities would not materially alter geologic conditions within the Covered Land. NiSource would continue to follow required ECS and individual project EM&CPs as required.

Potential impacts to geologic resources would result primarily from pipeline construction activities. This includes temporary disturbance to slopes within the existing right-of-way resulting from grading and trenching operations. NiSource is required to minimize impacts to slopes by returning contours to pre-construction conditions.

Alternative 2

AMMs outlined in the MSHCP for the action alternatives have the potential to further minimize impacts to geological resources that support associated Covered Species. These include NiSource's commitment to clearly mark karst buffers until ground disturbing activities are completed, and using an inverted filter to bridge karst features when filling new sinkholes. Contaminants, including but not limited to oils, solvents, and smoke from brush piles, will be strictly controlled as provided for in the EMCS and ECS, Section II.C.2, and Section IV so the quality and quantity of karst resources are not affected.

Mitigation for Indiana bat and Madison cave isopod will provide long-term protection for some important karst features. Implementation of additional karst protective measures, such as upland buffers, may occur based on future site-specific environmental reviews of potential locations.

Alternative 3

Implementation of any of the alternatives is expected to result in minimal direct or indirect effect to local or regional geology, topography, or geological hazards in the Covered Land. The major difference between Alternative 3 and Alternative 2 is any benefits to geological resources as a result of O&M mitigation would not occur as rapidly, as NiSource would not front-load their O&M mitigation under Alternative 3 (see Tables 8.2.2-1 MSHCP).

4.2.4 Soils

The soils in the Covered Land are very diverse due to the variety of climates, parent material, vegetation, landforms, and age of surface materials. Throughout the Covered Land, six of the 12 NRCS soil orders are encountered, including Ultisols, Alfisols, Inceptisols, Entisols, Mollisols, and Histosols. Analysis of soil resources associated with NiSource Covered Activities within the Covered Land includes potential impacts to soil stability, soil erosion and soil contamination, including measures to avoid and/or minimize such impacts. All of the species in the MSHCP are directly and/or indirectly affected by soil resources in the Covered Land.

Alternative 1

The Covered Land traverses a variety of soil types and conditions, the majority of which have been previously disturbed by human activity. Construction activities, such as clearing, grading, trenching, and backfilling, could adversely affect soil resources by causing erosion, compaction, and degradation. Clearing removes protective vegetative cover and exposes soil to the effects of wind and rain, which could increase the potential for soil erosion. Grading, spoil storage, and equipment traffic can compact soil, reducing porosity and increasing runoff potential. Rock or fill material brought to the surface during trenching operations could impact soil productivity and hinder restoration of the right-of-way vegetation. Permanent impacts to soils would mainly occur at existing and proposed aboveground facilities, and within previously disturbed ROWs.

NiSource would implement measures to control erosion, enhance successful revegetation, and minimize any potential adverse impacts to soil resources. Specifically, potential soil impacts would be mitigated through measures such as topsoil segregation, temporary and permanent erosion control, and post-construction restoration and revegetation of construction work areas. Additionally, NiSource would implement spill prevention and clean-up plans during construction and operation to prevent and contain, if necessary, accidental spills of any material that may contaminate soils and to ensure that any inadvertent spills of fuel, lubricant, or solvents are contained and cleaned up in an appropriate manner.

NiSource's ECS (see Appendix B) establishes specific requirements to protect and maintain soil resources, including standards related to clearing, grading, trenching, restoration, and stabilization. For example, temporary erosion controls must be installed immediately before the initial disturbance of soil. Also, when grading or trenching occurs topsoil must be stripped and stockpiled separately for residential or agricultural work areas to prevent the mixing of topsoil and subsoil. In addition, the NPDES storm water program requires construction site operators engaged in clearing, grading, and excavating activities that disturb one acre or more to obtain coverage under an NPDES permit for their storm water discharges. Agencies provide concurrence that construction activities are completed in a manner that minimizes soil erosion and eventual impacts to receiving waters. Under this alternative however, the additional AMMs

outlined in the MSHCP which also serve to minimize impacts to soil resources (see below) would not be required as a condition of an ITP. Instead, implementation of such measures would likely vary, negotiated in the future on a project-by-project basis with affected Service Field Offices.

Alternative 2

AMMs implemented under Alternative 2 go above and beyond the status quo ECS requirements of Alternative 1. These include employing silt fences around construction areas and soil disturbance areas, using native material to backfill trenches, as well as refraining from blasting and drilling, within specified distances of potential occupied habitat (see Chapter 6 of the MSHCP for a complete list of AMMs). NiSource's spill prevention, containment and control measures outlined in the ECS help ensure that spills are contained within secondary containment structures and potential contact with soils limited.

Habitat-based mitigation for Indiana bat, mussels, and other species has the potential to restore and protect soil resources where land that is currently "developed" is converted back into land with a semi-permanent or permanent vegetative cover (e.g., forests, wetlands, grasslands)(see Tables 8.2.2-1 and 8.2.2-2 in MSHCP).

Alternative 3

NiSource's standard BMPs, regulatory requirements related to submission of SWPPPs for construction projects, and AMMs that have been included in the MSHCP should avoid and minimize potential direct and indirect impacts to soil resources associated with these future activities under each of the alternatives, including the No Action Alternative, resulting in minimal direct or indirect effects to local soil resources. However, any benefits to soil resources as a result of O&M mitigation would not occur as rapidly, as NiSource would not front-load their O&M mitigation under Alternative 3.

4.2.5 Climate

According to the EPA, long-term observations indicate that our climate may be changing. As reported, greenhouse gases are at increased levels in the atmosphere. Global mean temperatures have increased 1.2 to 1.4ºF in the last 100 years according to NOAA and NASA, with most of the warming occurring in recent decades. Other aspects of the climate also appear to be changing, such as rainfall patterns, snow and ice cover, and sea level (EPA 2009). Global and regional climate models predict warming and increased variability in the timing and type of precipitation. As a consequence of these changes, fire regimes are likely to be altered, which, in some parts of the country, may result in increased fire frequency and intensity. Climate change may also have some direct effects on productivity and biogeography as well as indirect effects on vegetation through changes in fire, insect, and disease disturbances (Carroll et al. 2003; Dale et al. 2001; Parry et al. 2007). Some ecological communities are projected to move upward in both elevation and latitude (Walther et al. 2002). Therefore, since climate change is likely to manifest itself through other changed circumstances like flooding (as discussed in detail below), this MSHCP will discuss climate change as it relates to the accelerated rate of warming.

Alternative 1

According to the American Meteorological Society, there are local and regional considerations that come into play when trying to project a pattern of global warming onto weather or climate conditions in a specific region. The American Meteorological Society explains that there are regional variations in the signature of climate change, with warming in the western U.S. but little or no annual temperature change occurring in the southeast U.S. in recent decades. Evidence for warming is also observed in seasonal changes with earlier springs, longer frost-free periods, longer growing seasons, and shifts in natural habitats and in migratory patterns of birds (American Meteorological Society 2007).

For the Covered Land, climate can vary substantially and is influenced by variations in elevation, topographic features, latitude, and proximity to the ocean. The potential for NiSource Covered Activities to influence or impact regional climate is considered extremely low.

NiSource's Covered Activities do not include extensive or large-scale de-vegetation, re-vegetation, de-watering, re-watering, or any other activity that could influence the regional climate within any portion of the Covered Land. Further, potential direct and indirect impacts on climatic resources, including climate change, cannot be quantified at this time.

Alternative 2

Aquatic and terrestrial biomes are effective biological "scrubbers" of atmospheric carbon, a major component of greenhouse gases. The Service regards protection and restoration of natural habitats important aspects of controlling carbon, both in terms of preventing loss of carbon currently stored in the terrestrial biosphere and as natural sequesters of carbon. The mitigation actions proposed in the MSHCP would preserve and restore additional land and water, and enhance carbon sequestration. For instance, for Indiana bat mitigation, NiSource may protect and restore up to 10,960 acres of forest land (see Table 2.3.4 in EIS and Tables 8.2.2-1 and 8.2.2-2 in MSHCP). These actions may contribute toward efforts to mitigate human-induced global climate changes, both in terms of preventing loss of stored carbon, and in carbon sequestration, although at a very small immeasurable scale.

Alternative 3

Any benefits to mitigate human-induced global climate change as a result of NiSource O&M mitigation would not occur as rapidly under this alternative, as NiSource would not be front-loading their O&M mitigation. Given the scale at which climate change is occurring, and the localized scale in which NiSource mitigation would occur, we would expect no material difference between Alternative 2 and Alternative 3.

4.2.6 Air Quality

Analysis of air quality includes a discussion of impacts to, or exceedance of, air quality standards as a result of the Proposed Action and associated Covered Activities. The ambient air quality in an area can be characterized in terms of compliance with the primary and

secondary NAAQS. The CAA, as amended, requires the EPA to set NAAQS for pollutants considered harmful to public health and the environment.

Alternative 1

NiSource Covered Activities could impact air quality, though emissions generated by equipment during construction, and from the long-term operation of compressor stations. Impacts to air quality associated with these projects, while thought to be minor, could include short-term, local air quality degradation related to ground disturbance and/or internal combustion exhaust from heavy machinery or generators. NiSource compliance with ECS and requirements of other existing (for O&M) and future permits or approvals would likely reduce or eliminate the chance of air quality exceedance of NAAQS or local ordinances. Compliance with the CAA and NAAQS, as well as any additional state-specific regulations for air quality within the Covered Land, would occur on a project-by-project basis for those NiSource Covered Activities requiring additional state or federal approvals and including O&M.

Trees can reduce pollution by actively removing pollution from the atmosphere. Leaf stomata, the pores on the leaf surface, take in polluting gases which are then absorbed by water inside the leaf. Trees also act as filters by intercepting airborne particles. Particles are captured by the surface area of the tree and its foliage until they are either washed off by rainwater or blown off by winds. Tree cover can reduce the amount of harmful gasses and particulate matter in the air. This is particularly true for urban areas. In urban areas, trees have been shown to improve air quality, and to lower air temperatures, which can reduce energy use. NiSource Covered Activities, including ROW clearing, could reduce tree cover in local areas, reducing the beneficial effects the trees might have on air quality.

Alternative 2

Issuance of an ITP to NiSource would have little or no consequence to air quality, beyond benefits associated with mitigation. There were no AMMs developed for take species or MSHCP species that specifically targeted air quality concerns.

The mitigation actions proposed in the MSHCP would preserve and restore land and water, which could potentially improve air quality on local scales. NiSource may protect and restore up to 10,960 acres of forest land and associated habitats as mitigation for the Indiana bat (see Table 2.3.4 in EIS and Tables 8.2.2-1 and 8.2.2-2 in MSHCP). These actions may contribute toward improvements in air quality, as increasing the amount of tree cover in an area could help reduce harmful gasses and particulate matter in the air.

Alternative 3

Under Alternative 3, any improvements to air quality through potential mitigation actions would be roughly the same as Alternative 2, with one exception; the potential increase in tree cover as a result of NiSource mitigation would occur at a slower rate, as NiSource would not front-load their O&M mitigation in the first seven years after MSHCP implementation.

4.3 Impacts to Biological Resources

4.3.1 Vegetation

Analysis of vegetation includes a discussion of potential direct and indirect impacts on vegetation within the Covered Land as a result of the Proposed Action and the NEPA alternatives. All of the species in the MSHCP depend, either directly or indirectly, on the vegetation resources within the Covered Land.

Alternative 1

As stated in Chapter 2, the NiSource on-shore pipeline and storage field system equals approximately 15,562 miles of linear facilities, including twelve counties where potential storage fields most likely to be considered for expansions are found. With these counties and a buffer of one-half mile along the linear facilities, the NiSource Covered Land footprint equates to approximately 9,783,207 acres. In Appendix A of the MSHCP, NiSource provides annual acreage disturbance projections (see MSHCP Appendix A). Of the total anticipated disturbance within the Covered Land, approximately 95 percent of the disturbance would occur on existing

previously disturbed ROWs in the form of vegetation maintenance. The remaining 5 percent represents new disturbance from operations and maintenance activities or new construction projects. Over a 50-year period this acreage impact would be approximately 42,200 acres within the Covered Land or roughly 844 acres annually.

The most prevalent land-use type in the Covered Land is Deciduous Forest (49.30%), followed by Cultivated Crops (17.72%), Pasture/Hay (13.53%), and Developed – Open Space (6.47%). The remainder of the area is covered by eleven other types, none exceeding 3% of the total area. A description of each land-use-cover class is included in Table 3.2 in the MSHCP.

NiSource impacts to vegetation would depend on the type of vegetation affected, the rate at which the vegetation would regenerate, and the area and frequency of vegetation maintenance conducted during operations. Pipeline construction, including the removal of the existing pipeline, could cause cutting, clearing, and/or removal of existing vegetation. Following ROW construction, up to a 100-foot-wide permanent right-of-way would be maintained to operate and maintain the pipeline system. During ROW maintenance, trees and other woody material would be cut, generally chipped, and removed from the ROW. Where necessary, roots would be excavated and placed in a disposal area. Following construction, all of the workspaces would be seeded in accordance with applicable permits and landowner requests. After cleanup and reseeding of the ROW, the herbaceous components of the early successional-upland scrub-shrub cover type would regenerate quickly, typically within 1 to 3 years. Other vegetation types, such as woody-shrub lands, would take longer. Additionally, permanent impacts would occur in shrub lands located within the permanent easement, due to the periodic removal of woody vegetation during routine maintenance, which is on a seven-year cycle.

Construction in forest lands would permanently remove the tree canopy over the entire width of the construction ROW, which would change the structure of the underlying vegetation community. Trees growing on the permanent ROW would be controlled through vegetation maintenance, which would preclude their re-establishment into mature trees. The regrowth of trees would be permitted within temporary workspaces, but it may take decades before these trees resemble the forest vegetation that was present before construction. The clearing of trees

from the construction ROW could also have secondary effects. Soils that were previously shaded by the tree canopy would receive increased amounts of light, which could lead to drier soils and higher soil temperatures. Trees located on the edge of the ROW might be subject to mechanical damage to trunks and branches, and root impacts from soil disturbance and compaction, all of which could result in the decreased health and viability of some trees.

NiSource's ECS (in particular Section II) establishes specific standards related to vegetation clearing activities that take place prior to construction, as well as post-construction restoration of plant communities for upland and wetland areas, along with areas around water body crossings. The ECS also detail required vegetation management during normal ROW maintenance and monitoring (Section V). For instance, following construction, NiSource has an established protocol to begin restoration within six days of final grading, assuming weather and soil conditions allow. Restoration includes fertilizer and lime application (in upland areas) along with seeding and mulching of the ROW or well site area. NiSource has established specific application rates and seed mixes that must be followed, unless an existing ROW agreement, permit, or local, state, or federal agency has other site-specific requirements that must be met.

In general, NiSource Covered Activities involving major ground disturbance could have long-term impacts to vegetation; however, restoration of vegetative cover associated with ECS requirements and EM&CPs would reduce potential long-term negative impacts.

Under the No Action Alternative, AMMs in the MSHCP which serve to further avoid and minimize take of MSHCP species and habitat, would not occur, nor would mitigation. Implementation of RPMs with similar objectives would likely vary, given they would be dependent upon terms and conditions of project-specific permits or authorizations NiSource would receive through Section 7 (a)(2) consultations.

Alternative 2

Issuance of an ITP and implementation of the MSHCP would have minimal long-term direct or indirect impacts on vegetation within the Covered Land, given the requirements for restoration

and re-vegetation already in-place. The AMMs in the MSHCP include additional measures that will avoid and minimize potential impacts to vegetation, take and MSHCP species habitat, as well as other fauna. For example, in its MSHCP NiSource has committed to:

- Avoid stepping on hummocks and tussocks
- Avoid pulling woody vegetation out by the roots in identified habitat
- Place and timing restrictions on mowing
- Avoid dragging vegetation through occupied habitat
- Avoid burning brush piles within a specified distance of occupied habitat
- Re-vegetate disturbed habitat in accordance with the ECS
- Leave piles of woody debris along edge of ROW if clearing vegetation
- Avoid additional clearing of trees
- No woody vegetation or spoil disposal within occupied habitat
- Retain snags, dead/dying trees, and trees with exfoliating bark
- Maintain a diversity of open, herbaceous habitat
- Thoroughly clean all equipment prior to use to avoid inadvertent introduction of exotic species

NiSource's ECS, site-specific requirements already in place, and certain AMMs included in the MSHCP, are expected to minimize the potential for direct and indirect impacts to habitat and vegetation. Mitigation, primarily for Indiana bat, could produce a net gain in habitat (vegetation) restored and protected. NiSource may protect and restore up to 10,960 acres of forest land and associated habitats as mitigation for the Indiana bat (see Table 2.3.4 in EIS and Tables 8.2.2-1 and 8.2.2-2 in MSHCP). For mussels, NiSource has proposed to protect and restore land associated with riparian areas along streams and rivers (see Table 2.3.4 in EIS and Tables 8.2.2-1 and 8.2.2-2 in MSHCP) for a purpose of improving water quality. Both of these actions

could provide also additional habitat for native wildlife, and mitigate for vegetation impacts due to NiSource Covered Activities.

Alternative 3

The environmental consequence of Alternative 3 would be the same as Alternative 2 with one exception: the amount of habitat protected and restored within the first seven years would be less under Alternative 3, as NiSource would not be mitigating "up-front" for O&M impacts. All of the AMMs and most of the mitigation would be the same as Alternative 2.

4.3.2 Wetlands

Analysis of wetlands includes a discussion of potential direct and indirect impacts on those transitional areas between terrestrial and aquatic systems in the Covered Land where water covers the land, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season. Species within the MSHCP most dependent on high quality wetlands include the bog turtle and Indiana bat.

Alternative 1

Primary impacts of pipeline construction and right-of-way maintenance activities on wetland resources would be the alteration of wetland vegetation. Other types of impacts could include temporary changes in wetland hydrology and water quality. Clearing, trenching, backfilling, and grading activities could temporarily impact wetlands. During construction, failure to segregate topsoil over the trench line could result in the mixing of the top soil with the subsoil. This disturbance could result in altered biological activities and chemical conditions in wetland soils and could affect the re-establishment and natural recruitment of native wetland vegetation after restoration. Compaction and rutting of soils during construction could result from the movement of heavy machinery and the transport of pipe sections within wetland areas. The resulting alteration of the natural hydrologic patterns could inhibit seed germination or increase the potential for siltation in wetlands. The discharge of storm water, trench water, or hydrostatic test water could result in silt-laden water entering a wetland and cause the release of chemical and

nutrient pollutants from sediments. Clearing activities around wetlands could temporarily affect the wetland's capacity to buffer flood flows and/or control erosion.

Under the No Action Alternative, NiSource would continue to implement construction, operations, and maintenance activities as it currently does by obtaining all individual permits and approvals, including Section 404 permits of the Clean Water Act. Section 404 of the CWA of 1972 established standards to minimize impacts to wetlands under the regulatory jurisdiction of the USACE. These standards require avoidance of wetlands where possible and minimization of disturbance where impacts are unavoidable to the degree practical. On a national level, jurisdictional wetlands include those wetlands subject to regulatory authority under Section 404 of the CWA as well as EO 11990 (Protection of Wetlands) for protection of Federal lands, programs, and activities. Many states also have state-level regulations that further protect wetland areas, including isolated wetlands not subject to federal regulations.

NiSource's ECS (Section III (B)) establish specific requirements to protect wetlands, including that all wetlands be marked by a professional prior to construction. In addition, the ECS establish standards related to crossing techniques, clearing, grading, trenching, blasting, backfilling, and restoration work within wetlands. Examples include working with appropriate government agencies to minimize the impacts of new construction or ROW maintenance in wetlands per Section 404 of the CWA and any state-specific regulations, installation of equipment bridges, segregating topsoil over the trench line in non-saturated wetlands to avoid mixing of topsoil and subsoil, restricting use of herbicides or pesticides within 100-feet of a wetland, restoration of pre-construction contours and elevations, revegetation, use of HDD construction as feasible, and prohibiting storage of hazardous materials within a wetland or within 100-feet of a wetland boundary.

NiSource's standard BMPs, regulatory requirements related to USACE's Section 10 and/or 404 permit, and other state and local permits that have been included in the MSHCP all serve to avoid and minimize the potential for direct or indirect impacts to wetland resources from future NiSource Covered Activities.

Alternative 2

For both action alternatives, potential impacts to wetlands would be avoided and minimized through implementation of species-specific AMMs (e.g., bog turtle). While site-specific, these measures will also have secondary benefits of reducing impacts to wetland resources. Some of the AMMs that will help protect wetland resources include:

- Abide by staging area location restrictions
- Ensure that all imported fill material is free from contaminants
- Use enhanced and redundant spill control for storage well activities in wetlands
- Avoid use of fertilizers within a specified distance of wetlands
- Avoid use of herbicides within a specified distance of wetlands
- Follow standard policies and procedures for herbicide use in proximity to wetlands
- Avoid stepping on hummocks and tussocks
- Avoid pulling woody vegetation out by the roots in identified habitat

NiSource's standard BMPs, regulatory requirements related to USACE's Section 10 and/or 404 permit, other state and local permits, and AMMs (for the action alternatives) all serve to minimize the potential for direct or indirect impacts to wetland resources from future NiSource activities.

Alternative 3

The environmental consequence of Alternative 3 would be the same as Alternative 2 with one exception: the amount of habitat protected and restored within the first seven years would be less under Alternative 3, as NiSource would not be mitigating "up-front" for O&M impacts. All of the AMMs and most of the mitigation would be the same as Alternative 2.

4.3.3 Wildlife and Fish

Analysis of wildlife and fish resources includes a discussion of direct and indirect impacts to non-ESA listed wildlife and fish species encountered within the Covered Land.

Alternative 1

Wildlife Resources

NiSource Covered Activities have the potential to impact a variety of non-listed wildlife species. A variety of wildlife could be impacted by clearing of vegetation; alteration of the landscape from scraping the ground, soil disturbance, and re-contouring; conflicts with vehicles; human presence; activities associated with trenching; increased predation from creating habitat "edge effects" and fragmentation. New construction and the clearing of ROW vegetation could reduce cover, nesting, and foraging habitat for some wildlife. The degree of impact would depend on the type of habitat affected and the rate at which vegetation regenerates after construction. During construction, more-mobile species would be temporarily displaced from the construction right-of-way and surrounding areas to similar habitats nearby. Some wildlife displaced from the right-of-way would return to the newly disturbed area and adjacent, undisturbed habitats after completion of construction. Less mobile species, such as small mammals, reptiles, amphibians, and nesting birds, may experience direct mortality or permanent displacement. Displacement of species could lead to increased competition for some resources. The clearing of vegetation on the construction ROW would reduce cover, foraging, breeding, and nesting habitat for some wildlife. The effect on species that rely on open landscapes would be short-term, as these areas would be reseeded and would likely recover within 1 to 3 years after construction.

Habitat areas comprising tree and shrub dominated vegetation may be affected on a longer-term basis. The effect of workspace clearing on forest-dwelling wildlife species (e.g., birds and bats) would be greater than on open habitat wildlife species since forested lands would take years and possibly decades to return to pre-construction condition in areas used for temporary workspace, and would be prevented from reestablishing on the permanent right-of-way. Soil-dwelling invertebrates could be impacted directly through movement of soil from one place to

another, resulting in some mortality and displacement. This could reduce the forage potential for insectivores that inhabit the area. Other animals could be indirectly affected through the reduction in seed banks, resulting in longer recovery times for vegetation that could provide forage, cover, and nesting habitat. The regional impact of these effects, however, would be minor due to the temporary nature of the effects and limited area affected by construction.

The impact on species that commonly inhabit agricultural lands would be relatively minor and temporary because these areas are regularly disturbed and would be replanted during the next growing season following pipeline installation. The effect on forest-dwelling wildlife species would be greater, as forested lands may take longer (more than 50 years) to return to preconstruction conditions. The impact on species using non-forested areas should be short-term because herbaceous lands, riparian vegetation, and vegetated portions of developed lands would recover relatively quickly.

Blasting may be required during construction. Blasting could result in the removal of adjacent habitat and the direct mortality or injury of wildlife species in the vicinity.

Most of the above mentioned impacts would be minimized by adherence to NiSource ECS. NiSource ECS include stipulations and standards related to mowing, clearing, grading, trenching, water body crossings, spill prevention, containment and control, and final restoration and stabilization.

Fishery and Aquatic Resources

The majority of waterbodies within the Covered Land support warmwater fisheries. No essential fish habitat, as defined by the Magnuson-Stevens Fishery Conservation and Management Act, would be affected by NiSource Covered Activities. Stream crossings and the clearing of ROW vegetation have the greatest potential for impacting fishery resources. Overall, these impacts would be minor due to the relatively small area of the waterbody that would be affected. Measures to avoid and minimize impacts to fishery and aquatic life would be similar to those designed to protect surface waters (see 4.2.1 above).

Stream crossings using open-cut, dry-ditch, and HDD have the potential to affect fish habitat. Open-cuts could increase turbidity and sedimentation in the crossing vicinity, potentially decreasing the dissolved oxygen, thereby potentially suffocating eggs and larvae of fish and invertebrates. Increases in siltation can impair aquatic plant growth, stress adult fish by damaging gill membranes, destroy the eggs of fish and other aquatic organisms, and degrade local spawning and nursery areas. Sedimentation can also displace the more mobile species and potentially smother benthic invertebrates, decreasing prey availability for fish. These effects could degrade the quality of the habitat, making it unsuitable for spawning and rearing activities. Impacts from open-cut construction would be temporary and limited to the crossing location and areas immediately downstream. Impacts would normally be limited to a few days, and generally no longer than one month after construction ends, depending on conditions at the crossing, the type and amount of suspended sediment, and other factors.

Dry-ditch methods, such as flume and dam-and-pump, could also be used to cross waterbodies. Both crossing methods would maintain water flow and decrease impacts from turbidity and sedimentation. Temporary impacts from sedimentation and turbidity would generally be limited to periods of active construction within a waterbody. Benthic invertebrates located in an area where water is diverted could experience direct adverse impacts. Larger, more mobile species would experience little to no impact through use of the flume or dam-and-pump method.

Use of HDD would likely avoid direct impacts on water bodies. However, in the event of a frac-out, or a release of drilling fluid during an HDD crossing, benthic invertebrates and fish eggs and larvae could be smothered and the more mobile species could be displaced. Bore crossings could also be used for small water body crossings and would avoid impacts on water bodies by allowing the pipeline to be installed underneath the water body without disturbing the bank or bed.

Some NiSource new construction may require blasting activities in or adjacent to perennial water bodies. If in-stream blasting is required, aquatic organisms close to blasting activities could be injured or killed. Temporary and minor impacts on aquatic resources from blasting activities would be expected. However, the preparation for blasting may displace many aquatic

organisms from the immediate vicinity of blasting activities. NiSource would immediately remove all blasted rock from the area to prevent any obstruction or slowing of stream flows.

NiSource ECS contain measures that would minimize construction impacts on fish and aquatic habitat. Temporary erosion control structures, such as silt fences and straw bales, would be installed immediately after vegetation removal, and rootstock would be left in the ground where possible to promote re-vegetation. Erosion and sediment control measures would prevent sediment from leaving the construction site and entering water bodies. Impacts on fisheries and aquatic resources from erosion would also be minimized by limiting the amount of time that construction activities would take within a water body. The season in which construction takes place can influence the degree of impacts associated with in-stream activities. Construction during periods of sensitive fish activity (i.e., spawning and migration) could have a greater impact on fish than construction during other periods.

The withdrawal of hydrostatic test water has the potential to affect aquatic species from entrainment and loss of prey organisms, as well as through the loss of fish and invertebrates during early life stages. The intakes for these withdrawals would be screened and located off the stream bottom to minimize the intake of large or benthic organisms and sediment. Impacts on fisheries and aquatic life from hydrostatic test water withdrawals and discharge would be limited by NiSource adhering to its ECS.

Fuels and other hazardous materials could spill or leak from storage containers, equipment working in or near streams, or fuel transfers. Any spill that reaches a water body could be detrimental to the aquatic life. The chemicals released during spills could have acute, direct effects on fish, or could have indirect, chronic effects such as altered behavior, changes in physiological processes, or changes in food sources. Large spills also could cause the direct mortality of species within the water body and indirect effects on the local food chain through ingestion of contaminated prey.

Alternative 2

Under Alternative 2, in addition to NiSource ECS, NiSource would implement species-specific avoidance and minimization measures, which would also benefit non-listed wildlife and fishery resources. For example, NiSource has committed to:

- Place and timing restrictions on mowing;
- Leave piles of woody debris along edge of ROW if clearing vegetation (where appropriate);
- Avoid additional clearing of trees;
- No woody vegetation or spoil disposal within occupied habitat;
- Retain snags, dead/dying trees, and trees with exfoliating bark;
- Maintain a diversity of open, herbaceous habitat; and
- Thoroughly clean all equipment prior to use to avoid inadvertent introduction of exotics

The mitigation actions proposed in the MSHCP would preserve and restore land and water, which would improve habitat for native wildlife and fish on local scales. NiSource may protect and restore up to 10,960 acres of forest land and associated habitats as mitigation for the Indiana bat (see Table 2.3.4 in EIS and Tables 8.2.2-1 and 8.2.2-2 in MSHCP). For mussels, NiSource has proposed to protect and restore land associated with riparian areas along streams and rivers (see Table 2.3.4 in EIS and Tables 8.2.2-1 and 8.2.2-2 in MSHCP). Both of these actions could provide additional habitat for native wildlife and fish at local scales.

Alternative 3

The environmental consequence of Alternative 3 would be the same as Alternative 2 with one exception: the amount of habitat protected and restored within the first seven years would be less under Alternative 3, as NiSource would not be mitigating “up-front” for O&M impacts. All of the AMMs and most of the mitigation would be the same as Alternative 2.

4.3.4 Migratory Birds

Migratory birds are protected under the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703–711) and EO 13186 (66 FR 3853), which serve to protect migratory birds from adverse impacts. The EO was enacted, in part, to ensure that the environmental analysis of a federal action evaluates the impacts of that action on migratory birds. It states that emphasis should be placed on species of concern, priority habitat, and key risk factors. It also prohibits the taking of migratory birds without authorization from FWS. Destruction or disturbance of a migratory bird nest, or any eggs or young contained within it, is also a violation of the MBTA. We note that EO 13186 requires federal agencies to avoid or minimize negative impacts on migratory bird populations and to restore and enhance the habitat of migratory birds, as practicable. The EO also requires a federal agency to identify where an unintentional “take” is likely to have a measurable negative effect on migratory bird populations.

On March 30, 2011, the FERC and the Service signed a Memorandum of Understanding on the Conservation of Migratory Birds (MOU). The MOU confirms that these agencies will carefully analyze FERC-regulated pipeline, transmission and other energy development projects that might impact migratory birds, and that mitigation may be required where any such impact might arise. The MOU was drafted to implement Executive Order (EO) 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds. The stated purpose of the MOU is to focus on "avoiding or minimizing adverse impacts on migratory birds and strengthening migratory bird conservation through enhanced collaboration [between the agencies] by identifying areas of cooperation."

Alternative 1

NiSource Covered Activities have the potential to adversely affect migratory birds. One hundred and fourteen species of migratory birds of conservation concern potentially occur within the Covered Land (Appendix D). Four species: the Eskimo Curlew, Ivory-billed Woodpecker, Kirtland’s Warbler, and Whooping Crane, are considered imperiled at a global scale, and are listed as Endangered by the Service. Six additional species: the Brown Pelican, Least Tern,

Piping Plover, Red-cockaded Woodpecker, Roseate Tern, and Wood Stork are also listed as Endangered by the Service. The remaining 103 species are declining within portions of their range; being possibly endangered, threatened, or at least monitored at a state level. While the species in Appendix D are the migratory species at greatest risk within the Covered Land, the MBTA provides protection for all migratory birds; thus additional migratory species not listed within the table would also potentially be affected by the project.

Primary impacts of NiSource Covered Activities on migratory birds include the loss and alternation of habitat associated with vegetation removal. Clearing and grading could remove nesting and foraging habitat, and could destroy occupied nests resulting in the destruction of eggs and mortality of young and unfledged birds. Construction could also temporarily displace birds into adjacent habitats, which could increase the competition for food and other resources. This in turn could increase stress, susceptibility to predation, and impact reproductive success.

Construction outside existing previously disturbed ROWs could cause habitat fragmentation, especially in forested areas. Fragmentation can alter bird species composition because biophysical conditions near the forest's edge can significantly differ from those found in the center or core of the forest. As a result, edge species could recruit to the fragmented area and native species that occupy interior habitats could be displaced. The disturbance of these areas could create a long-term impact on some forest interior bird species, although at local scales. Conversion of intact forested habitats to early successional stages and the increase in forest edge that results could adversely affect forest interior bird species by increasing rates of nest predation, parasitism, or interspecific competition; reducing pairing success; and inhibiting migration, dispersal, foraging, and other movements of species that are hesitant to cross openings. The breeding success of some forest interior bird species has been shown to be limited by the size of available unbroken forest tracts. Additional loss of forest habitat in tracts of already marginal size, in particular where the pipeline would traverse smaller isolated woodlots, could further reduce breeding success of forest interior birds.

Activities occurring before July 15 could overlap with the nesting seasons for many migratory birds. Construction during this time could cause direct and indirect impacts on the species that

occupy the area. Direct effects would be from the loss or disturbance of nesting trees, nests, and young; unfledged birds would likely be lost as habitat is removed. Indirect effects would be associated with the noise created by construction, as well as by human presence. Indirect effects would not likely cause significant impacts to non-nesting birds, as they likely would be temporarily displaced and would return once construction in that area is completed. Construction activities occurring adjacent to nesting individuals could result in nest abandonment, which would subsequently result in the chilling or mortality of eggs and young, or premature fledging and ejection from the nest.

Improper storage of chemically pretreated test water or test water contaminated by oil and/or grease residues from the pipe could contaminate surface water, groundwater, and soils, and impact certain bird species.

Alternative 2

The additional measures outlined in Chapter 2 for migratory birds should further minimize impacts above the status quo. Further, AMMs designed for Take and MSHCP species, such as Indiana bat timing restrictions for tree clearing, would also have beneficial effects for many bird species whose ranges overlap with Indiana bats. These additional benefits may not accrue under the No Action Alternative. Instead, implementation of such measures, including any mitigation to protect migratory bird species habitat, would likely vary given they would be dependent upon terms of individual project-specific environmental reviews.

NiSource proposed mitigation for take species has the potential to benefit a number of migratory bird species that occur in the areas ultimately protected and/or restored as mitigation, namely forest land and associated habitats, floodplain forests, and riparian areas. NiSource may protect and restore up to 10,960 acres of forest land and associated habitats as mitigation for the Indiana bat (see Table 2.3.4 in EIS and Tables 8.2.2-1 and 8.2.2-2 in MSHCP). For mussels, NiSource has proposed to protect and restore land associated with riparian corridors (see Table 2.3.4 in EIS and Tables 8.2.2-1 and 8.2.2-2 in MSHCP). Riparian corridors are considered important habitats for many migrating land birds, especially given the current pressures of

climate change. The management of north/south riparian corridors will likely be an important transitional habitat as migratory bird species shift their ranges northward.

Alternative 3

The environmental consequence of Alternative 3 would be the same as Alternative 2 with one exception: the amount of mitigation within the first seven years would be less under Alternative 3, as NiSource would not be mitigating "up-front" for O&M impacts. All of the AMMs and most of the mitigation would be the same as Alternative 2, over the long-term.

4.3.5 Bald and Golden Eagles

As stated previously in Chapter 3, golden eagles are not known to nest within the Covered Land. Bald eagles however may nest, roost, and forage in and around the Covered Land. Bald eagles nesting within the Covered Land can occur anywhere between October in the deep South to May in the Northeast, with full incubation and fledging lasting between four and five months.

The bald eagle was formerly a federally listed species, but was delisted in 2007 due to recovery of the population. However, the species retains protection under the Bald and Golden Eagle Protection Act (BGEPA), which prohibits the taking of eagles, their eggs, or their nests. In 2007, the Service developed and published National Bald Eagle Management Guidelines (Guidelines) to advise landowners, land managers, and others who share public and private lands with bald eagles when and under what circumstances the protective provisions of the Bald and Golden Eagle Protection Act (BGEPA) may apply to their activities. The Guidelines are intended to help minimize impacts, particularly where they may constitute "disturbance," which is prohibited by the BGEPA. For more information on the National Bald Eagle Management Guidelines see (http://www.fws.gov/pacific/eagle/NationalBaldEagleManagementGuidelines.pdf).

Alternative 1

NiSource Covered Activities could temporarily affect aerial foraging and predatory activities if construction occurs along waterbodies when roosting eagles are present. Disturbance could change foraging patterns or remove preferred roosting trees. Individual eagles could find other suitable roosts in similar habitat surrounding the area, and eagles would be expected to return to the area when construction activity has ceased. Given the linear nature of projects and the short timeframe in which waterbody construction would occur, we believe these impacts would be minor. However, in the past FWS has expressed concern over potential noise impacts on nesting bald eagles potentially located within the Covered Land. FWS has recommended that NiSource identify the location of bald eagle nests in the vicinity of the Covered Land. FWS further stated that the use of available current and reliable nesting surveys is acceptable. However, if surveys are not available, NiSource should conduct surveys of bald eagles in the Covered Land. FWS recommended that where nests are located in the vicinity of the pipeline, National Bald Eagle Management Guidelines (Guidelines) must be followed. According to these Guidelines, construction of roads and other linear utilities should be conducted outside the nesting season.

Crossing waterbodies using the HDD method may cause noise impacts to nesting bald eagles prior to the time that the eagles have fledged. Foraging bald eagles are anticipated to return to the area once construction and HDD crossings have been completed; however, an increase in noise near nesting bald eagles may cause nest abandonment and subsequent mortality of eggs and young. FWS has developed Guidelines that would minimize impacts to bald eagle nests by implementing site-specific buffers and limiting loud, disruptive construction activities (including open-cut and HDD construction methods) to periods outside of the nesting season. NiSource has agreed to adhere to the Guidelines in the presence of known or newly encountered active nests and would limit construction activities in the vicinity of active bald eagle nests, as recommended by FWS, to periods outside of the nesting season.

Since bald eagles are no longer listed under the ESA, NiSource no longer consults under Section 7 of the ESA with the Service on bald eagles. In the past, NiSource would contact an

appropriate Service Field Office through formal/informal consultation under Section 7 to receive guidance on bald eagle management for their planned activities. Now that bald eagles are no longer federally listed and consultation under Section 7 is no longer warranted, NiSource has adopted as part of its operations the Service's Guidelines. Presently, while conducting project reviews for federally listed species, NiSource also determines if its projects will affect bald eagle nesting, foraging, and roosting areas. If effects might occur, NiSource attaches appropriate avoidance measures from the Guidelines to the project's EM&CP and implements them during the activity. In the unlikely event that the avoidance measures cannot be implemented for a project, NiSource will obtain an appropriate permit from the Service before commencing the activity. Adherence to the Guidelines benefits NiSource by helping it avoid violations of the law, and also benefits bald eagles by ensuring NiSource activities do not harm and/or disturb eagles that may be present near a NiSource project area. With the implementation of FWS Guidelines to avoid disturbance to the bald eagle, we believe impacts on the bald eagle from NiSource Covered Activities are minimal.

Alternative 2

Under this Alternative, NiSource will adhere to the Guidelines and process described above. The main difference between Alternative 1 and Alternative 2 is the mitigation that will potentially occur for the take species in the MSHCP which could provide ancillary benefits to bald eagles. For instance, for Indiana bats, NiSource has proposed to protect and restore up to 10,960 acres of forest land. For mussels, NiSource has proposed to protect and restore land associated with riparian areas along streams and rivers (see Table 2.3.4 in EIS and Tables 8.2.2-1 and 8.2.2-2 in MSHCP). Both of these actions could provide additional habitat for bald eagles, as bottomland/riparian areas are important to nesting, roosting, and foraging bald eagles.

Alternative 3

Potential types of impacts to bald eagles under Alternative 3 are identical to those discussed above for Alternative 2, although the duration of the future impacts and level of take anticipated is logically reduced commensurately (generally to 1/5 the level as discussed in the MSHCP).

The potential conservation benefit associated with NiSource's Conservation Program would also be reduced based on the shorter duration of the MSHCP implementation, particularly the long-term benefits associated with the "front-loading" of the mitigation for all O&M activities within the first seven years of implementation associated with Alternative 2.

4.3.6 T&E and Candidate Species

The following provides a discussion and analysis of potential impacts to fish, wildlife, and plant species under the jurisdiction of the Service and listed as either threatened, endangered, or candidate species known or suspected to occur within the Covered Land.

Forty-three species from nine taxonomic groups were originally analyzed in the MSHCP. Since that original analysis, one of the candidate species (sheepnose) was listed as endangered and the Lake Erie watersnake was delisted, making the total number 42. They include six mammals, one bird, one reptile, two amphibians, six fish, two crustaceans, 17 freshwater mussels, four insects, and three plants. The list includes ten species for which NiSource is requesting incidental take authorization from the Service. Those include the Indiana bat, bog turtle, James spinymussel, Northern riffleshell mussel, Nashville crayfish, clubshell mussel, fanshell mussel, Madison cave isopod, American burying beetle, and sheepnose mussel. The remaining 32 species do not require take authorization, as take will be avoided either because NiSource has agreed to implement avoidance measures or the species was determined to be absent from the Covered Land.

In addition to the 42 species analyzed in the MSHCP, 46 additional threatened, endangered, or candidate species potentially occur within the Covered Land (defined as non-MSHCP Species). Of these 46 non-MSHCP species, NiSource Covered Activities could adversely affect 10, making the total number of species potentially adversely affected by NiSource Covered Activities 20 (see Table 4.3.1). However, NiSource is only seeking incidental take authorization for 10 species (i.e., Take Species).

Table 4.3.1: Species potentially impacted by NiSource Covered Activities

Common Name	Scientific Name	Federal Status	Species Included in the MSHCP?	Incidental Take Requested?
Mammals				
Indiana bat	*Myotis sodalis*	E	Yes	Yes
Insects				
American burying beetle	*Nicrophorus american us*	E	Yes	Yes
Reptiles				
Bog turtle	*Glyptemys muhlenbergii*	T	Yes	Yes
Eastern massasauga rattlesnake	*Sistrurus catenatus catenatus*	C	No	No
Fish				
Diamond darter	*Crystallaria cincotta*	PE	No	No
Roanoke logperch	*Percina rex*	E	No	No
Mollusks				
Clubshell mussel	*Pleurobema clava*	E	Yes	Yes
Fanshell mussel	*Cyprogenia stegaria*	E	Yes	Yes
James spinymussel	*Pleurobema collina*	E	Yes	Yes
Northern riffleshell	*Epioblasma torulosa rangiana*	E	Yes	Yes
Sheepnose	*Plethobasus cyphyus*	E	Yes	Yes
Dwarf wedgemussel	*Alasmidonta heterodon*	E	No	No
Pink mucket pearlymussel	*Lampsilis orbiculata*	E	No	No
Rabbitsfoot	*Quadrula cylindrica*	PT	No	No
Rayed bean	*Villosa fabalis*	E	No	No
Snuffbox	*Epioblasma triquetra*	E	No	No
Spectaclecase	*Cumberlandia monodonta*	E	No	No
Crustaceans				
Nashville crayfish	*Orconectes shoupi*	E	Yes	Yes
Madison Cave isopod	*Antrolana lira*	T	Yes	Yes
Plants				
Northeastern bulrush	*Scirpus ancistrochaetus*	E	No	No

The Services Biological Assessment (appended) and Biological Opinion (incorporated by reference) contain a full analysis of all threatened, endangered, or candidate species potentially affected by NiSource Covered Activities within the Covered Land. The Biological Opinion responds to the Service requirement for intra-Service consultation on the issuance of a Section 10(a)(1)(B) permit pursuant to Section 7 of the ESA.

Alternative 1

Section 7 of the ESA requires federal agencies to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of a federally listed threatened or endangered species, or result in the destruction or adverse modification of designated critical habitat of a federally listed species. Federal agencies are required to consult with the Service to determine whether any federally listed or proposed species or any critical or proposed critical habitat may occur in a project area, and to determine the potential effects of the Proposed Actions on these species or critical habitats. To comply with Section 7 of the ESA, NiSource has acted as a "non-federal representative" and assisted the federal agencies conducting informal consultations with the Service. Under this alternative, federal agency (FERC, USACE, USFS, NPS, Service) Section 7 consultations associated with future NiSource projects would continue to occur on a project-by-project basis.

The Service's primary federal action is issuance of the section 10(a)(1)(B) permit (incidental take permit; ITP) and associated implementation of the MSHCP. In conjunction with the primary action, the MSHCP involves federal actions by the U.S. Army Corps of Engineers (Corps), federal Energy Regulatory Commission (FERC), U.S. Forest Service (USFS), National Park Service (NPS), and multiple National Wildlife Refuges.

Common with all alternatives, NiSource's ECS have established methods to minimize overall impacts, including to wildlife, of construction and O&M activities. The ECS standards include stipulations and standards related to mowing, clearing, grading, trenching, water body crossings, spill prevention, containment and control, and final restoration and stabilization.

Under the No Action Alternative, the additional AMMs outlined in the MSHCP that also serve to avoid and/or minimize impacts to threatened, endangered, or candidate species or their habitats would not be required as a condition of the ITP. Instead, ESA compliance through formal Section 7 consultation would require some variation of these AMMs to protect species or habitat, depending on the nature of the specific proposed. One primary difference between ESA compliance through Section 7 vs Section 10 (i.e., Alternatives 2 and 3), is the requirement that NiSource must fully compensate, through mitigation, for all impacts associated with incidental take.

Alternative 2

Alternative 2 would entail the Service issuing NiSource an ITP for 10 species. Table 4.3.3 provides summary information on Take and MSHCP species. Table 4.3.6 provides summary information on non-MSHCP species. Information in each table is organized relative to: 1) species name, 2) Federal status, 3) location within the Covered Land; 4) Covered Activities potentially causing impacts, 5) potential species impacts, 6) mandatory and non-mandatory AMMs, and 7) mitigation.

This section also provides a description of "general" AMMs (Table 4.3.3) that NiSource and the Service have developed to be implemented in conjunction with future NiSource Covered Activities. These AMMs would need to be employed in order for those future activities to be in compliance with the ITP and assure incidental take coverage for NiSource relative to the MSHCP species. These AMMs are in addition to species-specific AMMs, which can be found in Chapter 6 of the MSHCP, Appendix F of the MSHCP, and Appendix E of this document.

MSHCP Species

Of the 42 species covered in the MSHCP, 23 "No Effect" determinations have been made, including: Blackside dace, Braun's rock cress, Cumberland bean pearlymussel, Cumberland snubnose darter, Delmarva fox squirrel, Dromedary pearlymussel, Gulf sturgeon, Karner blue butterfly, Louisiana pearlshell, Maryland darter, Mead's milkweed, Mitchell's satyr butterfly, Pale liliput pearlymussel, Pitcher's thistle, Puritan tiger beetle, Purple cat's paw pearlymussel, Scioto

madtom, Shenandoah salamander, Slackwater darter, Tan riffleshell, West Indian manatee, White cat's paw pearlymussel, and White wartyback pearlymussel. These No Effect determinations were based on our examination of the species proximity to anticipated future disturbance from NiSource Covered Activities.

For the remaining 19 species in the MSHCP (Table 4.3.4), implementation of AMMs (Table 4.3.3) will avoid take for nine of these species. These species include; Birdwing pearlymussel, Cheat mountain salamander, Cracking pearlymussel, Cumberland monkeyface pearlymussel, Gray bat, Interior least tern, Oyster mussel, Louisiana black bear, and Virginia big-eared bat. These determinations were made by the Service (USFWS 2007e) and based on species ranges and known occurrences relative to the Covered Land, the types and anticipated impacts of NiSource Covered Activities, and through the development and implementation of mandatory species-specific AMMs. For the remaining 10, NiSource could minimize, but not fully avoid take. Given this, NiSource has requested incidental take authorization for 10 species. Table 4.3.2 below is a summary of the type and amount of incidental take requested. Species-specific AMMs for MSHCP species are described in detail in Chapter 6 of the MSHCP, Appendix F of the MSHCP, and in Appendix E of this document.

Table 4.3.2: Summary of Incidental Take Requested over 50 years

Species	Summary of Take Requested
Indiana bat	Incidental take is requested for 69,900 acres of summer and/or spring staging/fall swarming habitat that could support up to 2,584 Indiana bat individuals.
Bog turtle	Incidental take is requested for impacts to turtles and habitat at 25 sites
Madison Cave isopod	Incidental take is requested for two populations within 2,764.5 acres of Madison Cave isopod habitat
Clubshell mussel	Incidental take is requested for up to 166 acres of clubshell mussel habitat
Northern riffleshell mussel	Incidental take is requested for up to 165.3 acres of northern riffleshell mussel habitat
Fanshell mussel	Incidental take is requested for 283.2 acres of fanshell mussel habitat
James spinymussel	Incidental take is requested for up to 12.8 acres of James spinymussel habitat
Sheepnose mussel	Incidental take is requested for up to 250.4 acres of sheepnose mussel habitat
Nashville crayfish	Incidental take is requested for up to 4.0 acres of Nashville crayfish habitat
American burying beetle	Incidental take is requested for 4 American burying beetle individuals

Take calculations vary by species. For terrestrial species, take numbers were calculated based on both the projected impact acres over the 50-year permit term as well as anticipated disturbance to individuals over the permit term, regardless of the type of disturbance. For aquatic species, take numbers were derived based on three factors (estimated crossings) relating to water body disturbance over the permit term, including the likelihood of one new construction looping project, one replacement of the existing pipeline, and other additional activity impacts (e.g., stabilization, removal) over the 50-year permit term. This take calculation assumes, however, that the three crossings (factors) in play would occur at a time interval sufficient to allow for full re-colonization to pre-disturbance densities. Chapter 6 of the MSHCP provides a detailed explanation of the take assessment process, as well as an impact of the take analysis.

It was recognized that absent a specific time and location of future NiSource Covered Activities within the Covered Land, coupled with the 50-year permit duration, the MSHCP does not predict take with absolute spatial and temporal certainty. It does however assume a “worst-case

scenario" which in all likelihood will result in an overestimate of take. Species conservation frameworks and threats analysis tables in Appendix E provide a detailed analysis of activities and impacts to NiSource Take Species.

Where take is anticipated, the MSHCP provides for mitigation to compensate for the impact of the take. Mitigation includes, but is not limited to, permanent protection of habitat, habitat enhancement, restoration, and management to achieve and/or maintain specific biological characteristics; and species propagation and reintroductions. The MSHCP does not prescribe where on the landscape these mitigation actions will take place, but it does provide parameters and criteria to ensure that appropriate mitigation occurs.

Table 4.3.3: Summary of Avoidance & Minimization Measures (AMMs) for MSHCP Species

Habitat and Occupation Surveys	
A1	Determine habitat suitability for the species, or assume potential presence
A2	Survey to determine presence/absence within identified suitable habitat
Measures to Avoid and Minimize Impacts to Species	
B1	Bait the species away from the project area
B2	Trap and relocate species away from the project area
B3	Species education for operators, employees, and contractors
B4	Avoid activities involving long-term noise disturbance >75db within specified distance
B5	Strict control of "bear attractants" such as use of "bear-proof" waste disposal containers
B6	Designated critical habitat within ROW maintained to NGTS ECS env. sensitive area standards
B7	Remove buildings during winter months, or after a survey year round
Prepare an Environmental Management & Construction Plan	
C1	Prepare an Environmental Management & Construction Plan
Stream Bed Construction Methods	
D1	Consider HDD or other trenchless methods for installation or replacement across habitat
D2	Install pipelines to a minimum depth at least 10-feet past the high water line in riparian areas
D3	Do not install In-Channel repairs within occupied habitat
D4	Work from a lay barge or temporary work bridge rather than operate heavy equipment in-stream
D5	Remove equipment bridges as soon as practicable
D6	Inspect for and correct bank destabilization associated with the pipeline within occupied habitat
D7	Ensure that work within streams does not result in impacts to adjacent habitats or karst features

D8	Avoid channelizing streams
D9	Cross perennial streams only during specified periods
D10	Use Dry-Ditch Dam and Pump methodology
Stream Bank Conservation	
E1	Do not construct culverts or stone access roads across waterbody/riparian occupied habitat
E2	Use sufficient half pipes to minimize flow disruption in stream habitat
E3	Ensure that upland work does not result in impacts to adjacent water habitats
Timing Restrictions	
F1	Timing restrictions to minimize impact
F2	Avoid construction activities after sunset in occupied habitat
Pipeline Abandonment	
G1	Pipeline abandonment specifications
Contaminants	
H1	Site staging areas location restrictions
H2	Ensure that all imported fill material is free from contaminants
H3	Use enhanced and redundant spill control for storage well activities in occupied habitat
H4	Avoid use of fertilizers within a specified distance of occupied habitat
H5	Avoid use of herbicides within a specified distance of occupied habitat
H6	Follow standard policies and procedures for herbicide use in proximity to occupied habitat
H7	Refuel equipment, check for leaks each day, and control contaminants as per the ECS
H8	Use tanks rather than waste pits to store waste fluids
H9	Contaminants should be controlled as provided for in the EMCS and ECS.
Withdrawal and Discharge of Water	
I1	Avoid discharging hydrostatic testing water from new pipe directly into occupied habitat
I2	Avoid drawing hydrostatic testing water directly from occupied habitat
I3	Discharge hydrostatic testing water down gradient or >300-feet upland from occupied habitat
I4	Use best available water withdrawal/discharge impact avoidance techniques
I5	Avoid discharging hydrostatic testing water from existing pipe directly into occupied habitat
Travel and Access Roads	
J1	Avoid driving across identified habitat
J2	Route new access roads a specified distance from occupied habitats
J3	With landowner consent, block access roads and ROWs leading to occupied habitat
Exotic Species	
K1	Thoroughly clean all equipment prior to use to avoid inadvertent introduction of exotics
Vegetation Management	
L1	Avoid stepping on hummocks and tussocks
L2	Avoid pulling woody vegetation out by the roots in identified habitat
L3	Restrictions on mowing
L4	Avoid dragging vegetation through occupied habitat
L5	Avoid burning brush piles within a specified distance of occupied habitat
L6	Re-vegetate disturbed habitat in accordance with the ECS

L7	Leave piles of woody debris along edge of ROW if clearing vegetation
L8	Avoid additional clearing of trees
L9	No woody vegetation or spoil disposal within occupied habitat
L10	Retain snags, dead/dying trees, and trees with exfoliating bark
L11	Maintain a diversity of open, herbaceous habitat
Routing Criteria and Construction	
M1	Avoid constructing bell holes and trenches in habitat areas
M2	Route new projects to avoid occupied or potential habitats
Soil and Geology Impacts	
N1	Employ silt fences around construction/soil disturbance areas within occupied habitat
N2	Blasting within a specified area of occupied habitat must ensure karst integrity is maintained.
N3	No HDD within the potential habitat zone
N4	Clearly mark karst feature buffers until ground disturbing activities are completed
N5	Use an inverted filter to bridge karst when filling new sinkholes
N6	Trenches to be backfilled using native material to specified depth where applicable
N7	Minimize alteration of existing grade and hydrology of existing surface karst features
N8	Drilling conducted in manner that will not compromise structural integrity of habitat/habitat features or alter hydrology
N9	Ensure restoration of pre-existing topographic contours after ground disturbance.

The majority of the AMMs listed above are mandatory and must be applied to all Covered Activities. However, as previously discussed, there is a sub-group of AMMs that NiSource determined cannot feasibly be implemented in every instance due to location, technical or engineering feasibility, potential adverse impacts to other species, project timelines, customer needs, or effectiveness. NiSource has stated that a decision regarding these “non-mandatory” AMMs will be made on a case-by-case basis, and these evaluation processes will be reported to the Service in its annual report.

NiSource has stated that species-specific AMMs (Appendix E) supplement (and supersede if an inconsistency is noted) those BMPs included within NiSource’s ECS documents and do not substitute for NiSource’s already required pre-construction planning and project implementation specifications. Rather, the information gathered during the pre-construction planning and project implementation phases will be used to determine actual project impacts on MSHCP Species and used as the basis for the mitigation program, for situations where take would occur.

Table 4.3.4: Impacts to Species Analyzed in the Species (i.e., "Take" and "MSHCP" Species")

Group	Common/ Scientific Name	Species Type	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Species Impacts due to Covered Activities	AMMs[1]	Mitigation[2]
Mammals	Gray bat *Myotis grisescens*	MSHCP	Endangered	**Not likely to adversely affect** in Adair, Allen, Carter, Clark, Estill, Fayette, Garrard, Greenup, Lee, Letcher, Lincoln, Madison, Menifee, Metcalfe, Monroe, Montgomery, Morgan, Powell, and Rowan counties, KY; and Davidson, Hardin, Lewis, Macon, Maury, McNairy, Sumner, Trousdale, Wayne, Williamson, and Wilson counties, TN.	Not applicable	Not applicable	**Mandatory**: A1, A2, B3, D6, D7, H1, H5, H7, J3, L5, L6, L9, N2, N3 **Non-Mandatory**: D1, D3, D4, D5, D9, F2, G1, L8	Not applicable

Group	Common/ Scientific Name	Species Type	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Species Impacts due to Covered Activities	AMMs[1]	Mitigation[2]
Mammals	Indiana bat *Myotis sodalis*	Take	Endangered	**Impacts likely** throughout the entire Covered Land footprint in Indiana, Kentucky, Ohio, Pennsylvania, Tennessee, and West Virginia; and in Allegany, Garret, and Washington counties, MD; Hunterdon, Morris, and Warren counties, NJ; Orange and Rockland counties, NY; and Albemarle, Alleghany, Augusta, Botetourt, Clarke, Frederick, Giles, Greene, Lexington, Lexington City, Madison, Page, Rockbridge, Rockingham, Shenandoah, Warren, Waynesboro City, and Waynesboro counties, VA[1]	Tree clearing associated with a wide variety of activities, tree side-trimming, access roads maintenance and construction, equipment operation, well plugging, presence of the pipeline corridor, construction and maintenance of waste pits, and herbicide application	Direct impacts due to tree removal, crushing bats, increased predation, entrapment, noise, and chemical contaminants, which may kill/wound/ harm/harass if they are present during the work. Indirect impacts due to loss or degradation of roosting, foraging, and travel corridor habitats along the ROW (harassment).	**Mandatory**: A1, B3, C1, D6, D7, F1, H1, H5, H7, H9J3, L5, L6, L8, L9, N2, N8, N9 **Non-Mandatory**: A2, B4, D8, L10	Protect and manage summer habitat; protect priority 1 & 2 hibernacula and associated spring staging/fall swarming habitat; and restore and maintain optimal habitat conditions in degraded caves and/or mines.

Group	Common/ Scientific Name	Species Type	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Species Impacts due to Covered Activities	AMMs[1]	Mitigation[2]
Mammals	Louisiana black bear *Ursus americanus luteolus*	MSHCP	Threatened	**Not likely to adversely affect** in East Carroll, Franklin, Iberia, Madison, Richland, and St. Mary parishes, LA; and Humphreys, Issaquena, Sharkey, Warren, and Washington counties, MS. **No effect** in Avoyelles and St. Landry Parish, LA	Not applicable	Not applicable	**Mandatory**: A1,B3,B4, B5, B6, L2, L3, L6, L8 **Non-Mandatory**: F1	Not applicable

Group	Common/ Scientific Name	Species Type	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Species Impacts due to Covered Activities	AMMs[1]	Mitigation[2]
	Virginia big-eared bat *Corynorhinus townsendii virginianus*	MSHCP	Endangered	**Not likely to adversely affect** in Bath, Carter, Estill, Jackson, Lee, Madison, Menifee, Montgomery, Morgan, Owsley, Powell, and Rowan counties, KY; Augusta, Bland, Giles, Rockingham, and Shenandoah counties, VA; and Fayette, Grant, Hardy, McDowell, Pendleton, Preston, Randolph, and Tucker counties, WV.	Not applicable	Not applicable	**Mandatory**: A1, A2, B3, B6, D6, D7, H1, H5, H7, H8, J3, L5, L9, L11, N2, N3 **Non-Mandatory**: F2, M2	Not applicable

Group	Common/ Scientific Name	Species Type	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Species Impacts due to Covered Activities	AMMs[1]	Mitigation[2]
Birds	Interior least tern *Sterna antillarum*	MSHCP	Endangered	**Not likely to adversely to affect** in East Carroll Parish, LA; and Issaquena, County, MS. **No effect** in Grant and Madison parishes, LA; and Warren and Washington counties, MS.	Not applicable	Not applicable	**Mandatory**: A2, D6, F1, H1, **Non-Mandatory**: D1, G1	Not applicable

Group	Common/ Scientific Name	Species Type	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Species Impacts due to Covered Activities	AMMs[1]	Mitigation[2]
Reptiles	Bog turtle *Glyptemys muhlenbergii*	Take	Threatened	**Impacts likely** in New Castle County, DE; Baltimore, Cecil, and Harford counties, MD; Gloucester, Hunterdon, Morris, Salem, and Warren counties, NJ; Orange and Rockland counties, NY; and Adams, Bucks, Chester, Cumberland, Delaware, Lancaster, Lehigh, Monroe, Montgomery, Northampton, and York counties, PA.	Vehicle operation, vegetation management (mowing), vegetation management (herbicide application), temporary and permanent access road construction, vehicle operation, minor spill event, vegetation management (clearing), ROW (trenching - digging, blasting, dewatering, grading), wetland crossings (trenching - digging, blasting, dewatering, clearing, grading)	Habitat loss, degradation and fragmentation, chemical contaminants, loss of individuals, hydrologic changes, isolation, illegal collection and trade	**Mandatory**: A1, A2, C1, D1, D7, E3, F1, G1, H4, H5, H6, H7, I1, I2, I3, I4, J1, L1, L2, L3, L4, L5, L6, M1, M2, N1	O&M impacts: Habitat restoration and enhancement within ROW if possible. If not possible, off-ROW restoration and management will occur on a 1:1 basis. New Construction or conventional replacement methods: Protect and restore (as needed) bog turtle sites. Priority given to sites within a complex versus isolated sites.

Group	Common/ Scientific Name	Species Type	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Species Impacts due to Covered Activities	AMMs[1]	Mitigation[2]
Amphibians	Cheat Mountain salamander *Plethodon nettingi*	MSHCP	Threatened	**Not likely to adversely affect** in Grant, Pendleton, Pocahontas, Randolph, and Tucker counties, WV.	Not applicable	Not applicable	**Mandatory**: A1, A2, D1, D8, G1, H1, H4, H5, H6, H7, I1, I2, I3, J2, L3, L4, L5, L6, L7, L8, M2, N1 **Non-Mandatory**: J1, L2	Not applicable

Group	Common/ Scientific Name	Species Type	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Species Impacts due to Covered Activities	AMMs[1]	Mitigation[2]
Crustaceans	Madison Cave isopod *Antrolana lira*	Take	Threatened	**Impacts likely** in Augusta, Clarke, Page, Rockbridge, Rockingham, Shenandoah, and Warren counties, and the City of Waynesboro, VA.	Construction grading, trenching (digging, blasting), access road construction (temporary and permanent), wetland crossings (digging, blasting), HDD (removed as activity in range of this species), minor spill, pipeline abandonment	Loss, degradation, and/or Fragmentation of habitat due to collapsing or filling in subsurface features and/or altering sub-surface water quality and/or quantity. The changes in habitat would render them temporarily to permanently unsuitable for future use by the Madison Cave isopod and may prevent movements among or between populations. Any Madison Cave isopods present in the zones of impact would likely be killed by smothering or poisoning.	**Mandatory**:A 1,A2,B3, D7, H1, H4, H5, H6, H7, I1, I2, I3,I4, I5, N2, N3, N4, N5, N7 **Non-Mandatory**: J3	Mitigation to be completed prior to commencing the activity causing the impact: protect key parcels (containing surface karst features) and restore surface karst features (if needed) within the immediate recharge areas of another known Madison Cave isopod occurrence

Group	Common/ Scientific Name	Species Type	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Species Impacts due to Covered Activities	AMMs[1]	Mitigation[2]
	Nashville crayfish *Orconectes shoupi*	Take	Endangered	**Impacts likely** in Davidson and Williamson counties, TN.	Pipeline corridor presence, tree clearing, mechanical repair in upland or wet- land areas, instream stabilization, existing road maintenance, culvert replacement, clearing and ground disturbance for cathodic protection, removal of abandoned pipe, tree, shrub, and herbaceous clearing, grading, regrading, water discharge related to hydrostatic testing, fertilizer application, temporary and permanent access roads, installation and removal of water diversion structures and equipment in stream, minor frac-out, and minor spill events	Sedimentation, riparian tree removal, crushing, altered flow, increased water temperature, substrate removal, sedimentation, chemical contaminants, facilitation of invasive species	**Mandatory**: A2, B2, C1, D1, D2, D3, D5, D6, D10, F1, H1, H2, H4, H5, I1, I2, I3, I4, J1, N6 **Non-Mandatory**: E1, G1,	O&M and Upland Disturbance: Restore and protect riparian buffers within identified priority areas New Construction and Repair at Stream Crossings: Restore, protect and enhance potential habitat within identified priority areas

Group	Common/ Scientific Name	Species Type	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Species Impacts due to Covered Activities	AMMs[1]	Mitigation[2]
Mollusks	Birdwing pearlymussel *Lemiox rimosus*	MSHCP	Endangered	**Not likely to adversely affect** in Maury County, TN.	Not applicable	Not applicable	**Mandatory**: A2, B2, C1, D1, D2, D3, D5, D6, E2, H1, H2, H3, H4, H5, H6, I4, K1 **Non-Mandatory**: D4, E1, F1, G1, I1, I2, J1	Not applicable

Group	Common/ Scientific Name	Species Type	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Species Impacts due to Covered Activities	AMMs[1]	Mitigation[2]
	Clubshell mussel *Pleurobema clava*	Take	Endangered	**Impacts likely** in Franklin, Madison, and Pickaway counties, OH; Armstrong and Clarion counties, PA; and Braxton, Clay, and Doddridge counties, WV **No effect** in Dekalb and Marshall counties, IN; Allen, Bath, Bracken, Mason, Pendleton, and Robertson counties, KY; Coshocton, Defiance, Delaware, Fairfield, Greene, Hancock, Trumbull, Tuscarawas, and Union counties, OH; Cattaraugus County, NY; Hardin County, TN; and Kanawha and Lewis counties, WV.	Pipeline corridor presence, vehicle operation, access road culvert replacement, access road maintenance, off-ROW clearing, mechanical repair and fill in ROW, in-stream stabilization, tree clearing, herbicide application, hydrostatic testing, pipe-line abandonment, well abandonment, wet ditch crossing activities, access road construction, grading, HDD, hydrostatic testing, re-grading, fertilizer application, erosion control devices, herbaceous and woody vegetation clearing, stream bank contouring, installation and removal of stream crossing structures, trenching related impacts, waste pits, minor spill events, in-stream stabilization, and vegetation disposal.	Sedimentation, chemical contaminants, increased water temperature, crushing, substrate compaction, altered flow, burying substrate, entrapment, water level reduction, introduction of invasive species, loss of habitat	**Mandatory**: A2, B2, C1, D1, D2, D3, D5, D6, E2, H1, H2, H3, H4, H5, I1, I2, I3, I4, K1 **Non-Mandatory**: D4, E1, G1, J1	See Table 4.3-5

Group	Common/ Scientific Name	Species Type	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Species Impacts due to Covered Activities	AMMs[1]	Mitigation[2]
Mollusks	Cracking pearlymussel *Hemistena lata*	MSHCP	Endangered	**Not likely to adversely affect** in Hardin, Maury, and Wayne counties, TN.	Not applicable	Not applicable	**Mandatory**: A2, B2, C1, D1, D2, D3, D5, D6, E2, H1, H2, H3, H4, H5, H6, I4, K1 **Non-Mandatory**: D4, E1, F1, G1, I1, I2, J1	Not applicable
	Cumberland monkeyface pearlymussel *Quadrula intermedia*	MSHCP	Endangered	**Not likely to adversely affect** in Maury County, TN	Not applicable	Not applicable	**Mandatory**: A2, B2, C1, D1, D2, D3, D5, D6, E2, H1, H2, H3, H4, H5, H6, I4, K1 **Non-Mandatory**: D4, E1, F1, G1, I1, I2, J1	Not applicable

Group	Common/ Scientific Name	Species Type	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Species Impacts due to Covered Activities	AMMs[1]	Mitigation[2]
	Fanshell mussel *Cyprogenia stegaria*	Take	Endangered	**Impacts likely** in Bracken, Nicholas, Pendleton, and Robertson counties, KY; Coshocton, Meigs, Morgan, Muskingum, and Washington counties, OH; Hardin County, TN; and Jackson and Kanawha counties, WV. **No effect** in Allen, Barren, Boyd, Carter, Greenup, Lawrence, Lewis, Mason, Monroe, and Powell counties, KY; and Wood County, WV	Pipeline corridor presence, vehicle operation, access road culvert replacement, access road maintenance, off-ROW clearing, mechanical repair and fill in ROW, in-stream stabilization, tree clearing, herbicide application, hydrostatic testing, pipeline abandonment, well abandonment, wet ditch crossing activities, access road construction, grading, HDD, hydrostatic testing, re-grading, fertilizer application, erosion control devices, herbaceous and woody vegetation clearing, stream bank contouring, installation and removal of stream crossing structures, trenching, waste pits, minor spill events, in-stream stabilization, and vegetation disposal.	Sedimentation, chemical contaminants, increased water temperature, crushing, substrate compaction, altered flow, burying substrate, entrapment, water level reduction, and introduction of invasive species	**Mandatory**: A2, B2, C1, D1, D2, D3, D5, D6, E2, H1, H2, H3, H4, H5, H6, I1, I2, I3, I4, K1 **Non-Mandatory**: D4, E1, G1, J1	See Table 4.3-5

Group	Common/ Scientific Name	Species Type	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Species Impacts due to Covered Activities	AMMs[1]	Mitigation[2]
Mollusks	James spinymussel *Pleurobema collina*	Take	Endangered	**Impacts likely** in Albemarle, Alleghany, Botetourt, Goochland, Greene, Orange, Powhatan, and Rockbridge counties, VA. **No effect** in Giles County, VA; and Monroe County, WV	Pipeline corridor presence, vehicle operation, access road culvert replacement, access road maintenance, off-ROW clearing, mechanical repair and fill in ROW, in-stream stabilization, tree clearing, herbicide application, hydrostatic testing, pipeline abandonment, and well abandonment, dry-ditch crossing activities, access road construction, grading, horizontal directional drill (HDD), hydrostatic testing (withdrawal and discharge), re-grading, fertilizer application, erosion control devices, herbaceous and woody vegetation clearing, stream bank contouring, installation and removal of stream crossing structures, trenching related impacts, waste pits, minor spill events, and vegetation disposal.	Sedimentation, chemical contaminants, increased water temperature, crushing, substrate compaction, altered flow, burying substrate, entrapment, water level reduction, and introduction of invasive species	**Mandatory**: A2, B2, C1, D1, D2, D3, D5, D6, E2, F1, H1, H2, H3, H4, H5, H6, I1, I2, I3, I4, K1 **Non-Mandatory**: D4, E1, G1, J1	See Table 4.3-5

Group	Common/ Scientific Name	Species Type	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Species Impacts due to Covered Activities	AMMs[1]	Mitigation[2]
Mollusks	Northern riffleshell mussel *Epioblasma torulosa rangiana*	Take	Endangered	**Impacts likely** in Pickaway, County, OH; Armstrong and Clarion counties, PA; and Kanawha County, WV. **No effect:** in De Kalb County, IN; Bath, Pendleton, and Rowan counties, KY; Franklin, Madison, and Union counties, OH; and Braxton and Clay counties, WV.	Pipeline corridor presence, vehicle operation, access road culvert replacement, access road maintenance, off-ROW clearing, mechanical repair and fill in ROW, in-stream stabilization, tree clearing, herbicide application, hydrostatic testing, pipeline abandonment, well abandonment, wet ditch crossing activities, access road construction, grading, HDD, hydrostatic testing (withdrawal and discharge), re-grading, fertilizer application, erosion control devices, herbaceous and woody vegetation clearing, stream bank contouring, installation and removal of stream crossing structures, trenching related impacts, waste pits, minor spill events, in-stream stabilization, and vegetation disposal	Sedimentation, chemical contaminants, increased water temperature, crushing, substrate compaction, altered flow, burying substrate, entrapment, water level reduction, and introduction of invasive species	**Mandatory**: A2, B2, C1, D1, D2, D3, D5, D6, E2, H1, H2, H3, H4, H5, H6, I1, I2, I3, I4, K1 **Non-Mandatory**: D4, E1, G1, J1	See Table 4.3-5

Group	Common/ Scientific Name	Species Type	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Species Impacts due to Covered Activities	AMMs[1]	Mitigation[2]
	Oyster mussel *Epioblasma capsaeformis*	MSHCP	Endangered	**Not likely to adversely affect** in Maury County, TN. **No effect** in Monroe County, KY	Not applicable	Not applicable	**Mandatory**: A2, B2, C1, D1, D2, D3, D5, D6, E2, H1, H2, H3, H4, H5, H6, I4, K1 **Non-Mandatory**: D4, E1, F1, G1, I1, I2, J1	Not applicable

Group	Common/ Scientific Name	Species Type	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Species Impacts due to Covered Activities	AMMs[1]	Mitigation[2]
Mollusks	Sheepnose mussel *Plethobasus cyphyus*	Take	Endangered	**Impacts likely** in Bath, Boyd, Bracken, Clark, Fayette, Greenup, Lewis, Madison, Mason, Nicholas, Pendleton, and Rowan counties, KY; Sunflower County, MS; Adams, Brown, Clermont, Gallia, Lawrence, Meigs, Scioto, and Washington counties, OH; and Cabell, Jackson, Mason, Wayne, and Wood counties, WV. **No effect**: in Garrard County, KY; Humphreys County, MS; and Athens, Coshocton, and Morgan counties, OH.	Pipeline corridor presence, vehicle operation, access road culvert replacement, access road maintenance, off-ROW clearing, mechanical repair and fill in ROW, in-stream stabilization, tree clearing, herbicide application, hydrostatic testing, pipeline abandonment, well abandonment, wet ditch crossing activities, access road construction, grading, HDD, hydrostatic testing (withdrawal and discharge), regrading, fertilizer application, erosion control devices, herbaceous and woody vegetation clearing, stream bank contouring, installation and removal of stream crossing structures, trenching related impacts, waste pits, minor spill events (major spill events are addressed outside the context of the MSHCP), in-stream stabilization, and vegetation disposal	Sedimentation, chemical contaminants, increased water temperature, crushing, substrate compaction, altered flow, burying substrate, entrapment, water level reduction, and introduction of invasive species	**Mandatory**: A2, B2, C1, D1, D2, D3, D5, D6, E2, H1, H2, H3, H4, H5, H6, I1, I2, I3, I4, K1 **Non-Mandatory**: D4, E1, G1, J1	See Table 4.3-5

Group	Common/ Scientific Name	Species Type	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Species Impacts due to Covered Activities	AMMs[1]	Mitigation[2]
Insects	American burying beetle *Nicophorus americanus*	Take	Endangered	**Impacts likely** in Athens, Morgan, and Perry counties, OH. **No effect** in Lafayette County, MS; and Gloucester County, NJ; and Hocking and Vinton counties, OH.	Off ROW clearing including tree clearing, shrub clearing, herbaceous vegetation clearing, grading, temporary access roads, and permanent access roads	Habitat degradation, chemical contaminants, reduction in carrion prey base, and increased interspecific competition	**Mandatory**: A1, B2 **Non-Mandatory**: A2, B1	Within first 3 years of MSHCP implementation: Captive propagation and release, monitoring of release and its success, follow up surveys the next spring.

[1]See Table 4.3.3 (above) for a listing of general AMMs and Appendix E for species-specific AMMs
[2]See MSHCP for specific details regarding Mitigation

Based on the analysis in the MSHCP, BA, and BO, we make the following conclusions regarding potential impacts to MSHCP species in (Table 4.3.4). Note, for nine of the 19 species in that table, NiSource will avoid take through implementation of the avoidance measures in Table 4.3.3. In addition, for some of the take species, NiSource may, in coordination with the appropriate Service Field Office, elect to do "pre-project surveys" with the goal of establishing the surveyed species is absent from the project area. In these situations, the FWS may agree, that based on the results of the survey, NiSource Covered Activities would have no effect on those species.

Indiana Bats

We expect that the overall level of take of Indiana bats will be relatively low, and not result in significant population-level impacts. The Service reached this conclusion based on: 1) take of Indiana bats in winter hibernacula is not anticipated; 2) take of winter habitat is not anticipated; and 3) no direct take is anticipated in known summer maternity habitat (pups or adults) or known spring staging/fall swarming habitat of Priority 1 and 2 hibernacula.

NiSource has proposed mitigation for their impacts to Indiana bats in the MSHCP. The mitigation package includes: the purchase (i.e., fee title or easement) and protection (i.e., gating) of either 126 or 252 acres surrounding one or two P1 or P2 hibernacula and the protection (i.e., fee title or easement) of between 8,907 and 10,960 acres of known maternity colony habitat. The protection of hibernaculum also includes the development and implementation of a Hibernaculum Protection Plan to address threats (e.g., unauthorized human entrance). We believe this type and amount of mitigation will fully compensate for the impact of the take from NiSource's Covered Activities on populations within and associated with the Covered Lands. We conclude that the Proposed Action of issuing NiSource an ITP for 50-years does not pose a significant risk to the viability of the Indiana bat, and will not result in measurable population declines or losses in the Covered Lands. Because we do not expect the impacts to have population-level effects, we do not expect that the Proposed Action will

appreciably reduce the likelihood of both the survival and recovery of the species as a whole. Therefore, we conclude that the Proposed Action is not likely to jeopardize the continued existence of the species.

Bog Turtle

Take of bog turtles from NiSource activities would occur primarily from impacts directly associated with new construction of pipeline and related facilities across occupied habitat. The NiSource MSHCP provides the following estimation of take numbers (Chapter 6, p. 73-78), which we endorse (after slight modification) and incorporate here.

For looping (10 sites), conventional replacement (5 sites), and new construction (5 sites) projects, a small number of turtles (0-5 per site) may be missed during pre-construction surveys and wounded or killed. All turtles at the sites are expected to experience some harassment/harm in the form of a temporary reduction in reproductive success due to disturbance during construction, and habitat loss/degradation.

In addition, O&M activities may impact bog turtles at 25 sites through: 1) general vehicle use may result in 0-2 turtles wounded or killed per site; 2) mowing may result in one turtle wounded or killed per round of vegetation management for every 20 sites mowed (every seven years for a total of 9 bog turtles spread across 25 sites); 3) herbicide use may result in one turtle harassed/harmed (non-lethal) per round of vegetation management (every seven years for a total of 7 turtles/site); and 4) all bog turtles at one site may be harassed or harmed (non-lethal) during a minor spill event.

For the 5 sites with no anticipated ground-disturbing work, a total of 0-3 bog turtles are anticipated to be wounded or killed, and an additional 7 bog turtles harassed or harmed (non-lethal) over the life of the MSHCP. For the 20 additional sites where ground-disturbing work is anticipated, a total of 0-8 bog turtles may be wounded or killed over the life of the MSHCP, and all turtles at the sites will experience a temporary reduction in reproductive success. It is possible that a small bog turtle site could be extirpated due to ground-disturbing activities.

We agree with the assessment of beneficial impacts associated with mitigation discussed in the MSHCP and the following is a summary of that discussion. There are two forms of mitigation for impacts to bog turtles included in the MSHCP. For impacts at an estimated 20 bog turtle sites (see below) associated with construction (ground disturbance) activities and all future non-ground-disturbing O&M at those sites, NiSource will either permanently protect and restore a bog turtle site to optimal habitat or protect an existing site with optimal bog turtle habitat. The mitigation projects are in line with Recovery Action 2.3.3, 6.4.1, and 7.2. To mitigate for impacts to bog turtles associated with an additional 5 sites where only non-ground disturbing O&M activities are anticipated, NiSource will either protect and restore an off-site bog turtle wetland or conduct habitat restoration and long-term management (life of the permit) of the wetland impacted. Off-ROW habitat restoration will expand the amount of high quality nesting, basking, and foraging habitat which is expected to result in increased survival and reproductive success of the population. This will also serve to decrease the likely concentration of bog turtles within the ROW which will further reduce risk of future impacts to individual turtles from O&M.

NiSource actions should have no effect on the illegal collection or trade of the bog turtle. However, NiSource can contribute to the conservation needs of the species through the additional survey efforts planned, the management of bog turtle sites along the existing ROW, and permanent protection and restoration of bog turtle sites as part of their mitigation package.

NiSource is anticipated to impact 25 (or 4%) of known bog turtle sites range-wide. As discussed above, NiSource actions may adversely and beneficially affect bog turtles. The most significant adverse effects are associated with looping, replacement, and new alignment projects. However, NiSource has committed to avoid bog turtle habitat through routing and HDD whenever possible and will conduct pre-construction surveys to move bog turtles out of the way. Even with this commitment, we anticipate that some turtles will be killed and if this occurs at a wetland with a small, isolated population, this site may be extirpated. The vegetation management activities conducted on NiSource ROWs may also result in impacts to small numbers of turtles but is anticipated to be beneficial to the local populations overall. In addition, NiSource is anticipated to protect and restore 25 sites.

The number of known populations in the Recovery Units crossed by the NiSource project theoretically meets the conservation needs of the species (once sufficient populations are protected). When considering this, the potential loss of one known population of bog turtles would not measurably reduce our ability to continue to meet the conservation needs of the species. Therefore, we conclude that this project will not reduce the likelihood of survival and recovery of the bog turtle.

Madison Cave Isopod

We expect the overall level of take of MCI will be low. There are no known MCI sites within the Covered Land, and only one MCI site (Limekiln Cave) is located within ½-mile of the Covered Land. For our analysis, we assumed that one additional new MCI site will likely be found within the Covered Land, and along with Limekiln Cave, may be impacted during the 50-year life of the permit. We do not anticipate that impacts will significantly impact the Limekiln Cave population, given its distance from the Covered Land. We do anticipate that take of individuals from the unknown population may occur, and there is a potential for extirpation of one unknown population within the Covered Land.

To mitigate for impacts to MCI associated with the Limekiln Cave, NiSource will protect and restore a minimum of 25 acres around the Limekiln Cave. If that is not possible, NiSource will follow mitigation requirements for unknown occurrences. To mitigate for impacts to MCI associated with one unknown occurrence, NiSource will protect key parcels (minimum of 25 acres) in the drainage area immediately around a known MCI site. NiSource will restore 300-foot buffers around each karst feature on the parcel. This will protect the surface karst features from future disturbance which is very important in areas with high development threats.

We do not expect the Proposed Action to reduce the likelihood of survival and recovery of the MCI rangewide, or expect the Proposed Action to appreciably reduce the likelihood of both the survival and recovery of the species as a whole. Therefore, we conclude that the Proposed Action will not jeopardize the continued existence of the species.

Clubshell Mussel

Of the 17 known populations of clubshell, including eight stable/reproducing populations, NiSource has the potential to affect five; three of which are considered stable/reproducing populations (Allegheny River, Little Darby Creek, and Elk River) and two (Meathouse Fork and Big Darby Creek) are unknown. Because the status of the Meathouse Fork population is unknown and because NiSource crosses Meathouse Fork multiple times upstream of where the remaining clubshell population is likely located, the Service will require NiSource to implement dry-ditch techniques when working in Meathouse Fork to significantly limit downstream sediments. The Allegheny and Elk River populations cover many river miles and it is unlikely that NiSource activities would significantly affect these populations. NiSource crosses near the mouth of Little Darby Creek and downstream of the one individual found in Big Darby Creek - population level impacts in these streams are therefore also unlikely. The likelihood of any population being extirpated outright is small given the Service required actions, and the AMMs and BMPs implemented by NiSource. Therefore, after reviewing the current status of the species, the environmental baseline for the Covered Land, and the potential cumulative effects, it is our opinion that the Proposed Action is not likely to jeopardize the continued existence of the clubshell mussel. No critical habitat has been designated for this species; therefore, none will be affected.

Where take of mussels cannot be avoided, NiSource will employ mitigation to fully compensate for the impact of the take. For impacts to habitat wherever HCP or non-HCP mussels occur, NiSource will restore the disturbed stream bed and riparian area within its ROW resulting from its activities. Restoration will occur during the same construction season (next appropriate planting season for riparian restoration) as impacts unless there are extenuating circumstances and the Service is informed of those issues. The basic restoration will be conducted in accordance with standard industry specifications as defined in the ECS and required by FERC and other relevant regulatory agencies. This will involve, at a minimum, restoration of any impacts to the depth, flow, channel bottom, and/or banks as nearly as practical back to the pre-

activity condition. Vegetation restoration must be with site-appropriate native species. As the initial step in compensatory mitigation, NiSource will enhance the restored stream substrate within the construction zone to habitat that is optimal for the mussel species. This would typically involve either replacement or importation of clean, appropriately sized material for mussel re-colonization. NiSource will also enhance, where feasible, any pre-construction deficiencies associated with the depth, flow, bank stability, or riparian vegetation that would be detrimental to mussel recolonization, survival, and reproduction. This enhancement serves as one component of NiSource's overall mitigation program.

A second step in mitigation for mussel impacts is mitigation to compensate for sediment producing and other indirect impact producing activities (Aggregate Take). Mitigation for Aggregate Take will take the form of habitat protection/restoration. The protection or restoration of riparian habitat is designed to reduce the sediment impacts to mussel species by buffering occupied streams. The Service expects this to result in improved survival and reproduction of mussels in the mitigation area.

Last, for all species, NiSource has the option described in AMM #1 to relocate mussels as part of a stream crossing project. If the relocation is successful, as discussed in AMM #1, the following mitigation is required in addition to the enhancement and aggregate take mitigation described above. Find, relocate, and monitor the impacted species and other mussels within the assemblage impacted by the project to a suitable site upstream or downstream of the impact zone, and restore riparian habitat at the site of relocation, or at an upstream location as near to the mussel relocation site as possible, at a 1:1 ratio of the acreage amount of in-stream habitat impacted.

If NiSource chooses not to relocate mussels, additional mitigation is required specific to each species. For Clubshell, based on the impact of take, the mitigation amount required is a 1.5:1 ratio of the acreage amount of instream habitat impacted by stream crossing(s) of the Allegheny River (PA), the Elk River (WV), or Little Darby Creek (OH) (stable populations). For impacts to

Big Darby Creek (OH) or Meathouse Fork (WV), the 1.5:1 mitigation ratio will be increased by a multiplier of 1.5 to compensate for greater impacts to small isolated populations that may have less resilience. For impacts to streams not listed here, NiSource, in coordination with the Service, will determine whether the population is stable and recruiting or small and isolated and apply the appropriate mitigation ratios. For all riparian restoration, a multiplier of 3 will be used to account for the time it takes riparian restorations to mature, stabilize, and become fully functional.

Northern Riffleshell

There are 13 northern riffleshell populations currently identified and four known reproducing populations. NiSource would potentially affect only one of the four known reproducing populations (the large Allegheny River population). Two other reproducing populations are completely outside of the covered lands. NiSource has the potential to affect one population where reproduction is uncertain (Big Darby Creek) and one population that may or may not be extant (Elk River). Local impacts are possible to the Allegheny River population, but not to the larger population of millions of animals - the persistence and reproductive potential of this population should not be affected. The Elk River population is apparently very small and may already be extirpated. If, however, that population exists at a very low density in the vicinity of the pipeline, NiSource activities could result in significant impacts. NiSource activities may affect northern riffleshell in Big Darby Creek in Ohio. There are two augmented populations (two release sites) in Big Darby Creek in Franklin County, Ohio. They cover several miles of stream (in part upstream of the NiSource crossing) where it is unlikely that there would be population level impacts. The distribution of the northern riffleshell, which is focused in Pennsylvania, Ohio, and Kentucky within the NiSource Covered Lands has an additional population center in Canada/Michigan. The Elk River population in West Virginia may already be extirpated, but significant impacts could occur from multiple crossings of the Elk River if the population is extant, although impacts to the habitat would be minor and of short duration. The recovery plan (USFWS 1994) documents the Elk River drainage as necessary for recovery of the species. The 5-Year Review (USFWS 2008) indicates, however, that it is doubtful that this

criterion can be met because of a lack of understanding of the reasons for decline in the Elk River population of northern riffleshell. The existing Elk River population may no longer be relevant to recovery of this species. Therefore, after reviewing the current status of the species, the environmental baseline for the Covered Land, and the potential cumulative effects, it is our opinion that the Proposed Action, as proposed, is not likely to jeopardize the continued existence of the northern riffleshell mussel. No critical habitat has been designated for this species; therefore, none will be affected.

Mitigation for northern riffleshell follows that for clubshell except for new construction impacts where mussels are not relocated. In these instances, there will be two avenues to mitigation. Mitigation Option A will directly and immediately increase mussel populations by reintroducing captive-reared individuals to suitable habitat, or adding tothem to existing populations. Long-term population gains are also expected to accrue from reproduction of introduced mussels. The goal will be to establish a stable mitigation site(s) that over time foster northern riffleshell reproduction and expand. NiSource will be permitted to mitigate for impacts at one or more sites that occur within any 4-digit Hydrologic Unit at a mitigation site within that 4-digit Hydrologic Unit provided a suitable mitigation site as agreed to by the Service is available. NiSource must ensure a ratio of 2.5:1 mussels introduced into suitable stream as defined below for each mussel taken (either documented or estimated) from the Allegheny River or Big Darby Creek and a ratio of 2.5:1(x1.5):1 ratio for mussels taken in the Elk River to compensate for the variable impact of take of that population. A multiplier of 1.5 is used for all mitigation to compensate for the failure of some of the introduced animals to survive the transplanting process, however, NiSource will ensure through follow-up surveys that the mitigation site (s) maintain at minimum the number of mussels that reflect the baseline ratio of mussels restored to those taken (i.e., in the case of impacts to a stable/recruiting population, 2.5:1; and in the case of impacts to a small isolated population 3.75:1).

Mitigation Option B will fully compensate for the impact of take by protecting and restoring the riparian zones that moderate water temperature, provide nutrient inputs, and reduce sediments

and other contaminants along occupied streams, thereby improving the quality of the habitat. NiSource expects this to translate into increased survival and reproduction of mussels in the mitigation area. Protect and restore protect riparian buffers associated with occupied northern riffleshell habitat. Because of the impact of take on this species, the mitigation amount required is a 2.5:1 ratio of the acreage amount of instream habitat impacted by stream crossing (s) of the Allegheny River (PA) or Big Darby Creek (OH). For stream crossings of the Elk River (WV), the 2.5:1 mitigation ratio will be increased by a multiplier of 1.5 to compensate for greater impacts to small isolated populations that may have less resilience. For impacts to streams not listed here, NiSource in coordination with the Service will determine whether the population is stable and recruiting or small and isolated and apply the appropriate mitigation ratios. For all riparian restoration, a multiplier of 3 will be used to account for the time it takes riparian restorations to mature, stabilize, and become fully functional.

Fanshell Mussel

NiSource has the potential to affect two stable, reproducing populations of fanshell mussels (Muskingum River and NiSource has the potential to affect two of the stable, reproducing populations (Muskingum River and Licking River in Kentucky), two small, possibly non-reproducing populations (Tygart's Creek and Barren River), and the population in the Ohio River where the status is largely unknown. NiSource activities would potentially affect five of the approximately 13 known populations. It is possible that NiSource activities could impact one of the strongholds of the fanshell mussel in the Licking River in Kentucky. The extent of the fanshell in the lower Licking River suggests population level impacts would be unlikely. NiSource has the potential to impact a downstream segment of the fanshell population in the Muskingum River. NiSource will not affect the larger population that extends miles upstream of the NiSource crossings. NiSource makes seven crossings of the Ohio River between Ohio and Kentucky and Ohio and West Virginia. Populations of fanshell are known to persist in the Ohio, but population levels and densities are largely unknown. Although there will be multiple crossings, NiSource would affect the persistence or reproduction of the fanshell population of the Ohio River. The recovery plan indicates the need for three populations in Kentucky

tributaries to the Ohio. In 1991, the Tygart's Creek and Barren River populations were considered small and non-reproducing and may now be extirpated. Since the impacts to these populations and their status are both uncertain, and since NiSource activities are not expected to cause serious degradation of habitat, while NiSource activities could cause take in these streams, it does not seem likely that NiSource activities will impede recovery of this species. After reviewing the current status of this species, the environmental baseline for the Covered Land, and the potential cumulative effects, it is our opinion that the Proposed Action, as proposed, is not likely to jeopardize the continued existence of fanshell mussels. No critical habitat has been designated for this species; therefore, none will be affected.

Mitigation for fanshell follows the same pattern as for other mussels except for take from new construction. Mitigation for new construction will require NiSource to protect and restore riparian buffers adjacent to occupied fanshell habitat. Because of the impact of take on this species, the mitigation amount required is a 1.5:1 ratio of the acreage amount of instream habitat impacted by stream crossing(s). For impacts to Muskingum River (Ohio), Walhonding River (Ohio), Tygart's Creek (Kentucky), or the Barren River (Kentucky) the 1.5:1 mitigation ratio will be increased by a multiplier of 1.5 to compensate for greater impacts to small isolated populations that may have less resilience. For impacts to streams not listed here, NiSource in coordination with the Service will determine
whether or not the population is stable and recruiting or small and isolated and apply the appropriate mitigation ratios. For all riparian restoration, a multiplier of 3 will be used to account for the time it takes riparian restorations to mature, stabilize, and become fully functional.

James Spiny Mussel

JSM has a limited range, confined to the James and Roanoke River watersheds (Dan and Mayo Rivers) in Virginia and North Carolina. NiSource would potentially affect three known populations (considered small, isolated, or non-reproducing) and one population of unknown status, therefore potentially affecting four of the 21 known populations. NiSource would not directly impact any of the most robust remaining populations (Johns Creek, South Fork Potts

Creek, Mill Creek, and the Roanoke River drainage, nor the large, recently discovered population at Dicks Creek/Oregon Creek). NiSource makes 79 stream crossings within the Covered Lands in the James watershed. It is possible that some of the un-surveyed streams contain populations of JSM as evidenced by the discovery in 2010 of the Dicks Creek/Oregon Creek population. NiSource activities therefore could affect some currently unknown JSM populations, however, NiSource's agreement to implement all stream crossings using dry-ditch methodology and a mandatory time of year restriction (15 May to 31 July) designed to avoid the peak reproductive period would minimize population level impacts. Therefore, after reviewing the current status of this species, the environmental baseline for the Covered Land, and the potential cumulative effects, it is our opinion that the Proposed Action, as proposed, is not likely to jeopardize the continued existence of the James spiny mussel. No critical habitat has been designated for this species; therefore, none will be affected.

Mitigation for take of JSM from new construction is to protect and restore riparian buffers associated with occupied JSM habitat (coordinate with the Service and the Virginia Department of Game and Inland Fisheries about documented occurrences). Because of the impact of take on this species, the mitigation amount required is a 2.0:1 ratio of the acreage amount of instream habitat impacted by stream crossings affecting stable/recruiting populations (none at the time of issuance of the ITP). For stream crossings of all other JSM streams the mitigation ratio will be increased by a multiplier of 1.5 to compensate for greater impacts to small isolated populations that may have less resilience. In addition, a multiplier of 3.0 will be applied to habitat that is only protected and not restored.

Sheepnose Mussel

There are multiple stable or improving sheepnose populations outside of the NiSource impact area and two stable or improving populations within the general area of NiSource covered lands that would not be impacted by NiSource because of agreements to HDD these streams or because of the location of crossings relative to the populations. Of the 11 populations thought to be stable or improving, six are completely outside of the NiSource covered lands. There is the

possibility for take in the Allegheny, Muskingum, and Big Sunflower Rivers should HDD not be practical and should those populations extend into the crossing areas, but we would not expect population-level impacts. Take is likely from two declining populations (Kentucky and Licking Rivers) and there is some potential for NiSource to have population-level impacts on sheepnose in the Kentucky River, depending on the exact location and number of animals, and the actual level of impacts. Because this population is likely to be of limited importance to the species, NiSource activities will not preclude survival or recovery of the sheepnose. Therefore, after reviewing the current status of this species, the environmental baseline for the Covered Land, and the potential cumulative effects, it is our opinion that the Proposed Action, as proposed, is not likely to jeopardize the continued existence of the sheepnose mussel. No critical habitat has been designated for this species; therefore, none will be affected.

Mitigation for new construction impacts to sheepnose requires protection and restoration of riparian buffers adjacent to occupied sheepnose habitat. Because of the impact of take on this species, the mitigation amount required is a 2.0:1 ratio of the acreage amount of instream habitat impacted by stream crossing(s) of the Ohio River (Kentucky, Ohio, West Virginia), Muskingum River (Ohio), and the Big Sunflower River (Mississippi) (stable populations). For impacts to Kentucky River (Kentucky), Licking River (Kentucky), and Walhonding River (Ohio) the 2.0:1 mitigation ratio will be increased by a multiplier of 1.5 to compensate for greater impacts to small isolated populations that may have less resilience. For impacts to streams not listed here, NiSource in coordination with the Service will determine whether the population is stable and recruiting or small and isolated and apply the appropriate mitigation ratios. For all riparian restoration, a multiplier of 3 will be used to account for the time it takes riparian restorations to mature, stabilize, and become fully functional.

Nashville Crayfish

The existing NiSource pipeline, plus the one-mile corridor, bisects the Mill Creek Watershed. As such, NiSource Covered Activities have the potential to impact Nashville crayfish in the

mainstem of Mill Creek and six tributary streams. However, we do not anticipate population level impacts because NiSource has agreed to utilize dry-ditch techniques for all stream crossings. Impacts to individuals and habitat therefore should be limited to small reaches of stream at the crossing area. Therefore, based on our estimation of the current population sizes, our assumptions concerning the reproductive potential of Nashville crayfish, and the expected minimal long-term impacts to habitat, it seems unlikely that either mainstem or tributary populations would be significantly impacted by NiSource Covered Activities. As such, after reviewing the current status of this species, the environmental baseline for the Covered Land, and potential cumulative effects, it is our opinion that the Proposed Action, as proposed, is not likely to jeopardize the continued existence of the Nashville crayfish. No critical habitat has been designated for this species; therefore, none will be affected.

As with mussels, in all cases where direct take (stream crossings) occur, NiSource will restore the streambed and will restore the riparian area within the ROW disturbed as a result of its activities. The restorations will be conducted in accordance with ECS, AMMs, and requirements of FERC and other relevant action agencies. This will involve at minimum restoration of any impacts to the depth, flow, channel bottom, or banks as nearly as practical back to the pre-impact condition. Vegetation restoration must be with site-appropriate native species. As the initial step in compensatory mitigation, NiSource will also enhance the restored site to promote additional conservation of Nashville crayfish (at minimum this will include the addition of slab rock at a minimum size per slab of 1.6 square feet Walton 2008) within the 75 feet formerly enclosed by the coffer dams). The Service expects the enhancement of the substrate to result in more opportunities for recruitment of Nashville crayfish by providing suitable sheltering habitat.

Take of Nashville crayfish is anticipated to occur in two ways. First, the impact which may result from direct loss of individuals or habitat from stream crossings activities employed to install new pipeline, or repair or replace existing pipeline. Mitigation will entail restoration, enhancement, and protect potential of Nashville crayfish stream bed and riparian habitat within one of the

priority areas identified by Withers (2009) Indian Creek, Mill Creek upstream of downtown Nolensville or Bittick Creek an unnamed tributary to Mill Creek, or another priority stream identified in collaboration with the Service on a 1:1 basis with the Nashville crayfish habitat area affected by its activities equaling a minimum of 4.0 acres. This equates to streambed and riparian restoration, enhancement, and protection for a length of 3,485 linear feet.

The second kind of take is aggregate, which would result primarily from sedimentation from non-aquatic activities within the watershed, and secondarily from loss of riparian habitat, and other similar comparatively minor and indirect impacts. NiSource will implement mitigation for Aggregate Take in its entirety in conjunction with the first new construction project for which mitigation is required to ensure adequate and timely compensation for O&M activities in the watersheds where impacts would likely occur over the life of the ITP. It will use habitat protection/restoration as the mitigation option. The protection or restoration of riparian habitat is designed to reduce the sediment impacts to Nashville crayfish by buffering occupied streams. The total riparian area protected to mitigate for aggregate take will be 0.4 acre.

American burying beetle

We expect the overall take of American burying beetles (ABBs) will be low and not result in significant population-level impacts. Most of NiSource's existing facilities (e.g., ROW, compressor stations, appurtenant facilities) within the affected populations range is currently not suitable habitat. Where there is suitable habitat, the density of beetles are low, and these densities are anticipated to remain low, even with ongoing population augmentation efforts. The low density of beetles in suitable habitat reduces the potential for NiSource to directly (and unknowingly) encounter and harm individuals during their Covered Activities. Further, NiSource has proposed mitigation for their impacts to ABB in the form of a reintroduction program. This program will help bolster the reintroduction efforts directed at this population, and reduce the impact of any take from NiSource Covered Activities. We conclude that the proposed impacts from NiSource Covered Activities do not pose a significant risk to the viability of the ABB, and

will not result in measurable population declines or losses in the Covered Land. Therefore, we do not expect the Proposed Action to appreciably reduce the likelihood of survival and recovery of the ABB, and therefore conclude it is not likely to jeopardize the continued existence of the species.

Non-MSHCP Species

As discussed in Chapter 3, 46 Non-MSHCP Species that had the potential to be present in the Covered Land were also analyzed for potential impacts. Table 4.3.7 summarizes the results of our analysis. Appendix F contains species-specific impact tables relative to Covered Activities/Sub-Activities, stressors, range of species responses, management options (AMMs/BMPs), and likely affects. Table 4.3.5 below outlines AMMs for Non-MSHCP Species that are not likely to be adversely affected by NiSource's Covered Activities (total number = 32). Table 4.3.6 below outlines AMMs for MSHCP Species that are likely to be adversely affected by NiSource's Covered Activities (total number = 10). These AMMs largely made use of the AMMs developed for the MSHCP Species (Table 4.3.3 above and Appendix E). However, in some circumstances additional AMMs/BMPs have been added based on research identified in species' recovery plans and management plans aimed at further minimizing, or in some cases, avoiding impacts. For the remaining four (4) Non-MSHCP Species, the Service determined NiSource Covered Activities would have No Effect on the species.

Table 4.3.5 Summary of Avoidance and Minimization Measures (AMMs) for Non-MSHCP Species that are not likely to be adversely affected by NiSource Covered Activities.

Species	Location	AMM #	AMM Description
Fat pocketbook, Fluted Kidney shell pearlymussel, Orangefoot pimpleback pearlymussel, Ring pink mussel, Rough pigtoe, Slabside pearlymussel	See Table 4.3.7.	AMM-1	Implement the HCP mussel AMMs for all projects in areas specified for these species.
Red-cockaded Woodpecker	Calcasieu, Catahoula, Evangeline, Grant, La Salle, and Rapides parishes, Louisiana and Southampton and Sussex counties, Virginia	AMM-1	For prolonged operations and maintenance activities (e.g., >2 hours) within existing ROWs that traverse mature (greater than 60 years of age), pine-dominated forests containing sparse hardwood understory or midstory within Calcasieu, Catahoula, Evangeline, Grant, La Salle, and Rapides parishes, Louisiana and Southampton and Sussex counties, Virginia, conduct work between August 1 and April 14th or conduct surveys following FWS survey guidance.
Red-cockaded Woodpecker	Calcasieu, Catahoula, Evangeline, Grant, La Salle, and Rapides parishes, Louisiana and Southampton and Sussex counties, Virginia	AMM-2	For new construction activities that traverse mature (greater than 60 years of age), pine-dominated forests containing sparse hardwood understory or midstory within Calcasieu, Catahoula, Evangeline, Grant, La Salle, and Rapides parishes, Louisiana and Southampton and Sussex counties, Virginia, conduct surveys following FWS Service survey guidance.
Red-cockaded Woodpecker	Calcasieu, Catahoula, Evangeline, Grant, La Salle, and Rapides Parishes, Louisiana and Southampton and Sussex counties, Virginia	AMM-3	FWS Service survey guidance for RCW Step 1. Determine the presence/absence of suitable potential foraging or nesting habitat by correctly following the Survey Protocol described in Appendix 4 (pp. 288-290) of the Recovery Plan for the Red-cockaded Woodpecker - Second Revision (2003). These habitat surveys will be accepted for the life of NiSource's Incidental Take Permit Maintain survey reports (including entering both positive and negative findings in a GIS database to which the Service will have access). Potential nesting habitat present? • If no, is suitable foraging habitat present?

Species	Location	AMM #	AMM Description
			o If no, document for future NiSource activities and annual compliance report[1] and no further RCW AMMs are needed. o If yes and will be impacted, conduct an additional survey effort to identify any suitable nesting habitat within 0.5 miles of the project area to determine if there could be potential use of that impacted foraging habitat by groups outside of the project area. ▪ If no suitable nesting habitat is present within 0.5 miles of the project area, document for future NiSource activities and annual compliance report and no further RCW AMMs are needed. ▪ If suitable nesting habitat is present, conduct surveys for cavity trees (Step 2) or coordinate with the Service • If yes, conduct surveys for cavity trees (Step 2) or coordinate with the Service Step 2. Active cavity trees found? • If no, document for future NiSource activities and annual compliance report[1] and no further RCW AMMs are needed. Submit both positive and negative survey reports to the Service Field Office in the state in which the surveys were conducted. • If one or more active cavity trees are found: o For projects on existing ROWs- a foraging analysis (Step 3) should be conducted to determine whether sufficient amounts of foraging habitat will remain for each group post-project. o For new construction, further coordination/consultation with the Service is needed. Step 3. Adequate foraging habitat remaining post-project? (Adequate foraging habitat is described in Appendix 5 (pp. 292-294) of the Recovery Plan for the Red-cockaded Woodpecker - Second Revision (2003). • If yes, document for future NiSource activities and annual compliance report[8] and follow AMM 2. • If no, further coordination/consultation with the Service is needed. 1. Conduct operations and maintenance activities that may disturb RCW (i.e., would create a novel noise

Species	Location	AMM #	AMM Description
			disturbance or any activity that would be ≥ 2 hours duration) within existing ROWs that traverse mature (greater than 60 years of age and 10 inches dbh), pine-dominated forests containing sparse hardwood understory or midstory in RCW parishes/counties between August 1 and April 14. Survey reports should include the following details: 1. survey methodology including dates, qualifications of survey personnel, size of survey area, and transect density; 2. pine stand characteristics including number of acres of suitable nesting and/or foraging habitat, tree species, basal area and number of pine stems 10 inches or greater per acre, percent cover of pine trees greater than 60 years of age, species of dominant vegetation within each canopy layer, under-story conditions and species composition (several representative photographs should be included); 3. number of active and inactive RCW cavity trees observed and the condition of the cavities (e.g., resin flow, shape of cavity, start-holes); 4. presence or absence or RCWs; and 5. topographic quadrangle maps which illustrate areas of adequate RCW nesting and/or foraging habitat, cluster sites, and cavity tree locations relative to proposed construction activities.
West Virginia northern flying squirrel	The known WVNFS population centers which that overlap or are in close proximity to the NiSource Covered Lands area are: • Cheat Mountain (Pocahontas and Randolph counties, West Virginia) • Spruce Knob/Laurel Fork (Pendleton, Pocahontas, and Randolph counties, West Virginia) • Blackwater Canyon/Dolly Sods (Grant, Randolph, and	AMM-1	When within WVNFS habitat within the Monongahela National Forest, implement the Land and Resource Management Plan Forest-Wide Management Direction for WVNFS (TE63 to TE66).

Species	Location	AMM #	AMM Description
	Tucker counties, West Virginia) The majority of the WVNFS population centers within the NiSource MSHCP Covered Lands are found within the Monongahela NF.		
West Virginia northern flying squirrel	The known WVNFS population centers which that overlap or are in close proximity to the NiSource MSHCP Covered Lands are: • Cheat Mountain (Pocahontas and Randolph counties, West Virginia) • Spruce Knob/Laurel Fork (Pendleton, Pocahontas, and Randolph counties, West Virginia) • Blackwater Canyon/Dolly Sods (Grant, Randolph, and Tucker counties, West Virginia) The majority of the WVNFS population centers within the NiSource MSHCP Covered Lands are found within the Monongahela NF.	AMM-2	Employ all practical measures to minimize the area of disturbance when conducting O&M activities in occupied or potential habitat.

Species	Location	AMM #	AMM Description
West Virginia northern flying squirrel	The known WVNFS population centers which that overlap or are in close proximity to the NiSource MSHCP Covered Lands are: • Cheat Mountain (Pocahontas and Randolph counties, West Virginia) • Spruce Knob/Laurel Fork (Pendleton, Pocahontas, and Randolph counties, West Virginia) • Blackwater Canyon/Dolly Sods (Grant, Randolph, and Tucker counties, West Virginia) The majority of the WVNFS population centers within the NiSource MSHCP area Covered Lands are found within the Monongahela NF.	AMM-3	Avoid aerial application of herbicides within mapped WVNFS habitat.

Species	Location	AMM #	AMM Description
West Virginia northern flying squirrel	The known WVNFS population centers which that overlap or are in close proximity to the NiSource MSHCP Covered Lands are: • Cheat Mountain (Pocahontas and Randolph counties, West Virginia) • Spruce Knob/Laurel Fork (Pendleton, Pocahontas, and Randolph counties, West Virginia) • Blackwater Canyon/Dolly Sods (Grant, Randolph, and Tucker counties, West Virginia) The majority of the WVNFS population centers within the Covered Lands NiSource MSHCP area are found within the Monongahela NF.	AMM-4	When possible select routes that avoid tree clearing in suitable habitat.
West Virginia northern flying squirrel	The known WVNFS population centers which that overlap or are in close proximity to the NiSource MSHCP area Covered Lands are: • Cheat Mountain (Pocahontas and Randolph counties, West Virginia) • Spruce Knob/Laurel Fork (Pendleton, Pocahontas, and Randolph counties, West Virginia) • Blackwater Canyon/Dolly Sods (Grant, Randolph, and Tucker counties, West Virginia)	AMM-5	When working within WVNFS habitat, all work will occur within existing ROW and a 25-foot temporary workspace without further consultation.

Species	Location	AMM #	AMM Description
	The majority of the WVNFS population centers within the Covered Lands NiSource MSHCP area are found within the Monongahela NF.		
West Virginia northern flying squirrel	The known WVNFS population centers which that overlap or are in close proximity to the Covered Lands NiSource MSHCP area are: • Cheat Mountain (Pocahontas and Randolph counties, West Virginia) • Spruce Knob/Laurel Fork (Pendleton, Pocahontas, and Randolph counties, West Virginia) • Blackwater Canyon/Dolly Sods (Grant, Randolph, and Tucker counties, West Virginia) The majority of the WVNFS population centers within the Covered Lands NiSource MSHCP area are found within the Monongahela NF.	AMM-6	No new access roads will be constructed within WVNFS habitat without further consultation.

Species	Location	AMM #	AMM Description
West Virginia northern flying squirrel	The known WVNFS population centers which that overlap or are in close proximity to the Covered Lands NiSource MSHCP area are: • Cheat Mountain (Pocahontas and Randolph counties, West Virginia) • Spruce Knob/Laurel Fork (Pendleton, Pocahontas, and Randolph counties, West Virginia) • Blackwater Canyon/Dolly Sods (Grant, Randolph, and Tucker counties, West Virginia) The majority of the WVNFS population centers within the Covered Lands NiSource MSHCP area are found within the Monongahela NF.	AMM-7	No new storage well pits will be constructed within WVNFS habitat without further consultation
West Virginia northern flying squirrel	The known WVNFS population centers which that overlap or are in close proximity to Covered Lands the NiSource MSHCP area are: • Cheat Mountain (Pocahontas and Randolph counties, West Virginia) • Spruce Knob/Laurel Fork (Pendleton, Pocahontas, and Randolph counties, West Virginia) • Blackwater Canyon/Dolly Sods (Grant, Randolph, and Tucker counties, West Virginia)	AMM-8	Employ all practical measures to minimize the area of disturbance when conducting construction activities in occupied or potential habitat.

Species	Location	AMM #	AMM Description
	The majority of the WVNFS population centers within the Covered Lands NiSource MSHCP area are found within the Monongahela NF.		
West Virginia northern flying squirrel	The known WVNFS population centers which that overlap or are in close proximity to the Covered Lands NiSource MSHCP area are: • Cheat Mountain (Pocahontas and Randolph counties, West Virginia) • Spruce Knob/Laurel Fork (Pendleton, Pocahontas, and Randolph counties, West Virginia) • Blackwater Canyon/Dolly Sods (Grant, Randolph, and Tucker counties, West Virginia) The majority of the WVNFS population centers within the Covered Lands NiSource MSHCP area are found within the Monongahela NF.	AMM-8	Avoid tree removal between April 1 and September 15 to avoid felling of potential nest trees (i.e., trees greater than 5 inches diameter at breast height) in occupied or potential habitat when young WVNFS may be present in nests.

Species	Location	AMM #	AMM Description
West Virginia northern flying squirrel	The known WVNFS population centers which that overlap or are in close proximity to the Covered Lands NiSource MSHCP area are: • Cheat Mountain (Pocahontas and Randolph counties, West Virginia) • Spruce Knob/Laurel Fork (Pendleton, Pocahontas, and Randolph counties, West Virginia) • Blackwater Canyon/Dolly Sods (Grant, Randolph, and Tucker counties, West Virginia) The majority of the WVNFS population centers within the Covered Lands NiSource MSHCP area are found within the Monongahela NF.	AMM-9	Re-vegetate all disturbed WVNFS habitat within the non-permanent ROW with appropriate native species (red spruce).
West Virginia northern flying squirrel	The known WVNFS population centers which that overlap or are in close proximity to the Covered Lands NiSource MSHCP area are: • Cheat Mountain (Pocahontas and Randolph counties, West Virginia) • Spruce Knob/Laurel Fork (Pendleton, Pocahontas, and Randolph counties, West Virginia) • Blackwater Canyon/Dolly Sods (Grant, Randolph, and Tucker counties, West Virginia)	AMM-10	Monitor all restoration plantings for proper establishment and implement supplemental plantings as necessary.

Species	Location	AMM #	AMM Description
	The majority of the WVNFS population centers within the Covered Lands NiSource MSHCP area are found within the Monongahela NF.		
West Virginia northern flying squirrel	The known WVNFS population centers which that overlap or are in close proximity to the Covered Lands NiSource MSHCP area are: • Cheat Mountain (Pocahontas and Randolph counties, West Virginia) • Spruce Knob/Laurel Fork (Pendleton, Pocahontas, and Randolph counties, West Virginia) • Blackwater Canyon/Dolly Sods (Grant, Randolph, and Tucker counties, West Virginia) The majority of the WVNFS population centers within the Covered Lands NiSource MSHCP area are found within the Monongahela NF.	AMM-11	Establish an adequate number of nest boxes. Use 15 nest boxes per 50 acres of tree clearing and 1 box for each additional 5 acres.
West Virginia northern flying squirrel	The known WVNFS population centers which that overlap or are in close proximity to the Covered Lands NiSource MSHCP area are: • Cheat Mountain (Pocahontas and Randolph counties, West Virginia) • Spruce Knob/Laurel Fork (Pendleton, Pocahontas, and Randolph counties,	AMM-12	Comply with the WVNFS Management Direction from the Monongahela National Forest Plan (USFS 2006), as follows: TE63: Suitable habitat shall be determined using maps collaboratively produced by the Forest, USFWS, and WVDNR. These maps shall be reviewed during watershed or project analysis and refined when Forest, USFWS, and WVDNR biologists determine that suitable habitat is or is not present. All verified capture sites shall be included in the suitable habitat maps. TE64: Suitable habitat shall be considered occupied. Vegetation management activities in suitable habitat shall only be conducted

Species	Location	AMM #	AMM Description
	West Virginia) • Blackwater Canyon/Dolly Sods (Grant, Randolph, and Tucker counties, West Virginia) The majority of the WVNFS population centers within the Covered Lands NiSource MSHCP area are found within the Monongahela NF.		after consultation with USFWS, and: a) Under an Endangered Species Act Section 10 research permit to determine the effects of an activity on WVNFS or to determine activities that would contribute to the recovery of the species, or b) To improve or maintain WVNFS or other TEP species habitat after research has demonstrated the beneficial effects of the proposed management, or c) When project-level assessment results in a no effect or may affect, not likely to adversely affect determination, or d) To address public safety concerns. TE65: New developed recreation facilities, such as visitor centers or campgrounds, shall not be constructed in suitable habitat. Smaller facilities—such as foot trails, trailheads, picnic sites, ¼ acre vistas—may be constructed if they result in a no effect or may affect, not likely to adversely affect determination. TE66: Development of federal gas and oil is generally allowed as long as: (a) it remains within the limits projected in the 1991 Environmental Assessment Oil and Gas Leasing and Development and (b) protection measures for WVNFS are developed through consultation with the USFWS prior to Forest Service approval of operations.
Spotfin chub	Portions of the Buffalo River system, including the Rush branch and Grinder's Creek, in Lewis County, Tennessee.	AMM-1	Where species may be present, either avoid the habitat or conduct all activities with implementation of the HCP mussel AMMs.
Pygmy madtom	Duck River, Tennessee	AMM-1	Where species may be present, either avoid the habitat or conduct all activities with implementation of the HCP mussel AMMs.
Pygmy madtom	Duck River, Tennessee	AMM-2	NiSource will only use HDD for new crossings on the Duck River.
Virginia spiraea	Portions of McDowell, Mercer, Raleigh, Summers, Upshur, and Wyoming	AMM-1	Conduct surveys for Virginia spiraea prior to construction of new alignment or ground- disturbing (e.g., pipeline replacement) activities through riparian vegetation in modeled suitable habitat

Species	Location	AMM #	AMM Description
	counties, West Virginia. Overall, the Covered Lands intersect with approximately 44,768 acres of mapped suitable habitat. However, not all potential habitat within the covered lands is likely to be occupied by the species. We believe that new occurrences are most likely to be found in counties with known occurrences or within connected patches of modeled suitable habitat and estimate there is approximately 18, 029 acres of potential habitat for the species within the Covered Lands.		areas within McDowell, Mercer, Raleigh, Summers, Upshur, and Wyoming counties, West Virginia. If suitable habitat is absent, adverse effects would be avoided and that area could be excluded from any future consultation. If suitable habitat is present but the species is absent, the survey would be valid for 5 years and further consultation would not be required for that period. Survey protocols should be coordinated with the local FWS field office and survey results provided to the local FWS field office.
Virginia spiraea	Portions of McDowell, Mercer, Raleigh, Summers, Upshur, and Wyoming counties, West Virginia. Overall, the covered lands intersect with approximately 44,768 acres of mapped suitable habitat. However, not all potential habitats within the covered lands are likely to be occupied by the species. We believe that new occurrences are most likely to be found in counties with known occurrences or within connected patches of modeled suitable habitat and estimate there is approximately 18, 029 acres of potential habitat for the species within the Covered Lands.	AMM-2	Avoid impacts to newly discovered populations or further consultation with the Service will be needed.
Eastern prairie fringed orchid	The NiSource project may affect this species in Portions of Clark, Holmes, Lucas, Ottawa, Sandusky and Wayne Counties in	AMM-1	Route new ROW alignments to avoid impacts to the one known population of eastern prairie fringed orchid in Augusta County, Virginia, and the one known population at the intersection of Wayne and Holmes counties, Ohio.

Species	Location	AMM #	AMM Description
	Ohio; and Augusta County in Virginia. There are no known occurrences within the ROW proper in Ohio or Virginia. There is one occurrence at the intersection of Wayne and Holmes counties, Ohio, and one occurrence at the edge of the covered lands in Augusta County, Virginia. We believe that it is likely that populations may occur within the Covered lands given the presence of at least two populations within the covered lands. While no known populations will be impacted by the NiSource project, we conclude that NiSource activities could conceivably result in impacts to unknown populations of this species.		
Eastern prairie fringed orchid	The NiSource project may affect this species in Portions of Clark, Holmes, Lucas, Ottawa, Sandusky and Wayne Counties in Ohio; and Augusta County in Virginia. There are no known occurrences within the ROW proper in Ohio or Virginia. There is one occurrence at the intersection of Wayne and Holmes counties, Ohio, and one occurrence at the edge of the covered lands in Augusta County, Virginia. We believe that it is likely that populations may occur within the covered lands given the presence of at least two populations within the covered lands. While no known populations will be	AMM-2	Conduct surveys for eastern prairie fringed orchid prior to construction of new alignment or >1 acre of ground- disturbing (e.g., pipeline replacement) activities on existing ROWs in Clark, Holmes, Lucas, Ottawa, Sandusky and Wayne counties in Ohio; and in modeled suitable habitat in Augusta County in Virginia. Survey protocols should be coordinated with the local FWS field office and survey results provided to the local FWS field office. If suitable habitat is absent, adverse effects would be avoided and that area could be excluded from any future consultation. If suitable habitat is present but the species is absent, the survey would be valid for 5 years and further consultation would not be required for that period.

Species	Location	AMM #	AMM Description
	impacted by the NiSource project, we conclude that NiSource activities could conceivably result in impacts to unknown populations of this species.		
Eastern prairie fringed orchid	The NiSource project may affect this species in portions of Clark, Holmes, Lucas, Ottawa, Sandusky and Wayne Counties in Ohio; and Augusta County in Virginia. There are no known occurrences within the ROW proper in Ohio or Virginia. There is one occurrence at the intersection of Wayne and Holmes counties, Ohio, and one occurrence at the edge of the covered lands in Augusta County, Virginia. We believe that it is likely that populations may occur within the covered lands given the presence of at least two populations within the covered lands. While no known populations will be impacted by the NiSource project, we conclude that NiSource activities could conceivably result in impacts to unknown populations of this species.	AMM-3	Avoid impacts to newly discovered populations or further consultation with the Service will be needed.
Leafy prairie-clover	Portions of Davidson, Maury, Williamson, and Wilson counties, Tennessee, along with the potential discovery of undocumented extant pockets of the species within its historic range in Sumner County, Tennessee. There are no known occurrences in ROWs or Covered Lands but there is suitable habitat	AMM-1	Conduct surveys for leafy prairie-clover (in cedar glade areas only) prior to construction of new alignment or ground- disturbing (e.g., pipeline replacement) activities on existing ROWs between Interstate 40 and Interstate 24 in Davidson County, Tennessee. If suitable habitat is absent, adverse effects would be avoided and that area could be excluded from any future consultation. If suitable habitat is present but the species is absent, the survey would be valid for 5 years and further consultation would not be required for that period. Survey protocols should be coordinated with the local FWS field office and survey results provided to the

Species	Location	AMM #	AMM Description
	within the ROW between Interstate 40 and Interstate 24 in Davidson County Tennessee.		local FWS field office.
Leafy prairie-clover	Portions of Davidson, Maury, Williamson, and Wilson counties, Tennessee, along with the potential discovery of undocumented extant pockets of the species within its historic range in Sumner County, Tennessee. There are no known occurrences in ROWs or Covered Lands but there is suitable habitat within the ROW between Interstate 40 and Interstate 24 in Davidson County Tennessee.	AMM-2	Avoid impacts to newly discovered populations or further consultation with the Service will be needed.
Running buffalo clover	Portions of Bourbon, Campbell, Clark, Fayette, Madison, and Montgomery Counties, Kentucky; Brown, Clermont, and Lawrence counties, Ohio; and Pendleton, Pocahontas, Preston, Randolph, Tucker, and Webster counties; West Virginia. Additionally, the potential for rediscovery of the species within portions of its historic range exists in Jackson County, Kentucky and Monongalia County, WV.	AMM-1	Route new ROW alignments to avoid impacts to six known populations of running buffalo clover within covered lands in Augusta (1) and Hocking (1) counties in Ohio, and Preston (2), Brooke (1), and Tucker (1) counties in West Virginia.
Running buffalo clover	Portions of Bourbon, Campbell, Clark, Fayette, Madison, and Montgomery counties, Kentucky; Brown, Clermont, and Lawrence counties, Ohio; and Pendleton, Pocahontas, Preston, Randolph, Tucker, and Webster counties; West Virginia. Additionally, the	AMM-2	Conduct surveys in modeled suitable habitat for running buffalo clover prior to construction of new alignment or >>1 acre ground disturbing (e.g., pipeline replacement) activities on existing ROWs in Bourbon, Campbell, Clark, Fayette, Jackson, Madison, and Montgomery counties, Kentucky; Brown, Clermont, and Lawrence Counties, Ohio; and Monongalia, Pendleton, Pocahontas, Preston, Randolph, Tucker, and Webster counties West Virginia. Survey protocols should be coordinated with the local FWS field office and survey results provided to the local FWS field office. If suitable habitat is absent, adverse effects would be avoided and that area

Species	Location	AMM #	AMM Description
	potential for rediscovery of the species within portions of its historic range exists in Jackson County, Kentucky and Monongalia County, West Virginia.		could be excluded from any future consultation. If suitable habitat is present but the species is absent, the survey would be valid for 5 years and further consultation would not be required for that period.
Running buffalo clover	Portions of Bourbon, Campbell, Clark, Fayette, Madison, and Montgomery counties, Kentucky; Brown, Clermont, and Lawrence counties, Ohio; and Pendleton, Pocahontas, Preston, Randolph, Tucker, and Webster counties; West Virginia. Additionally, the potential for rediscovery of the species within portions of its historic range exists in Jackson County, Kentucky and Monongalia County, West Virginia.	AMM-3	Avoid impacts to newly discovered populations or further consultation with the Service will be needed.
Globe (Short's) Bladderpod,	Portions of its current range in Bourbon, Fayette, and Madison counties, Kentucky. This species is not found in the Covered lands in Tennessee. The species is also not found within existing ROWs.	AMM-1	Conduct surveys for Globe bladderpod prior to construction of new alignments in Bourbon, Fayette, and Madison counties, Kentucky. Survey protocols should be coordinated with the local FWS field office and survey results provided to the local FWS field office. If suitable habitat is absent, adverse effects would be avoided and that area could be excluded from any future consultation. If suitable habitat is present but the species is absent, the survey would be valid for 5 years and further consultation would not be required for that period. If the species is present, NiSource will design project subactivities to avoid impacts via consultation with the Service. If adverse effects would be likely, NiSource would need to reinitiate consultation with the Kentucky Ecological Services Field Office. NiSource has agreed to avoid all activities in the area specified. If the area cannot be avoided, consultation will need to be reinitiated for this species. -Globe (Short's) Bladderpod Avoidance Area: All areas designated by the Kentucky Natural Heritage Database.
Leedy's Roseroot,	One location in Schuyler County, New York.	AMM-1	Avoid all activities in the area specified for this species. If the area cannot be avoided, consultation will need to be reinitiated for this species. Survey protocols should be coordinated with the local FWS field office and survey results provided to the local FWS field

Species	Location	AMM #	AMM Description
			office. Avoidance Area: Area designated by the NY Heritage Database, with a 50 meter buffer on all sides.
Northern Monkshood,	One location in Hocking County, Ohio. Populations in these areas would be found in association with shaded or partially shaded cliffs and talus slopes in Ohio.	AMM-1	Avoid all activities in the area specified for this species. If the area cannot be avoided, consultation will need to be reinitiated for this species. Surveys should be coordinated with the local FWS field office. Avoidance Area: Crane Hollow State Nature Preserve, Laurel Township, Hocking County, Ohio.
Small whorled Pogonia	Portions of Califon Borough, Hunterdon County, and Morris County, New Jersey; Hocking County, Ohio; and Botetourt, Fairfax, Giles, Henrico, Madison, Rockbridge, and Prince William counties, Virginia. Small whorled pogonia does not occur in any of the storage field expansion counties and will not be impacted by those activities. There are no known occurrences in ROWs or the entire covered lands in New Jersey or Virginia. Small whorled pogonia is not anticipated to occur in existing ROWs; therefore, activities that are wholly contained within the existing ROW should not affect this species.	AMM-1	NiSource has agreed to avoid all activities in the area specified. If the area cannot be avoided, consultation will need to be reinitiated for this species. - Avoidance Area: Camp OtyOkwa, Benton Township, Hocking County, Ohio.
Small whorled Pogonia	Portions of Califon Borough, Hunterdon County, and Morris County, New Jersey; Hocking County, Ohio; and Botetourt, Fairfax, Giles, Henrico, Madison, Rockbridge, and Prince William Counties, Virginia.	AMM-2	Conduct surveys for small whorled pogonia prior to construction of new alignment in upland forest in Califon Borough, Hunterdon County, and Morris County, New Jersey; Centre and Chester, Greene, Monroe, and Montgomery counties, Pennsylvania and in modeled suitable habitat in Botetourt, Fairfax, Giles, Henrico, Madison, Rockbridge, and Prince William counties, Virginia. If suitable habitat is absent, adverse effects would be avoided and that area could be excluded from any future consultation. If

Species	Location	AMM #	AMM Description
	Small whorled pogonia does not occur in any of the storage field expansion counties and will not be impacted by those activities. There are no known occurrences in ROWs or the entire covered lands in New Jersey or Virginia. Small whorled pogonia is not anticipated to occur in existing ROWs; therefore, activities that are wholly contained within the existing ROW should not affect this species.		suitable habitat is present but the species is absent, the survey would be valid for 5 years and further consultation would not be required for that period. Survey protocols should be coordinated with the local FWS field office and survey results provided to the local FWS field office.
Small whorled Pogonia	Portions of Califon Borough, Hunterdon County, and Morris County, New Jersey; Hocking County, Ohio; and Botetourt, Fairfax, Giles, Henrico, Madison, Rockbridge, and Prince William Counties, Virginia. Small whorled pogonia does not occur in any of the storage field expansion counties and will not be impacted by those activities. There are no known occurrences in ROWs or the entire covered lands in New Jersey or Virginia. Small whorled pogonia is not anticipated to occur in existing ROWs; therefore, activities that are wholly contained within the existing ROW should not affect this species.	AMM-3	Avoid impacts to newly discovered populations or further consultation with the Service will be needed.
Short's goldenrod	Populations in these areas would be found in association with cedar glades or other glade-like habitats (e.g. road rights-of-way, roadside ledges, rocky	AMM-1	Avoid execution of project activities in those areas representing suitable habitat.

Species	Location	AMM #	AMM Description
	or over-grazed pasture, old fields), forest edges, or unmaintained fencerows. Based on specific land use, portions of the project corridor in Nicholas and Robertson counties do not contain suitable habitat for Short's goldenrod and can be excluded from this effects analysis. These areas would include residential, industrial, and commercial sites; agricultural fields used for row-crop production; wetlands; and dense forest.		
Short's goldenrod	Populations in these areas would be found in association with cedar glades or other glade-like habitats (e.g. road rights-of-way, roadside ledges, rocky or over-grazed pasture, old fields), forest edges, or unmaintained fencerows. Based on specific land use, portions of the project corridor in Nicholas and Robertson counties do not contain suitable habitat for Short's goldenrod and can be excluded from this effects analysis. These areas would include residential, industrial, and commercial sites; agricultural fields used for row-crop production; wetlands; and dense forest.	AMM-2	If NiSource cannot avoid areas with suitable habitat, conduct pre-disturbance presence/absence surveys prior to construction of new alignment or >1 acre of ground disturbing (e.g., pipeline replacement) activities on existing ROWs within those areas to determine if the species is present. Survey protocols should be coordinated with the local FWS field office and survey results provided to the local FWS field office. If suitable habitat is absent, adverse effects would be avoided and that area could be excluded from any future consultation. If suitable habitat is present but the species is absent, the survey would be valid for 5 years and further consultation would not be required for that period. If the species is present, NiSource will design project subactivities to avoid impacts via consultation with the Service. If adverse effects would be likely, NiSource would need to reinitiate consultation with the Kentucky Ecological Services Field Office.
Short's goldenrod	Populations in these areas would be found in association with cedar glades or other glade-like habitats (e.g. road rights-of-way, roadside ledges, rocky or over-grazed pasture, old fields), forest edges, or	AMM-3	Avoid all activities in newly discovered populations or further consultation with the Service will be needed.

Species	Location	AMM #	AMM Description
	unmaintained fencerows. Based on specific land use, portions of the project corridor in Nicholas and Robertson counties do not contain suitable habitat for Short's goldenrod and can be excluded from this effects analysis. These areas would include residential, industrial, and commercial sites; agricultural fields used for row-crop production; wetlands; and dense forest.		
Shale barren rock cress	Portions of Alleghany, Augusta, Botetourt, Page, Rockbridge, Rockingham, Shenandoah, and Warren counties in Virginia; Greenbrier, Hardy, and Pendleton counties in West Virginia. There is one occupied site in Alleghany County, Virginia (on the George Washington National Forest) within the Covered Lands and two additional sites ¼ mile from the Covered Lands. We believe that it is likely that other populations may occur within the covered lands in Virginia and West Virginia.	AMM-1	Avoid impacts to known population(s) of shale barren rock cress within Covered Lands (one currently within George Washington National Forest).
Shale barren rock cress	Portions of Alleghany, Augusta, Botetourt, Page, Rockbridge, Rockingham, Shenandoah, and Warren counties in Virginia; Greenbrier, Hardy, and Pendleton counties in West Virginia. There is one occupied site in Alleghany County, Virginia (on the George Washington National Forest) within the Covered Lands and two additional	AMM-2	NiSource will conduct surveys in modeled suitable habitat for shale barren rock cress prior to construction of new alignment or ground disturbing (e.g., pipeline replacement) activities ≥1 acre on existing ROWs in xeric shale areas 1099-2500 feet in elevation on 20 degree south- to southwest-facing slopes in Alleghany, Augusta, Botetourt, Page, Rockbridge, Rockingham, Shenandoah, and Warren counties, Virginia, and Greenbrier, Hardy, and Pendleton counties, West Virginia. Where the species is present, NiSource will avoid the habitat. If suitable habitat is absent, adverse effects would be avoided and that area could be excluded from any future consultation. If suitable habitat is present but the species is absent, the survey would be valid for 5 years and further consultation would not be required for that period. Survey protocols should be

Species	Location	AMM #	AMM Description
	sites ¼ mile from the Covered Lands. We believe that it is likely that other populations may occur within the covered lands in Virginia and West Virginia.		coordinated with the local FWS field office and survey results provided to the local FWS field office.
Shale barren rock cress	Portions of Alleghany, Augusta, Botetourt, Page, Rockbridge, Rockingham, Shenandoah, and Warren counties in Virginia; Greenbrier, Hardy, and Pendleton counties in West Virginia. There is one occupied site in Alleghany County, Virginia (on the George Washington National Forest) within the Covered Lands and two additional sites ¼ mile from the Covered Lands. We believe that it is likely that other populations may occur within the covered lands in Virginia and West Virginia.	AMM-3	Avoid impacts to newly discovered populations or further consultation with the Service will be needed.
Smooth coneflower	Portions of Albermarle, Alleghany, Augusta, Botetourt, Chesterfield, Clarke, Culpeper, Frederick, Giles, Goochland, Louisa, Mecklenburg, Orange, Page, Powhatan, Rockbridge, Rockingham, Shenandoah, and Warren counties, Virginia. Overall, the covered lands intersect with 32,770 acres of mapped suitable habitat. There are no known occurrences within the ROW proper in Virginia; however, it is possible that the species occurs in previously unsurveyed portions of the ROW in the above-listed counties. There are no known occurrences	AMM-1	Conduct surveys in modeled suitable habitat for smooth coneflower prior to construction of new alignment or ground-disturbing (e.g., pipeline replacement) activities ≥1 acre on existing ROWs in Albermarle, Allegheny, Augusta, Botetourt, Chesterfield, Clarke, Culpeper, Frederick, Giles, Goochland, Louisa, Mecklenburg, Orange, Page, Powhatan, Rockbridge, Rockingham, Shenandoah, and Warren counties, Virginia. If suitable habitat is absent, adverse effects would be avoided and that area could be excluded from any future consultation. If suitable habitat is present but the species is absent, the survey would be valid for 5 years and further consultation would not be required for that period. Survey protocols should be coordinated with the local FWS field office and survey results provided to the local FWS field office.

Species	Location	AMM #	AMM Description
	along the existing ROW in Virginia. However, the ROW provides suitable habitat for the species and most of the ROW has not been surveyed for smooth coneflower. There are also no known occurrences within the broader covered lands in Virginia; however, we believe that it is likely that populations may occur within the covered lands given the amount of suitable habitat.		
Smooth coneflower	Portions of Albermarle, Alleghany, Augusta, Botetourt, Chesterfield, Clarke, Culpeper, Frederick, Giles, Goochland, Louisa, Mecklenburg, Orange, Page, Powhatan, Rockbridge, Rockingham, Shenandoah, and Warren Counties, Virginia. Overall, the covered lands intersect with 32,770 acres of mapped suitable habitat. There are no known occurrences within the ROW proper in Virginia; however, it is possible that the species occurs in previously unsurveyed portions of the ROW in the above-listed counties. There are no known occurrences along the existing ROW in Virginia. However, the ROW provides suitable habitat for the species and most of the ROW has not been surveyed for smooth coneflower. There are also no known occurrences within the broader covered lands in Virginia; however, we believe that it is likely that populations may occur within	AMM-2	Avoid impacts to newly discovered populations or further consultation with the Service will be needed.

Species	Location	AMM #	AMM Description
	the covered lands given the amount of suitable habitat.		
Michaux's sumac	Portions of Brunswick, Chesterfield, Dinwiddie, Greensville, Mecklenburg, and Sussex counties, Virginia. Overall, the covered lands intersect with approximately 20,314 acres of mapped suitable habitat. There are no known occurrences within the ROW proper in Virginia; however, it is possible that the species occurs in previously unsurveyed portions of the ROW within these counties.	AMM-1	Conduct surveys in modeled suitable habitat for Michaux's sumac prior to construction of new alignment or ground- disturbing (e.g., pipeline replacement) activities ≥1 acre on existing ROWs in Brunswick, Chesterfield, Dinwiddie, Greensville, Mecklenburg, and Sussex counties, Virginia. Survey protocols should be coordinated with the local FWS field office and survey results provided to the local FWS field office. If suitable habitat is absent, adverse effects would be avoided and that area could be excluded from any future consultation. If suitable habitat is present but the species is absent, the survey would be valid for 5 years and further consultation would not be required for that period.
Michaux's sumac	Portions of Brunswick, Chesterfield, Dinwiddie, Greensville, Mecklenburg, and Sussex Counties, Virginia. Overall, the covered lands intersect with approximately 20,314 acres of mapped suitable habitat. There are no known occurrences within the ROW proper in Virginia; however, it is possible that the species occurs in previously unsurveyed portions of the ROW within these counties.	AMM-2	Avoid impacts to newly discovered upland plant populations or further consultation with the Service will be needed.
Sensitive joint-vetch	Portions of Chesterfield, Fairfax, Henrico, Isle of Wight, Prince George, Prince William, Suffolk, and Surry counties, Virginia. Logan Township, Gloucester County, New Jersey. Overall, the covered lands intersect with 2,433 acres of suitable habitat. There are no known occurrences within the ROW proper in Virginia; however, it is possible that	AMM-1	Route new ROW alignments to avoid historic location of sensitive joint-vetch in Logan Township, Gloucester County, New Jersey (beginning approx. 75°23'22.992"W, 39°46'51.094"N).

Species	Location	AMM #	AMM Description
	the species occurs in previously unsurveyed portions of the ROW in the above-listed counties. There are also no known occurrences within the broader covered lands in Virginia; however, we believe that it is likely that populations may occur within the covered lands given the amount of suitable habitat.		
Sensitive joint-vetch	Portions of Chesterfield, Fairfax, Henrico, Isle of Wight, Prince George, Prince William, Suffolk, and Surry counties, Virginia. Logan Township, Gloucester County, New Jersey. Overall, the covered lands intersect with 2,433 acres of suitable habitat. There are no known occurrences within the ROW proper in Virginia; however, it is possible that the species occurs in previously unsurveyed portions of the ROW in the above-listed counties. There are also no known occurrences within the broader covered lands in Virginia; however, we believe that it is likely that populations may occur within the covered lands given the amount of suitable habitat.	AMM-2	Conduct surveys in modeled suitable habitat for sensitive joint-vetch prior to construction of new alignment or ground- disturbing (e.g., pipeline replacement) activities within close proximity to tidal wetlands on existing ROWs in Chesterfield, Henrico, Fairfax, Prince George, Prince William, Isle of Wight, Suffolk, Surry counties, Virginia. Survey protocols should be coordinated with the local FWS field office and survey results provided to the local FWS field office. If suitable habitat is absent, adverse effects would be avoided and that area could be excluded from any future consultation. If suitable habitat is present but the species is absent, the survey would be valid for 5 years and further consultation would not be required for that period.
Sensitive joint-vetch	Portions of Chesterfield, Fairfax, Henrico, Isle of Wight, Prince George, Prince William, Suffolk, and Surry counties, Virginia. Logan Township, Gloucester County, New Jersey. Overall, the covered lands intersect with 2,433 acres of	AMM-3	Route new ROW alignments to avoid impacts to known population of swamp pink within Covered Lands in Augusta County, Virginia.

Species	Location	AMM #	AMM Description
	suitable habitat. There are no known occurrences within the ROW proper in Virginia; however, it is possible that the species occurs in previously unsurveyed portions of the ROW in the above-listed counties. There are also no known occurrences within the broader Covered Lands in Virginia; however, we believe that it is likely that populations may occur within the Covered Lands given the amount of suitable habitat.		
Swamp pink	Portions of Woolwich Township, Gloucester County, Mount Olive, Roxbury, and Randolph townships, Morris County, and Salem County, New Jersey; and Albemarle, Augusta, Botetourt, Fairfax, Greene, Henrico, Prince George, Rockbridge, Rockingham, and Page counties, Virginia. Overall, the Covered Lands intersect with approximately 5,097 acres of potential habitat in Virginia and 2,379 acres in New Jersey. There are no known occurrences in the ROW proper in New Jersey or Virginia; however, two sections of pipeline intersect historic populations of swamp pink in New Jersey. There are no swamp pink occurrences within the broader Covered Lands in New Jersey but there is one extant occurrence within the Covered Lands in Augusta County, Virginia. Given the historic and extant	AMM-1	Route new ROW alignments to avoid impacts to known population of swamp pink within Covered Lands in Augusta County, Virginia.

Species	Location	AMM #	AMM Description
	occurrences, we believe that additional populations may occur within the Covered Lands.		
Swamp pink	Portions of Woolwich Township, Gloucester County, Mount Olive, Roxbury, and Randolph townships, Morris County, and Salem County, New Jersey; and Albemarle, Augusta, Botetourt, Fairfax, Greene, Henrico, Prince George, Rockbridge, Rockingham, and Page counties, Virginia. Overall, the Covered Lands intersect with approximately 5,097 acres of potential habitat in Virginia and 2,379 acres in New Jersey. There are no known occurrences in the ROW proper in New Jersey or Virginia; however, two sections of pipeline intersect historic populations of swamp pink in New Jersey. There are no swamp pink occurrences within the broader Covered Lands in New Jersey but there is one extant occurrence within the Covered Lands in Augusta County, Virginia. Given the historic and extant occurrences, we believe that additional populations may occur within the covered lands.	AMM-2	Conduct surveys for swamp pink prior to construction of new alignment or ground disturbing (e.g., pipeline replacement) activities within 100 feet of forested wetlands on existing ROWs in Woolwich Township, Gloucester County, Mount Olive, Roxbury, and Randolph townships, Morris County, and West Deptford, East Greenwich, and Woolwich townships, Salem County, New Jersey, and in modeled suitable habitat in Rockbridge, Henrico, Botetourt, Rockingham, Greene, Fairfax, Prince George, Albemarle, Chesterfield, Augusta, Page counties, Virginia. If suitable habitat is absent, adverse effects would be avoided and that area could be excluded from any future consultation. If suitable habitat is present but the species is absent, the survey would be valid for 5 years and further consultation would not be required for that period. Survey protocols should be coordinated with the local FWS field office and survey results provided to the local FWS field office.
Swamp pink	Portions of Woolwich Township, Gloucester County, Mount Olive, Roxbury, and Randolph townships, Morris County, and Salem County, New Jersey; and Albemarle,	AMM-3	Avoid impacts to newly discovered populations or further consultation with the Service will be needed.

Species	Location	AMM #	AMM Description
	Augusta, Botetourt, Fairfax, Greene, Henrico, Prince George, Rockbridge, Rockingham, and Page counties, Virginia. Overall, the Covered Lands intersect with approximately 5,097 acres of potential habitat in Virginia and 2,379 acres in New Jersey. There are no known occurrences in the ROW proper in New Jersey or Virginia; however, two sections of pipeline intersect historic populations of swamp pink in New Jersey. There are no swamp pink occurrences within the broader Covered Lands in New Jersey but there is one extant occurrence within the Covered Lands in Augusta County, Virginia. Given the historic and extant occurrences, we believe that additional populations may occur within the Covered Lands.		
Virginia sneezeweed	Portions of Augusta, Botetourt, Page, Rockbridge, and Rockingham Counties, Virginia. Overall, the Covered Lands intersect with approximately 600 acres of mapped suitable habitat. There are no known occurrences within the ROW proper in Virginia; however, it is possible that the species occurs in previously unsurveyed portions of the ROW within the above-listed counties. There are five known occurrences within the broader Covered Lands in Virginia. Given the nearby occurrences, we believe that	AMM-1	Route new ROW alignments to avoid impacts to known population of Virginia sneezeweed within covered lands in Augusta, Botetourt, Page, Rockbridge, and Rockingham counties, Virginia.

Species	Location	AMM #	AMM Description
	it is likely that other populations occur within the Covered Lands in Virginia.		
Virginia sneezeweed	Portions of Augusta, Botetourt, Page, Rockbridge, and Rockingham counties, Virginia. Overall, the Covered Lands intersect with approximately 600 acres of mapped suitable habitat. There are no known occurrences within the ROW proper in Virginia; however, it is possible that the species occurs in previously unsurveyed portions of the ROW within the above-listed counties. There are five known occurrences within the broader Covered Lands in Virginia. Given the nearby occurrences, we believe that it is likely that other populations occur within the Covered Lands in Virginia.	AMM-2	Conduct surveys in modeled suitable habitat for Virginia sneezeweed prior to construction of new alignment or >> 1 acre ground disturbing (e.g., pipeline replacement) activities within close proximity to sinkhole ponds on existing ROWs in Augusta, Rockbridge, Botetourt, Rockingham, Page counties, Virginia. Survey protocols should be coordinated with the local FWS field office and survey results provided to the local FWS field office. If suitable habitat is absent, adverse effects would be avoided and that area could be excluded from any future consultation. If suitable habitat is present but the species is absent, the survey would be valid for 5 years and further consultation would not be required for that period.
Virginia sneezeweed	Portions of Augusta, Botetourt, Page, Rockbridge, and Rockingham Counties, Virginia. Overall, the Covered Lands intersect with approximately 600 acres of mapped suitable habitat. There are no known occurrences within the ROW proper in Virginia; however, it is possible that the species occurs in previously unsurveyed portions of the ROW within the above-listed counties. There are five known occurrences within the broader Covered Lands in Virginia. Given the nearby occurrences, we believe that it is likely that other populations occur within the	AMM-3	Avoid impacts to newly discovered populations or further consultation with the Service will be needed.

Species	Location	AMM #	AMM Description
	Covered Lands in Virginia.		
Pondberry	Sharkey and Sunflower counties, Mississippi. While no known populations will be impacted by the NiSource MSHCP, surveys for this species are incomplete and NiSource activities Covered Activities may impact unknown populations.	AMM-1	Conduct surveys for pondberry prior to construction of new alignment or ground disturbing (e.g., pipeline replacement) activities within 100 feet of bottomland hardwood wetlands on existing ROWs in Sharkey and Sunflower counties, Mississippi. Survey protocols should be coordinated with the local FWS field office and survey results provided to the local FWS field office. If suitable habitat is absent, adverse effects would be avoided and that area could be excluded from any future consultation. If suitable habitat is present but the species is absent, the survey would be valid for 5 years and further consultation would not be required for that period.
Pondberry	Sharkey and Sunflower counties, Mississippi. While no known populations will be impacted by the MSHCP project, surveys for this species are incomplete and NiSource activities Covered Activities may impact unknown populations.	AMM-2	Avoid impacts to newly discovered populations or further consultation with the Service will be needed.

Table 4.3.6 Summary of Best Management Practices (BMPs) for Non-MSHCP Species that are <u>likely to be adversely affected</u> by NiSource Covered Activities.

Non-HCP Mussels **Rabbitsfoot, Rayed Bean, Spectaclecase, Dwarf Wedgemussel, Pink Mucket, Snuffbox**
Determination without BMPs: LAA
Determination with BMPs: LAA
Ranges: See Table 4.3.7
<u>General BMPs</u> • Implement the HCP mussel AMMs for all projects in areas specified for these species. <u>Species-specific BMPs</u> Rabbitsfoot • Implement HDD at Little Darby Creek, if not practicable, survey and translocate mussels. • Make all Killbuck Creek crossings using dry-ditch. • Implement HDD at Muskingum River crossings, if not practicable, survey and translocate mussels. Rayed Bean

- Implement HDD at Allegheny if practicable, if not survey and translocate mussels.
- Implement HDD at Elk River crossings if practicable, if not survey and coordinate with WV Field Office on avoiding impacts to introduced population, use dry-ditch techniques and translocate mussels.

Spectaclecase
- None specified.

Dwarf Wedgemussel
- Cross all tributaries to Delaware River in Sullivan County, New York using dry-ditch techniques.
- Implement HDD at the Neversink River crossing if practicable, if not survey and translocate mussels.

Pink Mucket
- Implement HDD at Elk River crossings if practicable, if not survey and coordinate with WV Field Office on avoiding impacts to introduced population, use dry-ditch techniques and translocate mussels.

Snuffbox
- Implement HDD at Allegheny River crossing if practicable, if not survey and translocate mussels.

- Implement HDD at Elk River crossings if practicable, if not survey and coordinate with WV Field Office on avoiding impacts to introduced population, use dry-ditch techniques and translocate mussels.
- Implement HDD at Kanawha River crossings if practicable, if not survey and translocate mussels.
- Implement HDD at Little Kanawha River crossings if practicable, if not survey and translocate mussels.
- Implement dry-ditch crossing of Fish Creek, Fishing Creek, Leading Creek, Upstream Crossings (Rowan-Bath County Line) of Licking Creek, Meathouse Fork, Olentangy River, Tygart's Creek, and West Fork Little Kanawha River.

Roanoke logperch
Determination without BMPs: LAA
Determination with BMPs: LAA
Range: Portions of the Nottaway River system, including portions of Stony and Sappony Creeks, along with other tributaries in Brunswick, Dinwiddie, Greensville, Mecklenburg, Southampton, and Sussex Counties, Virginia.
<u>BMPs</u> • Implement the AMMs for the mussel species from the MSHCP for all activities within identified streams. • No in-stream work 15 March – June 30 of any year. Instream work will be conducted during the low flow period of any year, 1 August through 31 October, when possible.
Northeastern bulrush
Determination without BMPs: LAA

Determination with BMPs: LAA (in PA) (implementation of BMPs allows for NLAA determinations in WV and VA)
Range: Portions of Washington County, Maryland; Adams, Bedford, Cambria, Centre, Clinton, Cumberland, Franklin, Fulton, Lehigh, Monroe, and Northampton Counties in Pennsylvania; Alleghany, Augusta, Botetourt, Rockbridge, Rockingham, and Shenandoah Counties in Virginia; and Hardy County in West Virginia.
BMPs There is one known occurrence within the existing ROW in Centre County, Pennsylvania and two additional occurrences within the covered lands in Centre and Franklin Counties, Pennsylvania. We believe that it is likely that other populations may occur within the covered lands in Virginia and West Virginia. • Avoid all activities in known and presumed occupied habitat. If the area cannot be avoided, consultation will need to be reinitiated for this species. • Conduct surveys in modeled suitable habitat for Northern bulrush prior to construction of new alignment or ground disturbing (e.g., pipeline replacement) activities within wetlands within identified counties. Survey protocols should be coordinated with the local FWS field office and survey results provided to the local FWS field office. If suitable habitat is absent, adverse effects would be avoided and that area could be excluded from any future consultation. If suitable habitat is present but the species is absent, the survey would be valid for 5 years and further consultation would not be required for that period. • Avoid all activities in newly discovered populations or further consultation with the Service will be needed.
Eastern Massasauga snake
Determination without BMPs: LAA
Determination with BMPs: NLAA
Range: See Table 4.3.7
BMPs Surveys (1) Eastern massasauga rattlesnake (EMR) presence will be assumed in areas where it has been previously detected and those locations will be classified as Occupied Habitat. In identified habitat (known and modeled) where EMR have not been previously detected surveys can be conducted to determine if suitable habitat is present and/or the presence/absence of the subspecies. Surveys will follow the most current FWS-approved protocol and will be coordinated in advance with the local FWS office. If an adequate survey effort does not identify suitable habitat, the BMPs will not be mandatory. Habitat suitability surveys will expire in 10 years, but may be used for potentially longer based on site-specific evaluation by the Service. If an adequate presence/absence survey effort does not indicate EMR presence, the site will be classified as unoccupied habitat and the BMPs will not be mandatory. Negative presence/absence surveys will expire in 10 years, but may be used for potentially longer based on site-specific evaluation by the Service. A copy of the survey outcome and reports will be included in the annual report submitted to the Service.

Pre-Construction Planning: Preparation of an Environmental Management & Construction Plan

(2) A detailed Environmental Management and Construction Plan (EM&CP) will be prepared for any project potentially impacting occupied EMR habitat. The plan will incorporate the relevant requirements of the ECS and include site-specific details particular to the project area and potential impacts. Waterbody crossings will be considered as "high-quality" for the purpose of preparing this plan regardless of the actual classification. The plan will be strongly oriented towards minimizing stream bed and riparian disturbance (including minimization of tree clearing within 50 feet of the crossing), preventing downstream sedimentation (including redundant E&S devices as appropriate), and weather monitoring by the Environmental Inspector to ensure work is not begun with significant precipitation in the forecast. The EM&CP will include plans to minimize impacts to wetlands, including the potential use of HDD for new pipelines. Wetland construction/restoration plans will include measures necessary to prevent invasive species establishment unless the wetland is already infected with invasives. These measures include those described in detail in the ECS, Section III Stream and Wetland Crossings pp. 15 – 24 (see especially B.8. Restoration) and Section V Maintenance pp. 27-29. The plan will further focus on minimizing and avoiding impacts to the upland areas, including all relevant BMPs to minimize and avoid physical disturbance and direct injury/harm of individuals (e.g., weather, vehicle use). In areas of known multiple massasauga road kills, the plan will consider the need for seasonal activity restrictions. The plan will be approved in writing by NiSource Natural Resources Permitting (NRP) personnel prior to project implementation and will include a tailgate training session for all onsite project personnel to highlight the environmental sensitivity of the habitat and any BMPs (e.g. overall awareness, minimizing vehicle activity and speed control, etc.) which must be implemented.

Timing of Actions and Associated Generic AMMs Related to Earth Disturbance

(3) Operate vehicles/equipment, clearing trees, etc., in known/presumed occupied EMR habitat between October 31 - March 15 and when (1) the ground is frozen and (2) air temperatures are less than 45°F. During this time, under these conditions, EMR are most likely underground and will not be impacted by these activities.

(4) Do not use large equipment or perform earth-moving activities, water withdrawal/discharge for hydrostatic testing, or other activities that substantially affect the ground or water levels in potential EMR hibernacula areas. This requires a site evaluation to delineate likely hibernation areas. Avoidance measures may include, but are not limited to, re-routing of pipeline and appurtenance facilities, boring or drilling, and timing/weather-related restrictions. Measures will be set on a site-specific basis, based on local habitat conditions (in site specific EM&CP).

(5) Strictly control and minimize vehicle activity of NiSource staff in known/presumed occupied EMR habitat. Speed limits at NiSource facilities and access roads should be <10 MPH (should be set in the EM&CP).

(6) Conduct patrols, vegetative maintenance, etc., by foot whenever possible. Do not drive across

streams or in wetlands areas. Do not drive across known or presumed occupied streams or wetlands – walk these areas or visually inspect from bank and use closest available bridge to cross stream.

(7) In known/presumed occupied EMR habitat, ensure that upland work (including access roads) does not result in impacts (altered hydrology) to adjacent wetlands.

Mowing & Vegetation Removal

(8) Do not burn brush piles along ROW within known/presumed EMR habitat during the active season (March 15-October 30). Where possible, leave brushpiles in place or transport them off-site for disposal. If they must be burned, burn on the same day they are created if during the active season or they can be burned anytime during the hibernation season.

(9) Attempt to mow ROWs in presumed occupied EMR habitat during the hibernation season between October 31 - March 15 and when air temperatures are less than 45°F. Herbicides can be used during any time of the year. If mowing must be done during the active season, implement the following:

a. An open platform mower, sickle mower, or flail mower are recommended because they create little if any suction that can increase the risk of mower-related snake mortality. Blade height must be set at a minimum of 6 inches.
b. A qualified individual must walk and roughly "clear" the area before mowing begins. This individual must also walk the area following mowing to check the area for EMR.
c. Conduct mowing in accordance with the attached schedule developed by the Ohio DNR as much as reasonably practical. If harmed EMR are found during the follow-up walkover, implement requirements of BMP #10.

(10) Mow ROWs in known occupied EMR habitat during the hibernation season between October 31 - March 15 and when air temperatures are less than 45°F. Herbicides can be used during any time of the year. The mowed area will be reduced to 10 feet centered on the pipeline. If mowing must be done during the active season, implement the following:

a. Spot mow, as opposed to full-site mowing, wherever possible.
b. Use a sickle mower with a height setting of not less than 12 inches.
c. A qualified individual must walk and roughly "clear" the area before mowing begins. This individual must also walk the area following mowing to check the area for EMR.
d. Timing and daytime conditions must minimize the potential for EMR to be active, with mowing done according to the attached schedule developed by the Ohio DNR.

Routing Criteria (replacements, loops, new ROWs, access roads)

(11) Do not route new construction projects, such as pipelines, appurtenant facilities, or access roads, through known/presumed occupied habitat.

(12) Where activities in known/presumed occupied habitat cannot be avoided, install new or replacement pipelines and utility lines and performing major repairs under the wetlands and streams using horizontal directional drilling (HDD) or other trenchless methods rather than open trenching. Drilling should be carefully undertaken and a plan should be in place to minimize and address the risk of in-water disturbance due to frac-outs. The plan should also specifically reference species resources in the vicinity of the crossing as a key conservation concern and include specific measures identified in the ECS, from standard industry practices, or other mutually agreed upon practices to protect this resource. The plan will also include a frac-out impact avoidance plan which will evaluate the site in terms not only of feasibility of conducting HDD, but likelihood of large scale frac-out and its effects on this species and actions to address a large scale frac-out in occupied habitat. If, after detailed engineering studies (e.g., geotechnical, physiological, topographical, and economic studies), it is determined (and agreed to by NRP) that HDD is not feasible, a report will be prepared and included in the annual report submitted to the Service. If wetland or waterbody avoidance through rerouting or HDD is not feasible, all guidelines for open trench wetland crossings found in the NiSource ECS must be strictly adhered to.

(13) Install pipeline to the minimum depth described in the ECS and maintain that depth at least 10 feet past the high water line to avoid exposure of pipeline by anticipated levels of erosion based on geology and watershed character. These conditions and the response will be documented in the EM&CP and provided as part of the annual report to the Service.

(14) For known or presumed occupied waterbodies, pipeline replacement projects (non FERC 7c) shall be done in the following manner (in order of priority/preference):

a. Abandon line in place and conduct HDD or horizontal bore to install pipe under known/presumed occupied wetlands between September 15 - May 15 to avoid any potential impact to snakes during the active season. Route to avoid potential hibernacula areas, or

b. Use conventional construction practices in known/presumed occupied wetlands between May 15 - September15 to avoid impacts to hibernating snakes. Narrow or reconfigure the work area (uplands/wetlands) to avoid impacts to active snakes. Follow all applicable active-season BMPs.

(15) For known or presumed occupied habitat, new construction projects (FERC 7cstorage wells, looping projects, etc.) shall be done in the following manner (in order of priority/preference):

a. Route projects to avoid known/presumed occupied habitat. If site-specific analysis indicates that site restoration or enhancement could compensate for the impacts from new facilities then they may be considered; or

b. Conduct HDD or horizontal bore to install pipe under known/presumed occupied wetlands between September 15 - May 15 to avoid any potential impact to snakes during the active

season. Route to avoid potential hibernacula areas; or

c. Use conventional construction practices in known/presumed occupied wetlands between May 15 - September 15 to avoid impacts to hibernating snakes. Narrow or reconfigure the work area (uplands/wetlands) to avoid impacts to active snakes.

Measures to minimize direct impacts to massasaugas during the active season

(16) Before initiating any activity within an area of extreme sensitivity for EMR, including but not limited to earthmoving and/or construction within the project limits, all potential EMR habitat must be encircled with a snake-proof barrier (silt fencing or metal flashing, at least 30 inches high above ground) that prevents snakes from crossing over or under the barrier. [DO NOT use synthetic mesh material in construction of the snake-proof barrier.] The barrier should be buried at least 6 inches below the surface and the trench backfilled to support the barrier and prevent animals from burrowing under the barrier. The integrity of this barrier must be ensured throughout the period of activity, and breaches of the barrier must be repaired promptly. The snake-proof barrier must be in place at least 15 days prior to any activities occurring on the site. The snake-proof barrier can only be in place between April 15 and September 15 to ensure that access to their hibernacula and seasonal migratory movements are not impeded. Any EMR found within the area enclosed by the snake-proof barrier are to be captured using cover boards (sheet metal) placed within the area and/or funnel traps placed along the fencing. Captured EMR are to be moved to the outside of the project limits, but no further than 1,000 feet from their point of capture. The capture-removal of EMR should be conducted several times daily for a minimum of 14 days prior to initiating any activity within the project limits. After 14 days of EMR capture-removal, activities may begin in the area enclosed by the snake-proof barrier, so long as the integrity of the barrier is maintained. The 14 day EMR capture-removal does not have to be completed on consecutive days, but must be done over a period of less than 28 days. The barrier should only be breached for a few minutes at a time to move equipment into and out of the area; the barrier must then be immediately put back in place. Should the integrity of the barrier be compromised for more than 24 hours, it will be necessary to repeat the 14 days of snake capture-removal. Furthermore, on the ground outside of the snake-proof barrier, cover boards (sheet metal) must be placed around the perimeter as protection for EMR trying to access the project area. The cover boards should be placed parallel to the fence with no more than 25 feet between each sheet. This work must be done by a FWS approved contractor and all work must be approved by FWS prior to initiation.

(17) Employ a snake monitor when working in known/presumed occupied areas for projects that will require earth moving or use of large equipment. The number of monitors required will be in proportion to the size of the active work area. If EMR are found in the work area, construction activities in the vicinity will cease and the monitor will mark their locations on a topographic map and record GPS coordinates. A qualified EMR surveyor will be promptly engaged to survey the construction area and confirm that EMR are no longer present. If the EMR is found, the surveyor will take basic physical measurements of the handled snakes, and potentially insert PIT tags. The surveyor will then move the snake, unharmed outside the work limits. All work within the

vicinity should temporarily cease until the snake is moved to ensure the safety of the snake and workers. The appropriate land manager and FWS office must be notified immediately.

(18) Minimize the time required for activities in known/presumed occupied EMR habitat during the active season (March 15-October 31). Projects should be designed to be completed as quickly as possible. All measures regarding expedited water body crossings will be fully implemented in known/presumed EMR habitat.

Contaminants

(19) As described in the ECS section on "Spill Prevention, Containment and Control," site staging areas for equipment, fuel, materials, and personnel at least 100 feet from the waterway, if available, to reduce the potential for sediment and hazardous spills entering the waterway. If sufficient space is not available, a shorter distance can be used with additional control measures (e.g., redundant spill containment structures, on-site staging of spill containment/clean-up equipment and materials). If a reportable spill has impacted occupied habitat:

a. follow spill response plan;
b. call the appropriate Service Field Office to report the release, in addition to the National Response Center (800-424-8802).

(20) Ensure all imported fill material is free from contaminants (this would include washed rock or other materials that could significantly affect the pH of the stream) that could affect the species or habitat through acquisition of materials at an appropriate quarry or other such measures.

(21) For storage well activities, use enhanced and redundant measures to avoid and minimize the impact of spills from contaminant events in known or presumed occupied streams. These measures include waste pit protection and a spill response plan. These measures will be included in the EM&CP prepared for the activity.

(22) Do not use fertilizers within 100 feet of known or presumed occupied habitat. Fertilizer will not be applied if weather (e.g., impending storm) or other conditions (e.g., faulty equipment) would compromise the ability of NiSource or its contractors to apply the fertilizer without impacting presumed occupied
EMR habitat. The EM&CP prepared for this activity (AMM #2 above) will document relevant EPA guidelines for application.

(23) Concrete coating activities will not take place within 300 feet of any wetland.

Water Withdrawal/Discharge

(24)Do not withdraw water from wetlands in known/presumed EMR habitat for hydrostatic testing. Hydrostatic test water and/or water for storage well O&M will not be obtained from known or presumed occupied streams unless other water sources are not reasonably available. Water

from known or presumed occupied streams will be withdrawn in a manner that will not visibly lower the water level as indicated by water level height on the stream channel bank. Employ appropriately sized screens, implement withdrawal rates, and maintain withdrawal point sufficiently above the substrate to minimize impacts to the species.

(25) Do not discharge hydrostatic test water directly into known or presumed occupied habitat. Discharge water in the following manner (in order of priority and preference):

a. Discharge water down gradient of occupied habitat unless on-the-ground circumstances (e.g., man-made structures, terrain, other sensitive resources) prevent such discharge.
b. If those circumstances occur, discharge water into uplands >300 feet from occupied habitat unless on-the-ground circumstances (e.g., man-made structures, terrain, other sensitive resources) prevent such discharge.
c. If those circumstances occur, discharge water as far from occupied habitat as practical and utilize additional sediment and water flow control devices (Figures 6A&B, 7, 8, 14A&B; ECS) to minimize effects to the waterbody.

Restoration & Invasive species

(26) Re-vegetate all disturbed EMR habitat with appropriate native species. Monitor all restoration plantings for proper establishment and implement supplemental plantings as necessary.

(27) Ensure that all measures for the conservation of topsoil from the ECS are fully implemented in EMR habitat.

(30) Clean all equipment following established guidelines to remove exotic or invasive species before entering a watershed. It is important to follow these guidelines even if work is not occurring in the immediate vicinity of this species since, once introduced into a watershed; invasive species could move and eventually affect the federally listed species. During hydrostatic testing, do not draw water from another source (wetland or waterbody) and discharge it into wetlands or waterbodies in occupied or presumed habitat.

(28) Ensure that all fill material is free from exotic or invasive species.

Other measures:

(29) Abandon pipelines in place to avoid in-stream disturbance that would result from pipeline removal unless the abandonment would be detrimental to EMR.

(30) Due to the high threat of persecution/collection, do not advertise the presence of EMR other than to NiSource staff and its contractors. All NiSource staff will be educated about the EMR prior to beginning work at a site and will be given instructions on what to do if they encounter a snake.

(31) Any activities, including but not limited to erosion control and revegation, will not use any synthetic mesh material or due to the danger of trapping EMR.

(32) From March 15-October 31, use tanks to store waste fluids to ensure no loss of EMR by entrapment or exposure to toxins in waste pits within known/presumed occupied EMR habitat.

Diamond darter
Determination without BMPs: LAA
Determination with BMPs: NLAA – LAA
Range: Elk River, WV.
BMPs **Evaluating Presence of Species in NiSource Action Areas** 1. Due to the rarity of the species and the difficulty associated with documenting species presence even in known occupied areas, all areas of the Elk River within the covered lands will be assumed to be occupied by the diamond darter and all AMMs will be followed. Coordination with the US Fish & Wildlife Service (Service) 2. Prior to any activity that could directly affect diamond darters or their habitat (such as a pipeline replacement or stabilization of the river banks) NiSource will prepare a detailed EM&CP as described below and coordinate with the Service as detailed in the attached flowchart. Pre-Construction Planning: Preparation of an EM&CP 3. A detailed EM&CP will be prepared for any activity with potential effects (e.g., stream bank disturbance, impacts to riparian habitat, activities causing sediment) within 100 feet of the ordinary high water mark of occupied habitat. The plan will incorporate the relevant requirements of the NGTS ECS and include site-specific details particular to the project area and potential impact. The Elk River will be considered “high-quality” (as defined in the ECS) for the purpose of preparing this plan regardless of the actual classification. The plan will avoid streambed disturbance if possible and be strongly oriented towards minimizing any riparian disturbance (including minimization of tree clearing within 25 feet of the ordinary high water mark of the Elk River), preventing downstream sedimentation (including redundant erosion and sediment control devices, which would be designed to protect aquatic resources as appropriate), and weather monitoring by the Environmental Inspector to ensure work is not begun with significant precipitation in the forecast. This detailed site-specific and engineered plan will also include any realignment to avoid impacts to high quality foraging and spawning habitats. The EM&CP will identify the full-time Environmental Inspector for the project and include his qualifications relevant to aquatic and fisheries ecology. The plan will comprehensively address all activities needed to complete the work and minimize take of

diamond darters in occupied habitat including using dry-ditch crossing techniques for intermittent streams leading to diamond darter habitat. Decisions on locations of line replacements and construction alternatives will be made in accordance with the attached flow chart. The plan will include planting native, riparian woody vegetation in all disturbed areas within 25 feet of the ordinary high water mark of the Elk River after construction is completed. The EM&CP will also include a sediment control component for uplands that drain to and impact occupied habitat. Detailed erosion control plans will be developed specific to slopes greater than or equal to 30 percent leading directly to occupied habitat. In areas with less than a 30 percent slope, ECS and AMM erosion control measures protective of fish and mussels will be implemented. The Service's West Virginia Field Office will be notified at least five days prior to the initiation of activities in or under the Elk River. The plan will be approved in writing by NiSource NRP personnel prior to project implementation and will include a tailgate training session for all on-site project personnel to highlight the environmental sensitivity of the habitat and any diamond darter AMMs that must be implemented.

Streambed Construction

4. For activities in occupied habitat, install replacement pipelines and major repairs under the river bottom using HDD or other trenchless methods rather than open trenching unless the crossing evaluation report prepared in accordance with MSHCP Section 5.2.1.1 and Appendix J indicates otherwise. Drilling should be carefully undertaken and a plan should be in place to minimize and address the risk of in-stream disturbance due to frac-outs. The plan should also specify diamond darters in the vicinity of the crossing as a key conservation concern and include specific measures identified in the NGTS ECS, from standard industry practices, or other mutually agreed-upon practices to protect this resource. The plan will also include a frac-out impact avoidance plan which will evaluate the site in terms not only of feasibility of conducting HDD, but the likelihood of large scale frac-out and its effects on diamond darters, and actions to address a large scale frac-out in occupied habitat. The plan should also consider the potential effects on diamond darters if drilling fluids are released into the environment and include measures to immediately minimize and remediate any adverse effects. No in-stream (or under stream) activities will be conducted between January 1 and July 31. The plan must contain all information required for a FERC Section 7c filing at a minimum. The plan will specify that the Service's West Virginia Field Office will be immediately notified in the event of a frac-out.

If, after detailed engineering studies (e.g., geotechnical, physiological, topographical, and economic), it is determined (and agreed to by NRP personnel) that an HDD or other alternative methods that avoid instream impacts are not feasible, a report will be prepared and included in the EM&CP to be submitted to the Service during the consultation process. If other alternative are not feasible, NiSource will utilize a dry-ditch crossing technique as described in the ECS beginning on page 15 and Figures 18 and 19. The dry crossing will be

designed to minimize the amount of instream habitat that will be disturbed and will be installed in the following manner:

a. Install pumps or flumes to transport water past the construction site.
b. Install upstream dam.
c. Commence water transport past the construction site.
d. Install downstream dam.
e. Relocate (to the extent practical) mussels and fish to upstream location.
f. Pump water from construction site to upland area.
g. Dig trench, install pipe, and backfill.
h. Remove downstream dam.
i. Remove upstream dam.
j. Remove water transport equipment.

No in-stream activities will be conducted between January 1 and July 31. Clean 1 to 2-inch gravel will be used for the final one-foot of fill in the backfilled trench. The EM&CP will also include results from discussions with the US Army Corps of Engineers regarding flow minimization from Sutton Dam during in-stream construction activities.

5. Install pipeline to the minimum depth described in the ECS and maintain that depth at least 10 feet past the high water line to avoid exposure of pipeline by anticipated levels of erosion based on geology and watershed character. Additional distance may be required should on-site conditions (i.e., outside bend in the waterbody, highly erosive stream channel, anticipated future upstream development activities in the vicinity, etc.) dictate a reasonable expectation that the stream banks could erode and expose the pipeline facilities. Less distance may be utilized if terrain or geological conditions (long, steep bank or solid rock) will not allow for a 10-foot setback. These conditions and the response thereto will be documented in the EM&CP and provided as part of the annual report to the Service.

6. All repair activities that have the potential to cause turbidity in the Elk River will be done using dry techniques typically consisting of placing a coffer dam (typically sand bags) around the area requiring repair, pumping the water out of the coffer dam, and completing the repair.

7. As part of the routine pipeline inspection patrols, visually inspect all stream crossings in occupied habitat at least yearly for early indications of erosion or bank destabilization associated with or affecting the pipeline crossing that is resulting, or would before the next inspection cycle, likely result in sediment impacts to diamond darter habitat beyond what would be expected from background stream processes. If such bank destabilization is observed, it will be corrected in accordance with the ECS. Follow-up inspections and

restabilization will continue until the bank is stabilized (generally two growing seasons).

Stream Bank Conservation

8. Do not construct culvert and stone access roads and appurtenances (including equipment crossing) across the Elk River or within its riparian zone.

9. For equipment crossings of small streams that are tributaries of and within ½ mile of the Elk River, use half pipes of sufficient number and size that both minimize impacts to stream bed and minimize flow disruption to both upstream and downstream habitat (ECS, Figure 22).

Pipeline Abandonment

10. Abandon pipelines in place to avoid in-stream disturbance that would result from pipeline removal unless the abandonment would be detrimental to the diamond darter.

Contaminants

11. As described in the ECS section on "Spill Prevention, Containment and Control," site staging areas for equipment, fuel, materials, and personnel at least 300 feet from any waterway within the Elk River watershed, if available, to reduce the potential for sediment and hazardous spills entering the waterway. If sufficient space is not available, a shorter distance can be used with additional control measures (e.g., redundant spill containment structures, on-site staging of spill containment/clean-up equipment and materials). If a reportable spill has impacted occupied habitat: a). follow spill response plan, b). call the Service West Virginia Field Office (304-636-6586) to report the release; and c). call the National Response Center (800-424-8802).

12. Ensure all imported fill material to be used in projects in the vicinity of the Elk River are free from contaminants (this would include washed rock or other materials that could significantly affect the pH of the stream) that could affect the species population or habitat through acquisition of materials at an appropriate quarry or other such measures.

13. For storage well activities, use enhanced and redundant measures to avoid and minimize the impact of spills from contaminant events within the Elk River watershed. These measures include, for example, waste pit protection, redundant spill containment structures, on-site staging of spill containment/clean-up equipment and materials, and a spill response plan provided to the Service as part of the annual report. These measures will be included in the EM&CP prepared for the activity.

14. Do not use fertilizers or herbicides within 100 feet of the Elk River. Fertilizer and herbicides will not be applied if weather (e.g., impending storm) or other conditions (e.g., faulty equipment) would compromise the ability of NiSource or its contractors to apply the fertilizer or herbicide without impacting presumed occupied diamond darter habitat. The EM&CP prepared for this activity (AMM# 2 above) will document relevant EPA guidelines for

application.

Withdrawal and Discharge of Water

15. Do not draw hydrostatic test water and/or water for storage well O&M from or discharge water directly into the Elk River.

Discharge water in the following manner (in order of priority and preference):

a. Discharge water down gradient of occupied habitat unless on-the-ground circumstances (e.g., man-made structures, terrain, other sensitive resources) prevent such discharge.

b. If those circumstances occur, discharge water into uplands >300 feet from occupied habitat unless on-the-ground circumstances (e.g., man-made structures, terrain, other sensitive resources) prevent such discharge.

c. If those circumstances occur, discharge water as far from occupied habitat as practical and utilize additional sediment and water flow control devices (Figures 6A&B, 7, 8, 14A&B; ECS) to minimize effects to the waterbody.

Travel for O&M Activities

16. Do not drive across the Elk River – walk these areas or visually inspect from bank and use closest available bridge to cross stream.

Invasive Species

17. Clean all equipment (including pumps, hoses, etc.) that has (1) been in a perennial waterbody for more than four hours within the previous seven days and (2) will work in occupied habitat; following established guidelines to remove exotic or invasive species before entering the Elk River. Do not discharge any water for other sources that might be contained in equipment (e.g. ballast water, hoses, sumps, or other containment). It is important to follow these guidelines even if work is not occurring in the immediate vicinity of this species since, once introduced into a watershed, invasive species could move and eventually affect the diamond darter. If Japanese knotweed is found within any construction areas in the Elk River watershed, take measures to treat and control the species so that it does not spread.

Table 4.3.7: Summary of Impacts to Non-MSHCP Species

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
Mussels	Dwarf wedgemussel *Alasmidonta heterodon*	Endangered	**May be affected** (LAA) in Morris County, NJ; Delaware, Orange, Sullivan, and Warren counties, NY; Pike County, PA; and Chesterfield, Culpeper, Dinwiddie, Fauquier, Greensville, Hanover, Louisa, Prince William, and Sussex counties, VA; and in its **historic range** in Morris County, NJ; and Chesterfield County, VA.	Construction, operation, and maintenance of, ROWs, access roads, and storage wells, pipeline construction and removal, hydrostatic testing, vehicle operation and foot traffic, stream crossings, and vegetation management and clearing.	Entrapment, introduction of invasive species, crushing, sedimentation, chemical contaminants, permanent or temporary loss of occupied habitat, habitat degradation, physical impacts to individuals, loss of host fish, loss and degradation of host fish habitat, increase in water temperatures, altered flow.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
	Fat pocketbook *Potamilis capax*	Endangered	**May be affected** (NLAA) in East Carroll Parish, LA; and Issaquena, Sharkey, and Washington counties, MS.	Construction, operation, and maintenance of ROWs, access roads, and storage wells, pipeline construction and removal, hydrostatic testing, vehicle operation and foot traffic, stream crossings, and vegetation management and clearing.	Entrapment, introduction of invasive species, crushing, sedimentation, chemical contaminants, permanent or temporary loss of occupied habitat, habitat degradation, physical impacts to individuals, loss of host fish, loss and degradation of host fish habitat, increase in water temperatures, altered flow.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
	Fluted kidney shell pearlymussel *Ptychobranchus subtentum*	Candidate	**May be affected** (NLAA) in Jackson County, KY.	Construction, operation, and maintenance of ROWs, access roads, and storage wells, pipeline construction and removal, hydrostatic testing, vehicle operation and foot traffic, stream crossings, and vegetation management and clearing.	Entrapment, introduction of invasive species, crushing, sedimentation, chemical contaminants, permanent or temporary loss of occupied habitat, habitat degradation, physical impacts to individuals, loss of host fish, loss and degradation of host fish habitat, increase in water temperatures, altered flow.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
Mussels	Orangefoot pimpleback pearlymussel *Plethobasus cooperianus*	Endangered	**May be affected** (NLAA) in Bracken, Lewis, and Pendleton counties, KY; and Hardin and Maury counties, TN.	Construction, operation, and maintenance of ROWs, access roads, and storage wells, pipeline construction and removal, hydrostatic testing, vehicle operation and foot traffic, stream crossings, and vegetation management and clearing.	Entrapment, introduction of invasive species, crushing, sedimentation, chemical contaminants, permanent or temporary loss of occupied habitat, habitat degradation, physical impacts to individuals, loss of host fish, loss and degradation of host fish habitat, increase in water temperatures, altered flow.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
	Pink mucket pearlymussel *Lampsilis abrupta*	Endangered	**May be affected** (LAA) in Bath, Pendleton, and Rowan counties, KY; Gallia, Lawrence, Meigs, Morgan, and Washington counties, OH; Hardin and Trousdale counties, TN; and Clay, Jackson, Kanawha and Mason counties, WV.	Construction, operation, and maintenance of ROWs, access roads, and storage wells, pipeline construction and removal, hydrostatic testing, vehicle operation and foot traffic, stream crossings, and vegetation management and clearing.	Entrapment, introduction of invasive species, crushing, sedimentation, chemical contaminants, permanent or temporary loss of occupied habitat, habitat degradation, physical impacts to individuals, loss of host fish, loss and degradation of host fish habitat, increase in water temperatures, altered flow.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
Mussels	Rabbitsfoot mussel *Quadrula cylindrica*	Proposed Threatened	**May be affected** (LAA) in DeKalb County, IN; Adair, Allen, Barren, Campbell, Floyd, Greenup, Jackson, Lewis, Monroe, Owsley, and Pendleton counties, KY; Sunflower County, MS; Adams, Ashland, Coshocton, Defiance, Delaware, Fairfield, Franklin, Knox, Madison, Muskingum, Pickaway, Putnam, and Union counties, OH; Allegheny, Armstrong, Beaver, Fayette, Greene, Lawrence, Washington, and Westmoreland counties, PA; and Hardin and Maury Counties, TN.	Construction, operation, and maintenance of ROWs, access roads, and storage wells, pipeline construction and removal, hydrostatic testing, vehicle operation and foot traffic, stream crossings, and vegetation management and clearing.	Entrapment, introduction of invasive species, crushing, sedimentation, chemical contaminants, permanent or temporary loss of occupied habitat, habitat degradation, physical impacts to individuals, loss of host fish, loss and degradation of host fish habitat, increase in water temperatures, altered flow.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
	Rayed bean mussel *Villosa fabalis*	Endangered	**May be affected** (LAA) in Dekalb and Marshall counties, IN; Brown, Champaign, Clermont, Coshocton, Defiance, Delaware, Franklin, Hancock, Hardin, Lucas, Madison, Marion, Morrow, Pickaway, Scioto, Union, Warren, and Wyandot counties, OH; and Armstrong, Clarian and Mercer counties, PA.	Construction, operation, and maintenance of ROWs, access roads, and storage wells, pipeline construction and removal, hydrostatic testing, vehicle operation and foot traffic, stream crossings, and vegetation management and clearing.	Entrapment, introduction of invasive species, crushing, sedimentation, chemical contaminants, permanent or temporary loss of occupied habitat, habitat degradation, physical impacts to individuals, loss of host fish, loss and degradation of host fish habitat, increase in water temperatures, altered flow.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
Mussels	Ring pink mussel *Obovaria retusa*	Endangered; XN	**May be affected** (NLAA) in Bracken, Greenup, Lewis, and Pendleton counties, KY.	Construction, operation, and maintenance of ROWs, access roads, and storage wells, pipeline construction and removal, hydrostatic testing, vehicle operation and foot traffic, stream crossings, and vegetation management and clearing.	Entrapment, introduction of invasive species, crushing, sedimentation, chemical contaminants, permanent or temporary loss of occupied habitat, habitat degradation, physical impacts to individuals, loss of host fish, loss and degradation of host fish habitat, increase in water temperatures, altered flow.
	Rough pigtoe mussel *Pleurobema plenum*	Endangered	**May be affected** (NLAA) in Bracken, Lewis, and Pendleton counties, KY; and Hardin and Trousdale counties, TN.	Construction, operation, and maintenance of ROWs, access roads, and storage wells, pipeline construction and removal, hydrostatic testing, vehicle operation and foot traffic, stream crossings, and vegetation management and clearing.	Entrapment, introduction of invasive species, crushing, sedimentation, chemical contaminants, permanent or temporary loss of occupied habitat, habitat degradation, physical impacts to individuals, loss of host fish, loss and degradation of host fish habitat, increase in water temperatures, altered flow.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
	Slabside pearlymussel *Lexingtonia dolabelloides*	Candidate	**May be affected** (NLAA) in Maury County, TN.	Construction, operation, and maintenance of ROWs, access roads, and storage wells, pipeline construction and removal, hydrostatic testing, vehicle operation and foot traffic, stream crossings, and vegetation management and clearing.	Entrapment, introduction of invasive species, crushing, sedimentation, chemical contaminants, permanent or temporary loss of occupied habitat, habitat degradation, physical impacts to individuals, loss of host fish, loss and degradation of host fish habitat, increase in water temperatures, altered flow.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
	Snuffbox *Epioblasma triquetra*	Endangered	**May be affected** (LAA) in Bath, Carter, Greenup, Menifee, Montgomery, Nicholas, Powell, Robertson, and Rowan County, KY; Coshocton, Franklin, Greene, Madison, Marion, Monroe, Muskingum, Pickaway, and Washington County, OH; Clarion County, PA; Maury County, TN; Brooke, Calhoun, Doddridge, Gilmer, Kanawha, Marshall, Mason, Putnam, and Wetzel County, WV	Construction, operation, and maintenance of ROWs, access roads, and storage wells, pipeline construction and removal, hydrostatic testing, vehicle operation and foot traffic, stream crossings, and vegetation management and clearing.	Entrapment, introduction of invasive species, crushing, sedimentation, chemical contaminants, permanent or temporary loss of occupied habitat, habitat degradation, physical impacts to individuals, loss of host fish, loss and degradation of host fish habitat, increase in water temperatures, altered flow.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
Mussels	Spectaclecase mussel *Cumberlandia monodonta*	Endangered	**May be affected** (LAA) in Hardin County, TN.	Construction, operation, and maintenance of ROWs, access roads, and storage wells, pipeline construction and removal, hydrostatic testing, vehicle operation and foot traffic, stream crossings, and vegetation management and clearing.	Entrapment, introduction of invasive species, crushing, sedimentation, chemical contaminants, permanent or temporary loss of occupied habitat, habitat degradation, physical impacts to individuals, loss of host fish, loss and degradation of host fish habitat, increase in water temperatures, altered flow.
Transitional Successive Pants	American chaffseed *Schwalbea americana*	Endangered	**May be affected** (NLAA) in Greensville and Sussex counties, VA.	Vegetation management and clearing, ROW repair and construction, pipeline construction and removal, storage wells, vehicle operation and foot traffic, access road construction, and wetland, or other water body crossings.	Removal, crushing, burying, soil compaction, sedimentation, introduction of invasive species, collection, cutting, burning, chemical contaminants, water drawdown, flooding.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
Transitional Successive Pants	Eastern prairie fringed orchid *Platanthera leucophaea*	Threatened	**May be affected** (NLAA)in Elkhart, Lake, LaPorte, Noble and St. Joseph counties, IN; Clark, Holmes, Lucas, Ottawa, Sandusky, and Wayne counties, OH; and Augusta County, VA.	Vegetation management and clearing, ROW repair and construction, pipeline construction and removal, storage wells, vehicle operation and foot traffic, access road construction, and wetland, or other water body crossings.	Removal, crushing, burying, soil compaction, sedimentation, introduction of invasive species, collection, cutting, burning, chemical contaminants, water drawdown, flooding.
Upland Plants	Globe (Short's) bladderpod *Physaria globosa*	Candidate	**May be affected** (NLAA) in Bourbon, Fayette, and Madison counties, KY; and Davidson and Trousdale counties, TN; and in its **historic range** in Clark, Garrard, and Powell counties, KY; and Maury County, TN.	ROW repair and construction, herbicide application, off-ROW clearing, pipeline construction and removal, tree and shrub removal, storage wells construction and maintenance, vehicle operation and foot traffic, access road construction, and construction staging at stream, wetland, or other water body crossings.	Burying, soil compaction, chemical contaminants, introduction of invasives in occupied habitat, habitat alteration, increased competition with nonnative species, introduction of invasive species by equipment, cutting and crushing of individuals, flooding.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
Riparian Plants	Harperella *Ptilimnium nodosum*	Endangered	**May be affected** (NLAA) in Allegany and Washington counties, MD.	Vegetation management and clearing, ROW repair and construction, pipeline construction and removal, storage wells, vehicle operation and foot traffic, access road construction, and stream crossings.	Chemical contaminants, soil compaction, soil disturbance, introduction of invasive species, habitat alteration, sedimentation, altered flow, cutting, crushing and burying of individuals.
Upland Plants	Lakeside daisy *Hymenoxys herbacea*	Threatened	**No affect** in Erie and Ottawa Counties, OH.	ROW repair and construction, herbicide application, off-ROW clearing, pipeline construction and removal, tree and shrub removal, storage wells construction and maintenance, vehicle operation and foot traffic, access road construction, and construction staging at stream, wetland, or other water body crossings.	Burying, soil compaction, chemical contaminants, introduction of invasives in occupied habitat, habitat alteration, increased competition with nonnative species, cutting and crushing of individuals.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
Transitional Successive Plants	Leafy-prairie clover *Dalea foliosa*	Endangered	**May be affected** (NLAA) in Davidson, Maury, Williamson, and Wilson counties, TN; and in its **historic range** in Sumner County, TN.	Vegetation management and clearing, ROW repair and construction, pipeline construction and removal, storage wells, vehicle operation and foot traffic, access road construction, and wetland, or other water body crossings.	Removal, crushing, burying, soil compaction, sedimentation, introduction of invasive species, collection, cutting, burning, chemical contaminants, water drawdown, flooding.
Upland Plants	Leedy's roseroot *Sedum integrifolium spp. leedyi or Rhodiola integrifolia ssp. Leedyi*	Threatened	**May be affected** (NLAA) in Schuyler and Yates Counties, NY.	ROW repair and construction, herbicide application, off-ROW clearing, pipeline construction and removal, tree and shrub removal, storage wells construction and maintenance, vehicle operation and foot traffic, access road construction, and construction staging at stream, wetland, or other water body crossings.	Burying, soil compaction, chemical contaminants, introduction of invasives in occupied habitat, habitat alteration, increased competition with nonnative species, introduction of invasive species by equipment, cutting and crushing of individuals.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
Upland Successional Plants	Michaux's sumac *Rhus michauxii*	Endangered	**May be affected** (NLAA) in Dinwiddie County, VA.	ROW repair and construction, herbicide application, off-ROW clearing, pipeline construction and removal, storage wells construction and maintenance, vehicle operation and foot traffic, access road construction, and construction staging at stream, wetland, or other water body crossings.	Crushing, burying, soil compaction, top soil removal, introduction of invasive species by equipment, chemical contaminants, flooding, chopping, collection of individuals.
Wetland Plants	Northeastern bulrush *Scirpus ancistrochaetus*	Endangered	**May be affected** (LAA) in Washington County, MD; Adams, Bedford, Cambria, Centre, Clinton, Cumberland, Franklin, Fulton, Lehigh, Monroe, and Northampton counties, PA; Alleghany, Augusta, and Rockingham counties, VA; and Hardy County, WV.	Vegetation management and clearing ROW repair and construction, pipeline construction and removal, storage wells, vehicle operation and foot traffic, access road construction, and stream crossings.	Cushing, removal, soil compaction, topsoil removal and ground disturbance, sedimentation, chemical contaminants, habitat alteration, cutting, introduction of invasive species.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
Upland Plants	Northern monkshood *Aconitum noveboracense*	Threatened	**May be affected** (NLAA) in Delaware and Sullivan counties, NY; and Hocking County, OH.	ROW repair and construction, herbicide application, off-ROW clearing, pipeline construction and removal, tree and shrub removal, storage wells construction and maintenance, vehicle operation and foot traffic, access road construction, and construction staging at stream, wetland, or other water body crossings.	Burying, soil compaction, chemical contaminants, introduction of invasives in occupied habitat, habitat alteration, increased competition with nonnative species, , cutting and crushing of individuals.
Upland Successional Plants	Peter's Mountain mallow *Iliamna corei*	Endangered	**No affect** in Giles County, VA.	ROW repair and construction, herbicide application, off-ROW clearing, pipeline construction and removal, storage wells construction and maintenance, vehicle operation and foot traffic, access road construction, and construction staging at stream, wetland, or other water body crossings.	Crushing, burying, soil compaction, top soil removal, introduction of invasive species by equipment, chemical contaminants, flooding, chopping, collection of individuals.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
Wetland Plants	Pondberry *Lindera melissifolia*	Endangered	**May be affected** (NLAA) in Sharkey and Sunflower counties, MS.	Vegetation management and clearing ROW repair and construction, pipeline construction and removal, storage wells, vehicle operation and foot traffic, access road construction, and stream crossings.	Cushing, removal, soil compaction, topsoil removal and ground disturbance, sedimentation, chemical contaminants, habitat alteration, cutting, introduction of invasive species.
Transitional Successive Plants	Price's potato bean *Apios priceana*	Endangered	**No affect** in Maury, Wayne, and Williamson counties, TN; and in its **historic range** in Davidson County, TN.	Vegetation management and clearing, ROW repair and construction, pipeline construction and removal, storage wells, vehicle operation and foot traffic, access road construction, and stream, wetland, or other water body crossings.	Removal, crushing, burying, soil compaction, sedimentation, introduction of invasive species, collection, cutting, burning, chemical contaminants, water drawdown, flooding.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
Transitional Successive Plants	Running buffalo clover *Trifolium stoloniferum*	Endangered	**May be affected** (NLAA) in Bourbon, Campbell, Clark, Fayette, Madison, and Montgomery counties, KY; Brown, Clermont, and Lawrence counties, OH; and Pendleton, Pocahontas, Preston, Randolph, Tucker, and Webster counties; WV; and in its **historic range** in Jackson County, KY; and Monongalia County, WV.	Vegetation management and clearing, ROW repair and construction, pipeline construction and removal, storage wells, vehicle operation and foot traffic, access road construction, and stream, wetland, or other water body crossings.	Removal, crushing, burying, soil compaction, sedimentation, introduction of invasive species, collection, cutting, burning, chemical contaminants, water drawdown, flooding.
Riparian Plants	Sensitive joint-vetch *Aeschynomene virginica*	Threatened	**May be affected** (NLAA) in Chesterfield, Henrico, and James City counties, VA; and in its **historic range** in Gloucester and Salem counties, NJ; Delaware County, PA; and Prince George and Surry Counties, VA.	Vegetation management and clearing, ROW repair and construction, pipeline construction and removal, storage wells, vehicle operation and foot traffic, access road construction, and stream crossings.	Chemical contaminants, soil compaction, soil disturbance, introduction of invasive species, habitat alteration, sedimentation, altered flow, cutting, crushing and burying of individuals.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
Upland Successional Plants	Shale barren rockcress *Arabis serotina*	Endangered	**May be affected** (NLAA) in Alleghany, Augusta, Page, and Rockbridge counties, VA; and Greenbrier, Hardy, and Pendleton counties, WV.	ROW repair and construction, herbicide application, off-ROW clearing, pipeline construction and removal, storage wells construction and maintenance, vehicle operation and foot traffic, access road construction, and construction staging.	Crushing, burying, soil compaction, top soil removal, introduction of invasive species by equipment, chemical contaminants, flooding, chopping, collection of individuals.
Upland Successional Plants	Short's goldenrod *Solidago shortii*	Endangered	**May be affected** (NLAA) in Nicholas and Robertson Counties, KY.	ROW repair and construction, herbicide application, off-ROW clearing, pipeline construction and removal, storage wells construction and maintenance, vehicle operation and foot traffic, access road construction, and construction staging.	Crushing, burying, soil compaction, top soil removal, introduction of invasive species by equipment, chemical contaminants, flooding, chopping, collection of individuals.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
Upland Successional Plants	Small-whorled pogonia *Isotria medeoloides*	Threatened	**May be affected** (NLAA) in New Castle County, DE; Hocking and Scioto counties, OH; Centre and Chester counties, PA; and Fairfax, James City, Madison, and Prince William counties, VA; and in its **historic range** in Montgomery County, MD; Hunterdon County, NJ; Rockland County, NY; Greene, Monroe, and Montgomery counties, PA; and Greenbrier County, WV.	ROW repair and construction, herbicide application, off-ROW clearing, pipeline construction and removal, storage wells construction and maintenance, vehicle operation and foot traffic, access road construction, and construction staging at stream, wetland, or other water body crossings.	Crushing, burying, soil compaction, top soil removal, introduction of invasive species by equipment, chemical contaminants, flooding, chopping, collection of individuals.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
Upland Successional Plants	Smooth coneflower *Echinacea laevigata*	Endangered	**May be affected** (NLAA) in Allegheny and Botetourt counties, VA; and in its **historic range** in Lancaster County, PA.	ROW repair and construction, herbicide application, off-ROW clearing, pipeline construction and removal, storage wells construction and maintenance, vehicle operation and foot traffic, access road construction, and construction staging at stream, wetland, or other water body crossings.	Crushing, burying, soil compaction, top soil removal, introduction of invasive species by equipment, chemical contaminants, flooding, chopping, collection of individuals.
Riparian Plants	Spring creek bladderpod *Lesquerella perforata*	Endangered	**May be affected** (NLAA) in Wilson County, TN.	Vegetation management and clearing, ROW repair and construction, pipeline construction and removal, storage wells, vehicle operation and foot traffic, access road construction, and stream crossings.	Chemical contaminants, soil compaction, soil disturbance, introduction of invasive species, habitat alteration, sedimentation, altered flow, cutting, crushing and burying of individuals.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
Wetland Plants	Swamp pink *Helonias bullata*	Threatened	**May be affected** (NLAA) in New Castle County, DE; Cecil County, MD; Gloucester, Morris, and Salem counties, NJ; and Augusta and Henrico counties, VA.	Vegetation management and clearing ROW repair and construction, pipeline construction and removal, storage wells, vehicle operation and foot traffic, access road construction, and stream crossings.	Cushing, removal, soil compaction, topsoil removal and ground disturbance, sedimentation, chemical contaminants, habitat alteration, cutting, introduction of invasive species.
Wetland plants	Virginia sneezeweed *Helenium virginicum*	Threatened	**May be affected** (NLAA) in Augusta and Rockingham counties, VA.	Vegetation management and clearing ROW repair and construction, pipeline construction and removal, storage wells, vehicle operation and foot traffic, access road construction, and stream crossings	Cushing, removal, soil compaction, topsoil removal and ground disturbance, sedimentation, chemical contaminants, habitat alteration, cutting, introduction of invasive species
Riparian Plants	Virginia spirea *Spiraea virginiana*	Threatened	**May be affected** (NLAA) in Lewis County, KY; Sioto County, OH; and Greenbrier, Mercer, Raleigh, Summers, and Upshur counties; and in its **historic range** in Fayette County, PA.	Vegetation management and clearing, ROW repair and construction, pipeline construction and removal, storage wells, vehicle operation and foot traffic, access road construction, and stream crossings.	Chemical contaminants, soil compaction, soil disturbance, introduction of invasive species, habitat alteration, sedimentation, altered flow, cutting, crushing and burying of individuals.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
Upland Plants	White-haired goldenrod *Solidago albopilosa*	Threatened	**No affect** in Menifee and Powell Counties, KY.	ROW repair and construction, herbicide application, off-ROW clearing, pipeline construction and removal, tree and shrub removal, storage wells construction and maintenance, vehicle operation and foot traffic, access road construction, and construction staging at stream, wetland, or other water body crossings.	Burying, soil compaction, chemical contaminants, introduction of invasives in occupied habitat, habitat alteration, increased competition with nonnative species, introduction of invasive species by equipment, cutting and crushing of individuals.
Birds	Piping plover *Charadrius melodus*	Endangered	**May be affected** (NLAA) in Cameron, Lafourche, Plaquemines, St. Mary, Terrebonne, and Vermilion parishes, LA.	Construction, O&M of facilities, ROW repair and construction, herbicide application, off-ROW clearing, pipeline construction and removal, storage wells construction and O&M, vehicle operation and foot traffic, access road construction, construction staging at stream, wetland, or other water body crossings, vegetation management and clearing.	Habitat degradation, potential attraction of predators, increased disturbance stress on individuals, potential for contaminant impacts.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
	Red-cockaded woodpecker *Picoidees borealis*	Endangered	**May be affected** (NLAA) in Calcasieu, Evangeline, Grant, La Salle, and Rapides parishes, LA; and Lafayette County, MS; and in its **historic range** in Powell County, KY; Catahoula Parish, LA; Northampton County, NC; Hardin and McNairy counties, TN; and Southampton and Sussex counties, VA.	Construction, O&M of facilities ROW repair and construction, herbicide application, off-ROW clearing, pipeline construction and removal, storage wells construction and maintenance, vehicle operation and foot traffic, access road construction, , and vegetation management and clearing.	Habitat degradation, increased disturbance stress on individuals and nesting pairs, reduction in prey abundance, noise disturbance on individuals, potential for chemical contaminants, habitat degradation from chemical contaminants.
Fish	Diamond Darter *Crystallaria cincotta*	Proposed Endangered	**May be affected** (LAA) in Kanawha and Clay Counties, WV.	Construction, operation, and maintenance of facilities, ROWs, access roads, and storage wells, pipeline construction and removal, vehicle operation and foot traffic, stream crossings, and vegetation management and clearing.	Permanent or temporary loss of habitat, habitat degradation, water quality impacts, physical impacts to individuals, reduction of prey population diversity and abundance.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
	Pallid sturgeon *Scaphirhynchus albus*	Endangered	**May be affected** (NLAA) in East Carroll, Madison, Rapides, and St. Mary parishes, LA; and Issaquena, Sharkey, Warren, and Washington counties, MS.	Construction, operation, and maintenance of facilities, ROWs, access roads, and storage wells, pipeline construction and removal, vehicle operation and foot traffic, stream crossings, and vegetation management and clearing.	Temporary loss of occupied habitat, physical impacts to individuals, habitat degradation and water quality degradation, stress on individuals, contaminant impacts, stress on eggs.
	Roanoke logperch *Percina rex*	Endangered	**May be affected** (LAA) in Brunswick, Dinwiddie, Greensville, Mecklenburg, Southampton, and Sussex counties, VA.	Construction, operation, and maintenance of facilities, ROWs, access roads, and storage wells, pipeline construction and removal, vehicle operation and foot traffic, stream crossings, and vegetation management and clearing.	Temporary or permanent loss of occupied habitat, physical impacts to individuals, habitat degradation and water quality degradation, reduction of prey population, stress on individuals, stress on eggs.
	Spotfin chub *Erimonax monachus*	Threatened, XN	**May be affected** (NLAA) in Lewis County, TN.	Construction, operation, and maintenance of facilities, ROWs, access roads, and storage wells, pipeline construction and removal, vehicle operation and foot traffic, stream crossings, and vegetation management and clearing.	Permanent or temporary loss of occupied habitat, water quality impacts, habitat degradation, physical impacts to individuals, reduction of prey population diversity and abundance.

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
Fish	Pygmy madtom *Noturus stanauli*	Endangered, XN	**May be affected** (NLAA)in Maury County, TN.	Construction, operation, and maintenance of facilities, ROWs, access roads, and storage wells, pipeline construction and removal, vehicle operation and foot traffic, stream crossings, and vegetation management and clearing.	Temporary or permanent loss of occupied habitat, physical impacts to individuals, habitat degradation and water quality degradation, reduction of prey population, stress on individuals, stress on eggs.
	Kentucky arrow darter *Etheostoma sagitta ssp. spilotum*	Candidate	**May be affected** (NLAA)	Not applicable	Not applicable
Mammal	Virginia northern flying Squirrel (*Glaucomys sabrinus fuscus*)	Delisted	**May be affected** (NLAA) in Pocahontas, Pendleton,Randolph, Grant, and Tucker counties, West Virginia	Not applicable	Not applicable

Group	Common/Scientific Name	Federal Status	Potential Species Locations within the Covered Land	Covered Activities Causing Impacts	Potential Species Impacts due to Covered Activities
Reptiles	Eastern massasauga *Sistrurus catenatus catenatu*	Candidate	**May be affected** (LAA) in Elkhart, LaPorte, Marshall, Noble, Porter, and St. Joseph counties, IN; Ashtabula, Champaign, Clark, Clinton, Columbiana, Crawford, Defiance, Erie, Fairfield, Fayette, Greene, Hardin, Huron, Licking, Logan, Lorain, Lucas, Marion, Medina, Montgomery, Ottawa, Paulding, Sandusky, Seneca, Stark, Trumbull, Warren, Wayne, and Wyandot counties OH; and Butler and Mercer counties, PA.	Construction, operation, and maintenance of facilities, ROW repair and construction, herbicide application, off-ROW clearing, pipeline construction and removal, storage wells construction and maintenance, vehicle operation and foot traffic, access road construction and maintenance, and construction staging at wetland crossing construction, and vegetation management and clearing.	Physical impacts to individuals and habitat, chemical contaminants, water-level manipulation, predation, burning, chopping, and increase predation potential.

State Listed Species

As discussed in Chapter 3, all 10 take species and a number of the MSHCP and non-MSHCP species are either state listed threatened or endangered. In addition, there may be state-listed species (or species of “special concern”) affect by the Proposed Action that are not included in the MSHCP. For instance, the little brown bat and northern long-eared bat, while not included in the MSHCP, but which share some of the same habitat and habits as the Indiana bat, could be affected by NiSource AMMs (e.g., tree-clearing windows) and mitigation (e.g., protecting and enhancing forest habitat). The same could be true for some state-listed mussels that share habitat and habits with mussel species in the MSHCP. The state-listed spotted turtle, green snake, several dragonflies, and some fen plants should benefit from bog turtle habitat protection. Overall, we would expect impacts to these "other" state listed species to be minor, though positive.

Since most of the states have protections in place for state listed species, we assume NiSource will contact the appropriate state agency when conducting activities (including mitigation) that have the potential to impact state listed species. For instance, a state listed plant species could potentially occur along a riparian area that NiSource intends to restore as mitigation for mussel impacts. In order for NiSource to remain "otherwise lawful" under the ESA, NiSource would be expected to consult with the state agency responsible for that plant species and obtain any exceptions or authorizations needed to conduct that activity. Through those processes, we conclude that appropriate safeguards are in-place to protect state-listed species, and the risk of significant adverse impacts is minor and insignificant.

Alternative 3

Under Alternative 3, potential impacts to T&E species are identical to those discussed above for Alternative 2, although the duration of the future take authorized under an ITP is logically reduced commensurately. After 10 years, NiSource would have the option to return to the status quo for ESA compliance (i.e., Section 7), amend their MSHCP and/or renew their permit.

The potential conservation benefit associated with NiSource’s mitigation program would also be reduced based on the shorter duration of the MSHCP implementation, particularly the long-term benefits associated with the “front-loading” the mitigation for all O&M activities within the first

seven years of implementation, which is associated with Alternative 2. If after 10 years NiSource returns to the status quo, mitigation for impacts associated with take would likely be absent.

4.4 Impacts to Social Resources

4.4.1 Land Use

Analysis of land use resources includes a discussion related to land ownership and use, including federal, state, and local conservation lands, land cover types, and potential land conversion as a result of NiSource mitigation.

Alternative 1

The most prevalent land-use type in the Covered Land is Deciduous Forest (49.30%), followed by Cultivated Crops (17.72%), Pasture/Hay (13.53%), and Developed – Open Space (6.47%). The remainder of the area is covered by eleven other types, none exceeding 3% of the total area. A description of each land-use-cover class is included in Table 3.2 in the MSHCP. Appendix E in the MSHCP provides data on conservation lands owned by federal, state, and local governments and nongovernmental organizations that are crossed by the Covered Land.

NiSource Covered Activities could impact land use within the Covered Land. Construction activities such as clearing, grading, trenching, stripping, and backfilling could potentially impact agricultural uses by causing soil erosion, by altering drainage systems, and by degrading soils through mixing and compaction. These impacts could result in short-term loss of crops or pasture, as well as reduced crop productivity in future planting seasons. Residential lands could be impacted by increased noise, dust, and vehicle traffic. They would last only for the duration of construction, which in most cases would be no more than 1 or 2 weeks at a single location. NiSource has established procedures to minimize these impacts during construction.

New compressor facilities can affect adjacent land use if zoning changes are required to allow construction. Depending on the land use in the vicinity and the appearance and noise associated with the facility, adjacent property values could be affected. The presence of a pipeline generally has no effect on adjacent land use, although if extensive tree-clearing or right-

of-way erosion occurs, the aesthetic impact of the right-of-way can affect it. This aesthetic impact can also have some effect on adjacent recreational use. Within a right-of-way, land use is restricted. No permanent structures or trees are allowed to protect the pipeline and to provide access for maintenance. Agricultural uses of the ROW, other than tree or fruit farming, are not affected. Recreational use of the right-of-way by off-road vehicles is not allowed; however, as a practical matter, there is little that can be done to prevent such use.

Easements taken on properties for Covered Activities or mitigation could be considered a permanent impact, in that it would potentially restrict the use of that portion of the property for a period of time. Negotiated easements would be used to confer rights-of-way by a landowner to the pipeline company, on either a permanent or temporary (usually for construction) basis. The easement would give the company the right to construct, operate, and maintain the pipeline within a permanent or temporary right-of-way. In return, the company would compensate the landowner for its use of the land. Typically, an easement agreement between the company and landowner would specify compensation for loss of use during construction, loss of resources, or damage to the property, and would specify allowable uses for the permanent right-of-way after construction is completed. Compressor stations would emit noise for the life of the station.

In summary, the No Action Alternative would continue with the status quo. All future NiSource Covered Activities would undergo appropriate regulatory review by the appropriate land manager or regulatory agency (e.g. USFS, USFWS, USACE). The main difference between the No Action Alternative and the Action Alternatives is the MSHCP Mitigation Program, which would not occur under this Alternative.

Alternative 2

NiSource proposed mitigation has the potential to impact land use in two ways. First, land that is targeted for mitigation would be either purchased in fee or encumbered with a conservation easement. This has the effect of transferring land ownership and control from a private entity (i.e., land in private ownership) to NiSource or one of their designated agents. Secondly, land that is purchased for mitigation would be most likely maintained in a natural vegetative cover and/or restored and enhanced to native vegetative cover to provide benefits to target fish and wildlife species. This has the effect of converting land from one use to another. While the

composition of any future mitigation land is unknown, it could be possible that some of the land that is acquired for mitigation is cropland. NiSource may protect, restore and enhance up to 10,960 acres of forest land and associated habitats as mitigation for the Indiana bat (see Table 2.3.4 in EIS and Tables 8.2.2-1 and 8.2.2-2 in MSHCP). For mussels, NiSource has proposed to protect and restore land associated with riparian corridors (see Table 2.3.4 in EIS and Tables 8.2.2-1 and 8.2.2-2 in MSHCP).

Alternative 3

The environmental consequence of Alternative 3 relative to land use would be the same as Alternative 2 with one exception: the amount of mitigation land either acquired or encumbered with easements would be less within the first seven years under Alternative 3, as NiSource would not be mitigating "up-front" for O&M impacts. Over the long-term, assuming NiSource renews their ITP, of the AMMs and the mitigation would be the same as Alternative 2.

4.4.2 Environmental Justice

EO 12898 requires federal agencies to address, as appropriate, any disproportionately high and adverse human health or environmental effects of their actions, programs, or policies on minority and low-income populations. Chapter 3 contains a set of tables that provides statewide information on minority and low income populations, as well as information specific to the population residing within the Covered Land.

Of the 14 states included in the Covered Land, West Virginia has the lowest overall minority population; whereas New York, Maryland, and Louisiana have the highest (see Tables 3.4-20 through 3.4-22). Within the Covered Land specifically, a higher proportion of individuals are considered minority in North Carolina and Delaware relative to their respective statewide populations, whereas the Covered Land in New York has a lower minority population relative to the rest of the state.

New Jersey and Maryland have the lowest low income populations statewide, whereas Mississippi, Louisiana, West Virginia, and Kentucky have the highest. The proportion of the population considered low income within the Covered Land is similar relative to statewide

numbers for the majority of the 14 states. However, North Carolina, Kentucky, and Mississippi have a higher proportion of their populations within the Covered Land considered low income relative to their respective statewide populations, and New Jersey, Delaware, Tennessee, and Virginia have a lower proportion of their populations within the Covered Land considered low income relative to statewide numbers.

The mission of the Service is working with others to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people. The environmental justice strategy of the Service extends this mission by seeking to ensure that all segments of the human population have equal access to America's fish and wildlife resources, as well as equal access to information which will enable them to participate meaningfully in activities and policy shaping.

Conservation of fish and wildlife and their habitats provides opportunities for Americans to encounter their natural national heritage. Although social or experiential benefits of conservation are not easily quantified, it can be demonstrated that conservation does generate substantial economic activity at local, regional, and national scales.

Alternative 1

In general, construction and operation of pipeline should have a positive economic impact in the region surrounding the project area. Construction material purchases, sales tax on miscellaneous purchases, labor wages to local workers, and construction worker expenditures would result in positive short-term effects on local economies. During operations, NiSource pays county and local property taxes, representing a positive effect of continuing tax revenue generation for the counties.

Under Alternative 1, the Service would not issue NiSource an ITP and thus, no mitigation would be required. NiSource would not establish a designated mitigation fund to pay for mitigation for species take across the Covered Land, which could provide some benefit to local communities.

Alternative 2

Implementation of an ITP would result in land being protected, restored, and managed as mitigation land for the benefit of species covered by the ITP. While there may be some slight

variations in specific timing of NiSource activities due to time savings associated with the issuance of the ITP, there would be minimal differences between the type and overall number of operation, maintenance, and or construction activities that NiSource would ultimately pursue over the span of the proposed ITP. As such, no measurable direct or indirect impacts to employment, income, population (including low income/minority populations), housing or public services are expected throughout the Covered Land based on issuance of the ITP and implementation of the MSHCP. Variations in employment and/or goods and services associated with future construction projects as well as any MSHCP associated mitigation projects may occur, but these are expected to be localized and insignificant when compared to the existing conditions in the entire Covered Land.

Alternative 3

Potential types of impacts relative to environmental justice under Alternative 3 are identical to those discussed above for Alternative 2, although the duration of any future opportunity to provide local economic benefit through mitigation actions would be logically reduced commensurate with permit duration, as well as the opportunity to utilize NiSource mitigation funds associated with the "front-loading" of O&M mitigation during the first seven years of the permit, as provided for in Alternative 2.

4.4.3 Transportation

Analysis of transportation includes a general discussion of direct and indirect impacts related to transportation infrastructure.

Alternative 1

Minor, short-term impacts to the transportation network may result from certain NiSource Covered Activities. These impacts would result primarily from the movement of construction equipment and materials to and from work sites and the daily commuting of workers to and from work sites. These impacts are not expected to be significant. For instance, during NiSource construction projects, the commuting of the construction workforce to a project site could temporarily affect local traffic and potentially create roadside parking hazards. Although most of this commuting would take place during off-peak hours (e.g., before 7:00 AM and after 6:00

PM), it could result in increased traffic in a specific project area. In addition to the construction workforce, the delivery of construction equipment and materials to a work site could temporarily stress transportation networks at certain locations.

With all alternatives, future NiSource projects would be subject to regulatory approval. Therefore, any potential site-specific impacts on transportation networks based on NiSource's future activities would be considered on a project-by-project basis, and the approval of individual projects may be subject to specific mitigation measures. Conditions of approval within individual transportation-related permits might include notification requirements and traffic control measures during construction.

Alternative 2

Impacts to transportation due to Service issuance of an ITP to NiSource for incidental take of 10 species for a 50 year period would be minor, at best. As stated earlier, issuance of an ITP to NiSource does not authorize the activities that cause incidental take of species. Further, implementation of species AMMs and mitigation under an ITP would not change the covered activity in ways that would avoid and/or minimize potential impacts to transportation, as described in Alternative 1.

Alternative 3

Like Alternative 2, impact to transportation due to Service issuance of an ITP to NiSource for incidental take of 10 species for 10 years would be minor, at best.

4.4.4 Cultural Resources

Section 106 of the National Historic Preservation Act (NHPA), as amended, requires the Service to take into account the effect of its undertakings (including issuance of ITPs) on properties that are listed in or eligible for listing in the National Register of Historic Places (NRHP). The process NiSource must follow to assist the lead federal agency in compliance with the National Historic Preservation Act (NHPA) is described in Chapter 1 of this EIS.

Alternative 1

Construction and operation of natural gas pipeline and associated facilities could potentially affect historic properties. Impacts can be direct or indirect. Direct impacts could include the physical destruction or damage to all or a portion of a site, or alteration or removal of a historic property. Indirect impacts could include the introduction of visual, atmospheric, or audible elements that diminish the integrity of the site or alter settings associated with historic properties. Both direct and indirect project impacts on cultural resources can be mitigated. Mitigation measures for both direct and indirect project impacts on historic properties may include route variation to avoid historic properties; data recovery, including the scientific excavation of archaeological sites; detailed documentation, including architectural drawings of historic buildings; and the use of landscaping techniques to screen visual intrusions and maintain site settings.

A project sponsor (like NiSource) requiring a certificate from the Federal Energy Regulatory Commission (FERC) under Section 7 of the Natural Gas Act (NGA) is required to follow the procedures in the applicable FERC regulations and guidelines to assist the FERC in complying with Section 106. Projects constructed under the Natural Gas Policy Act (NGPA) or the NGA blanket certificate program must also meet requirements of the NHPA and comply with the applicable FERC regulations. Therefore, NiSource's construction and operation and maintenance activities must be in compliance with the NHPA to be authorized.

Compliance with Section 106 will occur as projects are reviewed for site-specific resource issues. Areas that are maintained within the pipeline ROW have already been reviewed for archeological resources. As new activities such as expansion projects occur, the areas will be reviewed for compliance with the NHPA. NiSource's annual project planning includes consultation with State Historic Preservation Officers for clearance or completion of any required compliance documentation (e.g., Phase I surveys). In the event that a site-specific project requires further planning relative to impacts on historic or cultural resources, NiSource serves as the non-Federal representative to complete those plans. For the Federal agency, and for agencies cooperating on this EIS, future NEPA documentation will include evaluation of any

historic or cultural preservation concerns as a result of NiSource planning and providing the information.

From a practical standpoint, the extent to which NiSource is able to document previous NHPA clearance for maintenance activities, such review will be completed. Where new ground disturbance is anticipated, such as looping of the existing pipeline, NiSource must assure that their Federally permitted activities are in full compliance with NHPA and other applicable Federal and state law governing historic and cultural resource preservation.

Alternative 2

There are no differences between any of the alternatives related to cultural resource protection. NiSource must assist the lead federal agency to fully comply with the NHPA regardless of which alternative is selected. However, under Alternative 2 and 3, NiSource would also be required to extend NHPA protections to the mitigation lands that are part of those alternatives.

Alternative 3

Again, there are no differences between any of the alternatives related to cultural resource protection. NiSource must assist the lead federal agency to fully comply with the NHPA regardless of which alternative is selected. Under Alternative 2 and 3, NiSource would also be required to extend NHPA protections to the mitigation lands that are part of those alternatives. Also, under Alternative 3, NiSource would not front-load mitigation.

4.4.5 Recreation

Analysis of recreation includes a discussion of potential direct and indirect impacts on land within the Covered Land, and those lands that may serve mitigation purposes.

Alternative 1

Public lands available for recreation have existing land use restrictions that guide allowable development and uses on these lands. As such, these restrictions would guide all NiSource activities on those properties under all alternatives, and would minimize potential impacts to recreational resources.

Construction of facilities could impact recreation and special use areas in the Covered Land in several ways. First, habitats and wildlife may be affected by the clearing of vegetation, the generation of noise, and or the generation of dust. Second, construction of the facilities could result in a disruption of recreational uses potentially including but not limited to hiking, fishing, camping, bird watching, picnicking, and environmental education. Disruptions to recreational uses could potentially occur if access is reduced due to construction activity or if construction activities change the recreational quality of the area.

Impacts to natural resources within recreation areas could indirectly impact recreation within these areas. If conventional construction is used, there may be permanent changes in natural resources associated with vegetation maintenance within the permanent right-of-way. In forested areas, recovery of the construction right-of-way could be short-term or long-term, depending on the age and type of trees. All other impacts would typically be short-term. If boring or HDD methods are used, then impacts to sensitive natural resources would be avoided, but there would still be impacts to any associated temporary workspaces. Construction-related noise, dust, and traffic could indirectly impact recreation in certain areas. Impacts due to changes in access could result if traffic flows within a recreation or special use area would be disrupted. These impacts would be temporary, lasting a few days to a few weeks in any given location. In general, the severity of impacts from noise, dust, and viewscape alteration would depend on the distance between the project site and areas where recreationalists would be located (e.g., campgrounds, picnic areas, trails, private lands). The timing of construction may also be important, as recreation is often seasonal.

Alternative 2

Under both action alternatives, there would be mitigation in the form of land acquisition, restoration, and management. Land acquisition by NiSource could have impacts ranging from reduced recreational opportunities resulting from land being removed from private ownership, to increased recreational opportunities, as land is restored and maintained for the benefit of fish and wildlife. Land that is restored and maintained in a natural state should attract more game species than developed land, and assuming those lands are made available to the public, there could be a net gain in the amount of hunting land available to the public, again at a local scale.

Rivers and streams that receive NiSource mitigation, mainly in the form of riparian restorations, could see improvements to water quality, thereby improving local fish populations used by recreationists.

Alternative 3

Impacts under Alternative 3 would be the same as Alternative 2. However, NiSource would not front-load mitigation; thus some recreation benefits may be foregone, or at least delayed, under this Alternative.

4.4.6 Visual Resources

Analysis of visual resources includes a discussion of potential impacts related to natural or human made features that make up the aesthetic quality of the Covered Land. These features may be landforms, water resources, vegetation, or manufactured in form, and make up the overall visual impression in a certain area. Specific lands or resources that would constitute potentially sensitive visual resources within the Covered Land include land managed by the NPS or USDOT, such as Wild and Scenic Rivers and Scenic Byways. For instance, there are eight segments of rivers designated as Wild and Scenic totaling just over 25 miles within the Covered Land area (see table Table 3.4-34). Other federal land of note within the Covered Land includes the Appalachian Trail and the Laurel Forks Wilderness Area within the Monongahela NF in West Virginia.

Alternative 1

As specific future NiSource activities are undertaken: local, state, or federal level permits or review may be required depending upon the nature and location of the activity. Potential direct or indirect impacts to visual resources (e.g., permanent clearing of vegetation, viewshed modification due to right-of-way construction and maintenance) would be considered on a project-by-project basis and would be subject to conditions of approval.

The Covered Land predominantly crosses privately owned lands. Private lands are not subject to federal or state visual management standards. Visual resources on private lands are a

function of geology, climate, and historical processes, and are influenced by topographic relief, vegetation, water, wildlife, land use, human uses, and development.

Visual impacts associated with new construction and associated temporary workspace areas could include the removal of existing vegetation and the exposure of bare soils, as well as earthwork and grading scars associated with heavy equipment tracks, trenching, blasting, rock formation alteration or removal, and machinery and tool storage. Other visual effects may result from the removal of large individual trees that have aesthetic value; the removal or alteration of vegetation that may currently provide a visual barrier; or landform changes that introduce contrasts in visual scale, spatial characteristics, form, line, color, or texture. Visual impacts would be greatest where the ROW parallels or crosses roads, trails, recreational waterbodies, overlooks, historic properties and districts, and where the pipeline ROW would be seen by passing motorists or recreational users. The visual impacts would vary depending on vegetation type. The recovery timeframe would be shortest on agricultural and open lands consisting of herbaceous and shrub communities, where the re-establishment of vegetation following construction would be relatively fast (between one or two growing seasons). Short-term impacts to developed lands would also be minor due to the previously disturbed nature of these areas and the quick recovery time.

Overall, the greatest potential for visual impact from NiSource Covered Activities would be from the removal of large, mature trees, which would take a longer time to regenerate than other vegetation types, and would be prevented from re-establishing on the new ROW. Clearing would convert existing forested areas to open areas and result in a new corridor with distinctive edges. In general, site-specific visual impacts would diminish over time as the affected areas gradually blend in with the surrounding landscape. Aboveground facilities would be the most visible, and would result in long-term changes to the landscapes where they are located.

Alternative 2

Under Alternative 2, impacts to visual resources would be the same as for Alternative 1. NiSource mitigation for Indiana bat and mussel species could result in improvements to visual resources assuming local publics appreciate forest land and forested riparian corridors. For NiSource projects that occur within or on special designation land, such as Wild and Scenic

Rivers, federal and state action agencies may require additional protective measures, including mitigation, beyond what is required for an ITP.

Alternative 3

Impacts of Alternative 3 would be the same as Alternative 2. Mitigation under Alternative 3 could be less than Alternative 2, especially in the first seven years.

4.4.7 Noise

Analysis of noise relates to impacts surrounding generation of sound or sounds that are loud, unpleasant, unexpected, or undesired within the Covered Land due to the alternatives considered. Human responses to noise can vary depending on the time of day, sensitivity of the receptor (homes, schools, hospitals, etc.), the distance between the source of noise and the receptor, and the type of noise. Noise levels are typically categorized as follows: a 3-dBA increase is considered noticeable, a 6-dBA increase is considered clearly noticeable, and a 9-dBA increase is considered significantly noticeable.

Alternative 1

New construction is expected to be typical of other pipeline projects in terms of schedule, equipment used, and types of activities. Construction activities would increase sound levels in the vicinity and the sound levels would vary during the construction period. Pipeline construction generally would proceed at rates ranging from several hundred feet to 1 mile per day. However, due to the assembly-line method of construction, activities in any one area could last from several weeks to several months on an intermittent basis.

Nighttime noise levels would normally be unaffected because most pipeline construction would take place during daylight hours. A possible exception would be at HDD sites. At HDD locations, drilling equipment may operate on a 24-hour-per-day, 7-day-per-week basis.

Noise associated with construction at a compressor station would be concentrated in the vicinity of the station. Construction equipment would be operated on an as-needed basis during those periods and would be maintained to manufacturers' specifications to minimize noise impacts.

Principal noise sources would include the air inlet, exhaust, and casing of the turbines. Secondary noise sources would include yard piping and valves. Noise from the relief valves, blow-down stacks, and electrical generation equipment would be infrequent. Noise control measures could be applied to motors and associated compressors, and appropriate building materials used to enclose turbines and engines. Mufflers could be installed for turbine exhaust systems or engine exhaust systems, and silencers could be installed for the engine or turbine air intake system. Acoustical insulation for aboveground piping may be installed if necessary to meet the applicable sound criteria. An air ventilation system for electric motors designed and specified to meet stringent noise requirements may be installed. Compressor stations would emit noise for the life of the station.

As projects are undertaken, and depending upon the nature of the activity (e.g., heavy equipment operation, blasting, drilling), local noise ordinances, state noise regulations, or federal level permits or review by FERC may be required, and therefore impacts to noise sensitive areas would be minimized to the extent possible. For example, under the NGA, FERC regulations (18 CFR 380.12) require that a noise resource report be developed involving compressor facilities at new or existing compressor stations and for all new liquid natural gas facilities. FERC also evaluates noise levels due to certain construction activities such as HDD. Potential impacts on noise sensitive areas would be considered on a project-by-project basis.

Alternative 2

Under Alternative 2, impacts resulting from noise would be the same as for Alternative 1.

Alternative 3

Impacts of Alternative 3 would be the same as Alternative 1 and 2.

4.5 Short-term Uses versus Long-Term Productivity

The National Environmental Policy Act (NEPA) states in Section 102 [42 United States Code (U.S.C.) 4332] that all agencies of the Federal Government shall:

> (C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on --
>
> (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity. Again, for the purposes of this EIS, short term is defined as three years or less; long term more than three years.

NiSource Covered Activities, including mitigation, could result in short-term and long-term impacts to physical, biological, and social resources in the Covered Land. The EIS evaluates these potential impacts (see above) to surface water, ground water, climate, air quality, vegetation, wetlands, wildlife and fish, threatened, endangered, candidate, and proposed species, socioeconomics and environmental justice, transportation and utilities, cultural resources, recreation, and noise and visual resources.

Over the life of the ITP, the estimated annual average disturbance anticipated from NiSource operations and maintenance activities and new construction will be approximately 19,000 acres. NiSource estimates that approximately 18,000 of these impacted acres would be within previously disturbed land (e.g., existing ROW) and that approximately 900 acres per year would be associated with new construction, equating to approximately 0.2 percent of the Covered Land footprint (see Appendix A in the MSHCP). There will be resources such as earth, fossil fuels, and labor allocated for these activities. Vegetation will be impacted in ROWs and workspaces, and habitats in those areas will be altered. Vegetation loss would be short term in some areas and long term in others, depending on the area and type of vegetative cover (i.e., grasses, shrubs, trees).

During new construction, short-term use of the labor force could result in long-term productivity of the economic environment, including employment, personal income, and tax revenue. Short-term employment would be related to construction activities. Long-term employment would be related to the operation and maintenance of ROWs, access roads, and storage fields.

Under Alternatives 2 and 3, there would be mitigation in the form of land acquisition, habitat restoration, and habitat management for impacts associated with the taking of listed species. In this context, mitigation would be required to "off-set" those impacts of take. In most cases, the "off-set" would occur over both short and long periods of time (i.e., the time it would take to restore habitat, or enhance the productivity (e.g., growth rate) of a species). Land acquisition and habitat management associated with mitigation would occur over long periods of time as well (i.e., 50 years), or in some cases, perpetuity.

4.6 Irreversible and Irretrievable Commitments of Resources

NEPA analysis also requires that an EIS include identification of ". . . any irreversible and irretrievable commitments of resources which would be involved in the Proposed Action should it be implemented."

Irreversible resource commitments are related to the use of nonrenewable resources, such as energy, minerals, and soils, and the effects that the uses of these resources would have on future generations. Such uses are considered irreversible because their implementation would affect a resource that has deteriorated to the point where renewal can occur only over long periods of time, or at great expense, or because they would cause the resource to be destroyed or removed. Irretrievable resource commitments mean loss of production or use of a resource. Irretrievable refers to the permanent loss of a resource, such as extinction of a species, destruction of a cultural site, or loss of soil productivity.

Under all alternatives, most resource commitments are neither irreversible nor irretrievable. Potential impacts to species are both short-term and long-term. In cases where a NiSource covered activity impacts habitat for a take or MSHCP species, NiSource will mitigate for those impacts, in some cases two or three times the amount of habitat that was impacted over time. Also, potential impacts will be reduced through appropriate measures (e.g., ECS, BMPs, and AMMs). Those resources that may have a possible irreversible or irretrievable commitment include individual plants, animals, and habitat patches. Land acquired for mitigation could remain within the conservation estate in perpetuity.

Under the NHPA, cultural resources eligible for listing in the NRHP would be protected from development (see Section 2.1.1). However, development of land could result in the irretrievable loss of unidentified cultural resources.

Funding and personnel commitments by the Service under Alternatives 1-3 for compliance with Section 7 of the ESA, MSHCP implementation, and MSHCP monitoring would be unavailable for other programs. The most substantial commitment of irretrievable resources would be in the form of employable labor associated with ESA compliance under Alternative 1, where Service personnel enter into informal and formal Section 7 consultations with other federal agencies and NiSource (see Section 1.5.2).

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Chapter 5 Cumulative Impacts

5.1 Introduction

The combined, incremental effects of human activity, commonly referred to as cumulative impacts, pose a serious threat to the environment. Cumulative impacts are defined in 40 CFR 1508.7 to mean "the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions regardless of what agency (federal or non-federal) or person undertakes such other actions." Cumulative impacts result when the effects of an action are added to or interact with other effects in a particular place and within a particular time. Cumulative impacts within the context of the NEPA arise when a relationship exists between a proposed action and other actions that have occurred or are expected to occur in a similar location or period of time. It is the combination of these effects, and any resulting environmental degradation, that is the focus of cumulative impact analysis.

As stated earlier, the proposed federal action in this EIS is the Service's issuance of an ESA Section 10(a)(1)(B) incidental take permit (ITP) to NiSource for the purpose of authorizing "take" of federally listed species protected by the ESA, within the context of a conservation plan. The scope of the cumulative impact analysis therefore focuses mainly on impacts to federally listed species, and the habitat resources that support them. The geographic scope of the analysis corresponds with the NiSource Covered Lands, and the resources contained within, as described in Chapter 3. The temporal range, or how far into the past and future the analysis looked, was based on whether the effects would be temporary, short-term, long-term, or permanent. The impact analysis is organized within the three resource categories covered in Chapters 3 and 4, namely physical resources, biological resources, and social and economic resources.

5.2 Past, Present and Reasonably Foreseeable Activities within the Covered Land

The NiSource Covered Land is diverse spatially and includes a variety of topographic, geologic, ecological, and unique land-use features (see Chapter 3 of this EIS). Portions of the proposed

Covered Land have undergone extensive development, while other portions are primarily agricultural and natural lands, which have experienced little development. Past and present activities within the Covered Land that have impacted physical, biological, and socioeconomic resources included natural gas production, storage, and transmission (i.e., NiSource Activities); agriculture development; wind energy development; commercial timber production; urban development; and transportation Infrastructure. Collectively, these activities have had profound impacts to the Covered Land landscape, the most notable being the loss and/or conversion of native landscapes to intensive agricultural production lands, urban and rural development, and transportation infrastructure. The result is a variety of past and present actions within the Covered Land that has shaped its condition today, as described in Section 3.3.1 of this EIS.

Due to the large geographic scope of the Covered Land, a quantifiable, project-specific evaluation of past, present and reasonably foreseeable activities is not feasible or practical. However, reasonably foreseeable activities can be anticipated based on history, current land use patterns, and other factors. We assume that innumerable activities are reasonably certain to occur within the Covered Land, including the following discussed below.

5.2.1 NiSource Activities

Natural gas distribution and storage activities within the Covered Land dates back eighty years, predating NEPA and numerous other environmental laws and regulations. The Covered Land includes NiSource's existing 15,000+ mile natural gas distribution and storage system operating within existing ROWs and other NiSource controlled land (i.e. storage fields) across 14 east-central states. The pipeline system includes approximately 15,562 miles of buried steel pipe ranging in diameter from 2 to 36 inches, 117 compressor stations with approximately 1.1 million in combined horsepower, and 6,236 measuring and regulating stations. NiSource also operates and maintains underground natural gas storage fields in conjunction with its pipeline system. Currently, NiSource operates 36 storage fields comprised of approximately 3,600 individual storage wells in Maryland, West Virginia, Ohio, Pennsylvania, and New York. Chapter 2 of the NiSource MSHCP describes the NiSource Covered Land and Covered Activities in detail.

Of late, NiSource has had three pipeline and storage field projects constructed under the authority of the FERC. These include:

Millennium Project – FERC Docket CP98-150-06

According to FERC Docket CP98-150-06 some of the key features of the Millennium project include the following:

- Construct and operate approximately 181.7 miles of 30-inch diameter pipeline from the Corning compressor station to the Ramapo station where the pipeline will connect with Algonquin;
- Replace approximately 1,278 feet of 10-inch diameter pipeline on Columbia's existing Line A with 24-inch diameter line in Orange County, New York;
- Operate 23 metering and regulating stations;
- Construct and operate a 15,002-horsepower compressor station and measuring and regulating facilities at a site adjacent to Columbia's existing Corning compressor station on property owned by Columbia;
- Construct the Wagoner measurement and regulation station in Deer Park, New York
- Install upgrades to the Ramapo station; and
- Modify the existing measurement and regulation stations at Tuxedo, Sloatsburg, and Ramapo to accommodate the replacement 30-inch line.

Hardy Storage - FERC Docket CP05-144

According to FERC Docket CP05-144, Hardy Storage, a subsidiary of NiSource, proposed to convert two partially depleted gas production fields that are connected to Columbia facilities to a storage field located in Hampshire and Hardy Counties, West Virginia. Hardy Storage's storage field proposal consisted of two pools: the Lost River pool, which begins a few miles from Columbia's Lost River Compressor Station and originally contained 11 inactive production wells; and the Inkerman pool, which began approximately 19.6 miles north of Lost River Compressor Station extending into Hampshire County and originally contained 4 inactive production wells.

Hardy Storage proposed to connect both pools by new storage pipelines to a new Hardy Storage Compressor Station, and from there, connected by a new storage pipeline to Columbia's Lost River Compressor Station. In all, the proposal stated that Hardy Storage would construct or recondition a total of 29 storage wells, construct 36.7 miles of pipeline, 7,100 horsepower of compression, and associated appurtenances, as well as install 26 new 4-inch, 6-inch, and 8-inch pipelines for reconditioned production wells and new storage wells. Hardy also proposed to install ground beds, repeater towers, access roads and a methanol injection system.

Ohio Storage – FERC Docket CP08-431

According to the EA completed by FERC for this project, the Ohio Storage Expansion Project proposed to provide an additional 103,400 dekatherms per day of storage deliverability for service in the eastern United States and to increase storage capacity at these fields by 6.7 billion cubic feet (Bcf) of natural gas. Specifically the project would add 3.0 Bcf within the Crawford Storage Field (Fairfield and Hocking Counties, Ohio) and 3.7 Bcf within the Weaver Storage Field (Ashland and Holmes Counties, Ohio). The project would not result in an expansion of the certificated storage field boundaries or increase the maximum operating pressure within the respective storage fields. Basic project components are described below:

- **Crawford Storage Field Pipelines** - Columbia would construct a total of about 13.4 miles of interconnecting pipeline at 42 locations within the Crawford Storage Field including approximately 1.2 miles of abandonment by replacement of existing pipeline, ranging in size from 4- to 8-inches in diameter. In addition, approximately 0.2 mile of existing pipeline would be abandoned-in-place as a result of project activities.

- **Crawford Storage Field Wells** - Columbia would construct new storage wells, as well as upgrades and conversions of existing wells, within the existing storage field boundary. Namely, Columbia would install 19 new storage wells in previously undisturbed sites located within the limits of the existing storage field; these wells would require new permanent rights-of-way and access roads; convert 11 existing counter storage wells to injection/withdrawal uses; convert 10 existing observation wells to counter storage or injection/withdrawal wells; convert

two injection/withdrawal wells to counter-storage wells; and purchase and convert the four Rose Run wells to storage wells.

- **Crawford Compressor Station** - Columbia would make minor modifications to the existing Crawford Compressor Station within the limits of the existing station yard in the Crawford Storage Field.

- **Weaver Storage Field Wells** - The Weaver Storage Field in Ohio currently consists of more than 150 wells. Columbia would recondition 21 of these wells, 12 of which are located within the boundary of Mohican Memorial State Forest.

- **Weaver Storage Field Pipelines** - Columbia would install approximately 4.15 miles of new 6-inch-diameter high-density polyethylene (HDPE) plastic natural gas pipeline in a new permanent right-of way; abandon and remove a total of 1.7 miles of 2-inch-diameter plastic pipeline at two locations, and replace these segments with a new 6-inch-diameter HDPE plastic pipeline (installed within the existing permanent right-of-way) install one meter station; install one regulation station; and install one mainline valve setting.

As discussed in Chapter 4, over the next 50 years NiSource anticipates 964 acres of new disturbance (i.e., new construction) and 18,505 acres of disturbance on previously disturbed ROW (most of which is vegetation maintenance) on an annual basis. This equates to a total annual disturbance of approximately 0.2% of the total Covered Land area (0.19% within the existing ROW and 0.0092% in areas outside existing ROWs). NiSource estimates that 95% of their future projects will occur within existing ROWs (typically 50 feet wide with the buried pipe(s) generally in the center) and will result in little ground disturbance. NiSource anticipates that the majority of their near-term projects will occur in the states of West Virginia and Ohio.

Cumulative impacts to resources could occur from NiSource construction activities occurring outside of existing ROWs. Impacts and stressors include land clearing, habitat alteration and disturbance, introduction of nonnative invasive species, human disturbance, application of potentially toxic chemicals, degradation of waterways.

5.2.2 Agriculture Development

Beginning with European settlement thousands of acres of land were converted from native forests and open landscapes to agriculture and pasture. In recent years, as rural development has expanded, agricultural land has been subdivided for commercial and residential development, reducing the amount of agricultural use.

Cultivated crops and pasture/hay land presently comprise 1,722,685 acres and 1,321,169 acres respectively within the NiSource Covered Land (Table 3.4-8). Cultivated crops include corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20 percent of total vegetation. This class also includes all land being actively tilled. Pasture and hay land includes grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle.

Agriculture has the potential to impact a wide range of physical, biological, and social and economic resources, including water quality, soil retention and productivity, carbon sequestration, biodiversity conservation, employment, and recreation. Impacts and stressors include conversion to nonnative land cover types, habitat alteration and disturbance, human disturbance, introduction of nonnative invasive species, application of potentially toxic chemicals, and degradation of waterways.

5.2.3 Wind Energy Development

The Department of Energy has reported that wind power is expected to provide 20% of the nation's electricity by 2030. Wind power in the US has expanded quickly over the last decade. Construction of new wind power generation capacity in the first three quarters of 2012 totaled 4,728 Mws, bringing the total installed capacity to 51,630 Mws (American Wind Energy Associated, October 2012).

Activities associated with wind energy development include access road construction; site development (i.e., tree, shrub, herbaceous clearing); pad construction; excavation of foundation footings for structures; pouring concrete foundations for wind generator towers, placement of

meteorological towers, transformer pads, and substations; trenching for underground utilities and placement of subsurface electrical and communication cables; placement of electrical poles and cables for overhead transmission; substation construction; tower assembly, erection, and equipment installation; electrical connection to tower; access road grading, and vegetation management.

According to the Federal Aviation Administration, approximately 371 wind turbines have either been constructed or are proposed within the NiSource Covered Land (**Table 5.1-1**). Cumulative impacts to wildlife from operating wind turbines include mortality to birds and bats. In addition to turbines, it is reasonable to assume that there would also be upgrades and extensions to the existing electrical power transmission grid to support wind energy development in the vicinity of the Covered Land. The magnitude of impacts from the upgrades and extensions would be dependent upon the extent of new lines required to meet the needs of new and existing wind farms. Impacts and stressors include land clearing, habitat alteration and disturbance, physical disturbance from human activity, and presence of turbines (impacts, collisions). Cumulative impacts from future construction and operation of transmission lines originating from wind farms could include disruption to land uses and vegetation, and avian wildlife mortality.

Table 5.1-1 – Wind Energy Development in the NiSource Covered Land

County-State	Status	Turbines	County	State
Lake-Indiana	Proposed	5	Lake	Indiana
Allegany-Maryland	Proposed	54	Allegany	Maryland
Garrett-Maryland	Proposed	8	Garrett	Maryland
Garrett-Maryland	Built	2	Garrett	Maryland
Crawford-Ohio	Proposed	18	Crawford	Ohio
Erie-Ohio	Proposed	2	Erie	Ohio
Hancock-Ohio	Proposed	9	Hancock	Ohio
Hardin-Ohio	Proposed	41	Hardin	Ohio
Huron-Ohio	Proposed	4	Huron	Ohio
Lorain-Ohio	Proposed	2	Lorain	Ohio
Medina-Ohio	Proposed	1	Medina	Ohio
Morrow-Ohio	Proposed	1	Morrow	Ohio
Ottawa-Ohio	Proposed	3	Ottawa	Ohio
Richland-Ohio	Proposed	55	Richland	Ohio
Sandusky-Ohio	Proposed	1	Sandusky	Ohio
Seneca-Ohio	Proposed	9	Seneca	Ohio
Wood-Ohio	Proposed	5	Wood	Ohio
Bedford-Pennsylvania	Proposed	26	Bedford	Pennsylvania
McKean-Pennsylvania	Proposed	2	McKean	Pennsylvania
Somerset-Pennsylvania	Proposed	9	Somerset	Pennsylvania
Somerset-Pennsylvania	Built	1	Somerset	Pennsylvania
Shenandoah-Virginia	Proposed	9	Shenandoah	Virginia
Hardy-West Virginia	Proposed	6	Hardy	West Virginia
Mineral-West Virginia	Built	3	Mineral	West Virginia
Preston-West Virginia	Proposed	91	Preston	West Virginia
Preston-West Virginia	Built	4	Preston	West Virginia
Subtotal	**Built**	**10**		
Subtotal	**Proposed**	**361**		
Total	**Built/Proposed**	**371**		

5.2.4 Commercial Timber Production

The U.S. Forest Service defines a forested area as "forest land" if it is at least 1 acre in size and *at least 10 percent occupied by forest trees of any size or formerly having had such tree cover and not currently developed for non-forest use.* Forest land includes transition zones,

such as areas between heavily forested and non-forested lands that are at least 10 percent stocked with forest trees, and forest areas adjacent to urban and built-up lands. Timberland on the other hand is defined as forest land used for the production of commercial wood products. Roughly seventy percent of U.S. timberland is located in the eastern portion of the U.S.

Over the years, large areas of native forest were converted into timber stands managed for timber production. Today, forest land within the Covered land includes deciduous forest, evergreen forest, and mixed forest that comprise 4,799,870 acres, 215,417 acres, and 124,263 acres respectively. What amount of that total is actually used for commercial timber production is unknown.

Impacts and stressors include land clearing, habitat alteration and disturbance, introduction of nonnative invasive species, and human disturbance. The cumulative effects of commercial timber production in the Covered Land region have been a change in the age structure of the forest and a gradual shift towards greater dominance by monoculture stands.

5.2.5 Rural and Urban Development

Rural and urban development refers to high, medium and low intensity development where people reside or work in high, medium and/or low numbers. High intensity development includes apartment complexes, row houses and commercial/industrial facilities, where impervious surfaces account for 80 - 100 percent of the total cover. Medium intensity development includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50 - 79 percent of the total cover. These areas most commonly include single-family housing units. Low intensity development includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20 - 49 percent of total cover. These areas most commonly include single-family housing units.

Within the Covered Land, high intensity development accounts for 28,907 acres; medium intensity development 79,184 acres; and low intensity development 244,524 acres. Impacts and stressors include conversion to nonnative land cover types, habitat alteration and disturbance, human disturbance, introduction of nonnative invasive species, application of potentially toxic chemicals, and degradation of waterways.

Transportation Infrastructure

Transportation infrastructure within the Covered Land includes vehicular, rail and air travel networks comprising roads, highways, railroads, and airports. There are innumerous federal, state, county, and local roadways crossed by the NiSource Covered Lands area (see page Chapter 3 page 159). There are approximately 1,677-miles of railroad and 53 unique railroad lines crossed within all states in the Covered Land area except North Carolina. The majority of lines have less than five-miles within the Covered Land area. CSX Transportation Incorporated and Norfolk Southern Railway Company are the two primary lines within the Covered Land, making up just over 73-percent of the total. There are five airports within the Covered Land and 15 within a three mile radius. Impacts and stressors include land clearing, habitat alteration and disturbance, potential introduction of nonnative invasive species, and human disturbance.

5.3 Cumulative Impacts to Physical Resources

5.3.1 Overview

Under all alternatives, the Applicant will continue to operate and maintain existing distribution and storage facilities within the Covered Land. Implementation of the MSHCP could be beneficial to some physical resources because many species conservation measures, which were developed to avoid and minimize adverse impacts to species, were designed to address the physical resource itself (e.g., water quality). Some species mitigation measures, such as protection and management of habitat, would serve to enhance the condition of the physical resources in those areas.

NiSource's Covered Activities are not expected to significantly contribute to loss or degradation of physical resources, including surface water, groundwater, geology, soils, or air quality, nor are they considered to create a separate, additive cumulative effect to any physical resources beyond that which already exists with the Covered Land. Broadly, cumulative impacts could include impacts on surface waters or groundwater due to inadvertent spills or contamination; impacts on geologic resources due to limiting of access to mineral resources; impacts on soils due to topsoil loss, erosion, and contamination; and impacts on air quality, due to fugitive dust emissions and pollutants. However, impacts would be negligible and, as such implementation of

the proposed MSHCP should not contribute to significant negative cumulative impacts. Below are some general examples of how various physical resource areas could be affected by a range of activity types.

5.3.2 Surface Water

All major watersheds crossed by the Covered Land and their waters have been cumulatively affected by agriculture, urbanization, timber harvest, and many other development activities over the past 150 years. Timber harvest has been a dominant activity in the Covered Land that has cumulatively affected surface water resources through tree removal and clearing activities, and from development and use of access roads. In many urban and agricultural areas, riparian vegetation is now thin or nonexistent, and the state of riparian vegetation in these areas is not expected to increase significantly in the foreseeable future. Agriculture, timber production, road construction, rural development, and urbanization have cumulatively affected water quality by increasing sediment loads to streams through soil disturbance and accidental release of contaminants.

As discussed in Chapter 4, construction-related direct and indirect impacts to surface water resources could occur from future NiSource activities within the Covered Land, especially earth-disturbing activities associated with wetlands, rivers and streams. Future commercial, industrial, and residential development could also impact surface water quality, primarily due to earth-disturbing activities and associated erosion. In general, the more energy-intensive activities that occur in the Covered Land, the more likely for potential surface water impacts, primarily due to erosion from earth-disturbing activities. As a result, there may be direct, indirect, and cumulative effects to surface water resources. However, minimization and mitigation measures have been developed to reduce NiSource's contribution to cumulative effects, whenever feasible.

5.3.3 Ground Water

Cumulative impacts of past, present, and future actions on the quantity and quality of groundwater would be variable and site-specific. Depending upon local groundwater conditions, groundwater resources in some portions of the Covered Land could be impacted from

commercial, industrial, or residential development, namely through the placement of impervious surfaces on the land. Population growth will likely be accompanied by an increase in groundwater consumption related to residential, commercial and/or industrial development, agriculture, and other activities.

Hydraulic fracturing associated with storage well installation, operations, and maintenance has the potential to adversely impact local ground water. Hydraulic fracturing involves high pressure injection of water-based slurry into a well or wells to break up the underlying geologic formation and expand or recondition the storage capacity of a storage well. This technique is used to enhance or recondition existing storage wells. However, typical depths of NiSource's storage field well fracturing is between 2,000-6,000-feet (NiSource 2010c), well under the groundwater supply commonly used for domestic or otherwise potable water supply. As such, there is no anticipated significant cumulative impact to potable ground water quantity or quality as a result of NiSource activities.

5.3.4 Geology

Cumulative impacts of past, present, and future actions to geologic resources, specifically mineral extraction capability, along with topography and seismic characteristics, would be variable and site-specific. Localized impacts to geological resources may occur if future commercial, industrial, or residential development and associated infrastructure limits access to geological resources (e.g., minerals, natural gas, and oil) in regards to limiting their extraction potential. Many potential future projects, especially transportation and utility corridors, and urban development, are not compatible with mining activities due to related noise, visual, and safety impacts, generally making these forms of development and geologic resource extraction activities mutually exclusive, further limiting potential extraction areas that are already constrained from activity in the Covered Land area (due to safety concerns in regards to the pipeline). Impacts to topography and seismic potential from most potential development activities would be highly localized, likely due to grading or foundation activities. Alternately, the topographic and seismic impacts from potential mineral extraction activities would likely be larger in physical scope, temporal length, and overall impact potential; however, due to the spatial scope of the Covered Land area, with the associated variety of mineral resources and

mining activities, a more detailed analysis of these potential impacts is not feasible, and would need to be covered more thoroughly in future project specific NEPA analyses.

NiSource activities may include hydraulic fracturing, a technique commonly used in the natural gas industry for storage well installation, operations, and maintenance. Hydraulic fracturing involves high pressure injection of a water-based slurry into a well or wells to create fractures in the underlying geologic formation of a storage well. Fractures in storage wells typically extend several hundred feet radially from the wellbore. Sand contained within the slurry props the fractures open to improve movement of natural gas through the well. This technique has the potential to impact local geology in the immediate area around the well within specific underground storage zones certificated by FERC.

5.3.5 Soils

Future commercial, industrial, or residential development in the Covered Land area have the potential to result in localized direct loss of topsoil resources via land conversion from agricultural or forest-based land uses to development, as well as from indirect soil loss due to erosion. Soils could also be contaminated with petroleum or chemicals due to spills or releases from construction related efforts associated with development (e.g., industrial, commercial and energy development). Cumulative impacts from these potential projects, along with NiSource's future actions, could occur if periods of construction are coincident, or activities occur in areas with highly erodible soils, leading to short-term increases in soil erosion during construction. Additionally, cumulative impacts could be seen in the form of permanent removal or covering of topsoil during development. Local, state, and federal laws, already in place to control storm water runoff, should minimize potential future erosion and runoff from either NiSource's covered activities or from other potential projects. Additionally, spill control plans would help to minimize the potential for spills or releases to occur and would provide a plan of action to follow in the event contamination does occur. Finally, standard BMPs for erosion control would be utilized for all construction and maintenance activities, limiting the potential for these to result in impacts.

5.3.6 Climate

Cumulative impacts of past, present, and future actions in regards to local and regional climate would be variable and site-specific. Due to a lack of anticipated climatological impacts from the NiSource covered activities, no additional cumulative impact to climate would be anticipated.

On October 8, 1997, the CEQ issued "Draft Guidance Regarding Consideration of Global Climatic Change in Environmental Documents Prepared Pursuant to the National Environmental Policy Act." The CEQ guidance calls on Federal agencies to consider, in the context of the NEPA process, both how major Federal actions could influence the emissions and sinks of greenhouse gases and how climate change could potentially influence such actions. Specifically, Federal agencies must determine whether and to what extent their actions affect greenhouse gases. Furthermore, Federal agencies must determine whether the actions they take, the planning and design of Federal projects, may be affected by any changes in the environment that might be caused by global climatic change. The CEQ concluded that "global climate change is a serious environmental concern which, given the current state of scientific knowledge, must be viewed under NEPA as a "reasonably foreseeable' impact of continued emissions and changes in sinks of greenhouse gases."

Issuance of an incidental take permit to NiSource by itself will not create or affect greenhouse gas emissions or sinks. Under all Alternatives, vehicles and equipment used for construction and maintenance activities would have the potential to emit carbon dioxide (CO2), nitrogen oxides (NOX), methane (CH4), and hydro fluorocarbons (HFCs). In addition, the clearing of rights-of-way vegetation would result in the reduction of greenhouse gas sinks. While these potential impacts are known, there is currently insufficient information to accurately quantify these impacts in a meaningful manner. Issuance of the incidental take permit will not result in an increase or decrease of greenhouse gas emissions.

The construction and maintenance of natural gas storage and distribution infrastructure is a long-term project. Any new construction will likely remain in place for a long period of time. As such, the Covered Activities have the potential to be impacted by the effects of climate change. EPA states that the potential effects of climate change observed to date and projected to occur

in the future, include, but are not limited to more heavy downpours and flooding, increased drought, greater sea-level rise, more intense storms, harm to water resources, harm to agriculture, and harm to wildlife and ecosystems. These predicted weather changes have the potential to increase the number of maintenance activities within the Covered Lands area. However, there is currently insufficient information to determine the specific local or regional effects of climate change, and their impact on the Proposed Action.

Populations within portions of the proposed Covered Land area have increased and will likely continue to grow throughout the 50-year life of the proposed permit. Population growth will likely be accompanied by an increase in fossil fuel consumption and greenhouse gas emissions related to transportation, energy and heat production, commercial and/or industrial production, agriculture, and other activities. Areas of population growth could experience increased land development, which would also decrease the amount of vegetation and natural sinks within the proposed Covered Land area.

5.3.7 Air Quality

Potential cumulative impacts of past, present, and future actions to air quality throughout the Covered Land area and surrounding environs could result due to a potential increase in natural gas development, industrial development, transportation and infrastructure development, as well as urbanization throughout the area. Typical types of impacts could include increases in dust emissions, exhaust emissions, fuel combustion emissions, and chemical/petroleum spills or releases. In general, the contribution of construction activities to degraded air quality would be fairly localized and short in duration. Localized impacts could include a short-term contribution to regional pollutants as well as fugitive dust emissions. Future operation and maintenance activities from natural gas or other industrial development would not likely produce a long term impact on air quality as such activities typically must file for air quality permits and/or be in compliance with local and regional air quality standards. An increase in population and associated transportation networks could result in an overall increase in exhaust emissions compared to what exists today.

5.4 Cumulative Impacts to Biological Resources

5.4.1 Overview

NiSource's Covered Activities are not expected to contribute cumulatively to significant loss of biological resources, including vegetation, wetlands, fish, wildlife and special status species, nor are they considered to create a separate, additive cumulative effect to any biological resources beyond that which already exists with the Covered Land area.

5.4.2 Vegetation

Cumulative impacts of past, present, and future actions on the vegetation and habitats would be variable and site-specific. Depending upon local conditions, vegetation and groundcover in some portions of the Covered Land area could be impacted (e.g., deforestation and destruction of vegetation, fragmentation, contamination due to chemical or petroleum spills or releases, and increases in invasive species) due to future construction activities proposed by NiSource or other entities, as well as due to other types of commercial, industrial, or residential development. In general, the more energy-related or other development pressure that occurs the more likely the potential for vegetation and habitat changes due to land conversion or community impacts.

As stated in Chapter 4, pipeline and storage field facilities within the Covered Land comprise approximately 15,562 miles of linear facilities, including twelve counties where potential storage fields most likely to be considered for expansions are found. The NiSource Covered Land footprint equates to approximately 9,783,207 acres. In Appendix A of the MSHCP, NiSource provides annual acreage disturbance projections (see MSHCP Appendix A). Of the total anticipated disturbance within the Covered Land area, approximately 95 percent of the disturbance would occur on existing previously disturbed ROWs in the form of vegetation maintenance. The remaining 5 percent represents new disturbance from operations and maintenance activities or new construction projects. Over a 50-year period this acreage impact would be approximately 42,200 acres within the Covered Land area (844 acres annually). This would be additive to impacts from other activities within the Covered Lands.

5.4.3 Wetlands

Past activities within the Covered Land has resulted in wetland loss and degradation. However, in some cases, the impacted wetlands have transitioned back to pre-disturbance conditions. Recovery time for herbaceous or scrub-shrub vegetation in wetlands is typically 2 to 5 years. For forested wetlands, recovery can take from 20 to 50 years or more to accommodate tree species height potential. Depending on the wetland type, past effects on wetlands within the Covered Land may still be evident. Cumulative impacts of future activities on wetland habitats would be variable and site-specific. Depending upon local conditions, wetland resources in some portions of the Covered Land area could be impacted (e.g., dredge and fill, degradation, contamination due to spills or releases) due to future construction activities proposed by NiSource or other entities, as well as due to other types of commercial, industrial, or residential development. In general, the more energy-related or other development pressure that occurs the more likely the potential for wetland degradation due to land conversion or inadvertent contamination. However state and federal laws (e.g., Section 404/401 Certification) already in place to protect wetlands would minimize or mitigate most potential impacts.

5.4.4 Wildlife and Fish

Cumulative impacts on wildlife and fish of past, present, and future actions due to future construction activities proposed by NiSource or other entities, as well as due to other types of commercial, industrial, or residential development would be variable and site-specific. For example, adverse impacts within portions of the Covered Land might include direct injury or mortality, impacts due to contamination, habitat fragmentation, interference with migration or other behavioral traits, increase in water temperature, or degradation of water quality.

Past and present actions within the Covered Land have caused the cumulative loss and degradation of wildlife habitat that supported a diversity of species. Clearing and converting land for agricultural use, urban development, utility infrastructure, roads, and other uses by past and present actions have led to cumulatively increased wildlife disturbance from human activity, increased habitat fragmentation, increased wildlife mortality from roads, and the spread of non-native vegetation that reduces habitat diversity. Timber production activities have converted

large tracts of old-growth forest to managed forest land, which has also resulted in disturbance from human activity, habitat loss and fragmentation, and reduced habitat diversity.

Reasonably foreseeable development activities in previously undeveloped areas would incrementally add to cumulative wildlife impacts, both through reduction of potential habitat, and disturbance and mortality of wildlife species in and around the sites of these actions. For instance, evidence shows that certain species of bats are particularly susceptible to mortality from operating wind turbines. Of the 45 species of bats found in North America, 11 have been observed dead at wind energy facilities. Of these, nearly 75% were eastern red bats (*Lasiurus borealis*), hoary bats (*Lasiurus cinereus*), and silver-haired bats (*Lasionycteris noctivagans*). Other bat species documented killed by wind turbines in the US and of special concern to the Service include the little brown bat (*Myotis lucifugus*) and northern long-eared bat (*Myotis septentrionalis*).

NiSource Covered Activities would contribute to cumulative wildlife impacts through the loss of wildlife habitat where project facilities such as ROWs, access roads, and substations would be located, and disturbance to wildlife during maintenance and construction projects. All action alternatives would contribute incrementally to the impacts that past, present, and reasonably foreseeable future timber production, urbanization, utility infrastructure, roads, and agricultural and other uses have had on wildlife species and habitat.

Past and present actions have also resulted in cumulative impacts to fish. These include agricultural and timber harvest activities, transportation infrastructure, and other human developments, especially in floodplains. These past actions have caused the loss of streamside riparian cover and function, the loss of large woody debris sources, and the addition of sediment into streams.

Reasonably foreseeable future actions that could cumulatively impact fish include actions that would remove shade vegetation in riparian areas along rivers or streams and actions that degrade water quality in rivers or streams from soil erosion. These future actions include forest harvest activities, residential and commercial development (especially in floodplains), and creation or expansion of ROWs for gas transmission and/or power transmission lines. Covered Activities, regardless of the alternative, would remove forested vegetation in riparian areas

along the ROWs and access roads, and these areas would be managed by restricting future vegetation growth. However, projects and practices will also be implemented to mitigate or restore natural stream functions. In particular, riparian area restoration and protection projects by NiSource would likely result in a greater degree of riparian function.

5.4.5 T&E and Candidate Species

Wind resources suitable for energy development occur within the Covered Land, specifically in the Midwest and Northeast regions, which is are also part of the core maternity range of the Indiana bat. As of April 2013, four Indiana bats have been documented killed by wind energy facilities: two in Indiana, one in Ohio, and one in West Virginia.

Cumulative impacts of past, present, and future actions on special status species due to future construction activities proposed by NiSource or other entities, as well as due to other types of commercial, industrial or residential development would be similar to those on other wildlife and fish species as discussed in **Section 5.3.3**. Impacts on special status species would be variable and site-specific. In general, the more development pressure that occurs within the Covered Land, the more likely it is for special status species to be impacted. Through the application of the species-specific and general AMMs (as described in **Section 4.3.4** and **Appendix E**) and mitigation, impacts to MSHCP and take species would be avoided, reduced or compensated for in regards to NiSource activities. Similarly, local, state, and federal wildlife laws such as the ESA would serve to reduce the potential for impacts from other potential projects in the area.

5.5 Cumulative Impacts to Social and Economic Resources

5.5.1 Overview

The analysis of social and economic effects contained in Chapter 4 of this EIS largely takes into account past and present actions in the region that have had a cumulative effect on social and economic considerations. Reasonably foreseeable actions that could contribute to cumulative social and economic impacts include those that would generate employment or income, increase demand for housing and public services, population changes, or impacts to property values. Typical examples include commercial and residential construction, major infrastructure projects, and increased timber production activities.

NiSource Covered Activities are not expected to significantly contribute to loss or negative/adverse impacts to social and/or economic resources, including land use, transportation and utilities, cultural resources, recreation, visual resources or noise, nor are they considered to create a separate, additive cumulative effect to any social and/or economic resources beyond that which already exists with the Covered Land area. Potential cumulative impacts due to future construction activities by NiSource or other entities, as well as due to other types of commercial, industrial, or residential development, would vary state-to-state, county-to-county, and city-to-city.

NiSource Covered Activities would not cause significant demands on public services or facilities. During construction, public services such as police, fire, and medical facilities, would be needed only in cases of emergency, which would likely be the case with other construction projects that could potentially coincide with Covered Activities. Covered Activities would not have a noticeable adverse impact on local landfill resources or their ability to handle other current or future waste streams. NiSource Covered Activities would not contribute to cumulative impacts to public services or facilities.

Future urbanization within the Covered Land area, as well as industrial development and associated transportation and infrastructure development, could translate into an increase in population within the general vicinity of that development, along with potential changes to employment, tax revenues, and personal income. No specific environmental justice impacts are anticipated to occur to low income or minority populations due to such cumulative actions.

Employment created by NiSource or other entities would be temporary jobs that would last only through project construction. If construction coincides with construction-related activities from other reasonably foreseeable future actions, such as those described above, this would increase the number and/or duration of temporary jobs, which would increase the cumulative need for temporary construction workers in the area. None of the alternatives would change populations or the need for permanent housing. There likely would be a need for temporary lodging for construction workers not hired from the local area. These impacts would be cumulatively beneficial as they would increase lodging-related revenue and other ancillary

businesses such as restaurants, grocery stores, gas stations, and other businesses necessary to support temporary construction workers.

While beneficial, local construction-related expenditures, employment, and earnings would be small relative to the total amount of economic activity in the Covered Land area, and would, as a result, make a small positive contribution to cumulative impacts on any local economy. Other reasonably foreseeable projects would make similar positive, yet small contributions to local economies. Overall, the cumulative actions combined with the proposed project would have a small beneficial cumulative effect on local economies.

The subsections below outline general examples of how various social and economic resource areas have been and could be affected by activity types.

5.5.2 Land Use and Valuations

Land use within the Covered land has incrementally changed due to cumulative past and present development, and this trend would be expected to continue. Past and present actions have cumulatively established the current land use patterns. Urban development is expanding with population and economic growth, generally occurring on the periphery of already developed areas, and there is no evidence of any shift in trends. Assuming these trends continue, land would continue to be converted from rural to developed uses, and urban uses would continue to be intensified within already developed areas.

Because transmission ROWs have relatively small footprints and, other than associated transmission and storage structures, span other land uses, Covered Activities would not be expected to cumulatively contribute to any changes in existing land use in areas outside of ROWs. Adjacent agricultural areas would still be used for agriculture, timber areas would remain as timber areas, and residential areas would continue to be residential. Covered Activities would, however, cumulatively add to the presence of developed uses and the on-going development of utility-related land use.

Cumulative effects on land values are difficult to estimate and location specific. Some NiSource construction projects could have a detrimental effect on property values, while others could

serve to increase values (e.g., mitigation land managed for wildlife). Further, it is difficult to distinguish and isolate a specific projects effect on land values due to the myriad of other factors that affect property values, such as market conditions, potential buyer preferences, and economic conditions. Nonetheless, NiSource Covered Activities are not expected to have a significant impact on property values, and thus would make only minor contributions to any cumulative effect on property values.

Because Covered Activities would introduce new ROWs and facilities, including ROW easements, those activities could contribute incrementally to potential cumulative land use impacts. However, those impacts would be minor given the relatively small amount of land NiSource would purchase.

5.5.3 Transportation and Utilities

Potential cumulative impacts of past, present, and future actions on transportation and utilities due to future construction activities proposed by NiSource or other entities, as well as due to other types of commercial, industrial, or residential development would vary greatly within the Covered Land area. Increased urbanization of private lands and an increase in commercial and industrial activity could result in associated improvements to, and expansion of, the transportation network and utility networks within and surrounding the Covered Land area. Potential impacts could include increased congestion on existing or future transportation networks, and construction-related interruption of service on existing or future utility networks.

5.5.4 Cultural Resources

Cultural resources have been and are being cumulatively impacted by past and present development and activities. These cumulative impacts include disturbance of cultural sites, reduction of the cultural integrity of certain sites, and removal of cultural artifacts. Past actions that have affected cultural resources include agricultural activities, timber harvest activities, highway and railroad construction, construction of existing gas transmission infrastructure, and commercial, industrial, and residential development. Present and ongoing activities add to these impacts. Continued conversion of native vegetation to agricultural land, timber production land, or development decreases the amount of land Tribes can use for native plant gathering.

During ground disturbing construction activities, there is the potential to affect undiscovered archaeological resources. Compliance with Section 106 of the National Historic Preservation Act would lessen or avoid the potential for impacts on archaeological resources. However, the project may still contribute incrementally to the adverse cumulative impact on cultural resources in the area.

Potential cumulative impacts due to future construction activities proposed by NiSource or other entities, as well as due to other types of commercial, industrial, or residential development would vary across the area. Any future urbanization that occurs, as well as industrial development and associated transportation and infrastructure development could negatively affect culturally significant resources due to inadvertent destruction or degradation. Regardless, compliance with Section 106 and associated state-specific regulations for new construction projects within the Covered Land area will occur on a project-by-project basis for those NiSource covered activities requiring such approvals, as well as for other future construction activities proposed by other entities, limiting the potential for future impacts.

5.5.5 Recreation

Recreational areas within the Covered Land are numerous, along with recreational uses such as hunting, fishing, camping, hiking, biking, and alike, occurring predominately on public land in the area. Reasonably foreseeable actions within the Covered Land could cumulatively increase opportunities for recreation. However, other reasonably foreseeable actions, such as timber harvest, could cumulatively reduce opportunities for recreation or interfere with recreational experiences.

Potential cumulative impacts from future NiSource actions on recreational use and access to recreational land, as well as due to other types of commercial, industrial, or residential development, would vary state-to-state, county-to-county, and city-to-city. Land conversion due to increased urbanization of private lands and an increase in commercial and industrial activity could result in an increase in incompatible land uses which in turn could impact both the quality of certain recreational experiences as well as the availability of lands for recreational use. For instance, NiSource could contribute to cumulative impacts on the recreational experience in

areas where it introduces a developed feature to a natural landscape. Development of new access roads and improvements to existing access roads also may increase access by motorized users to some areas difficult to access or inaccessible to these users, which could also contribute to cumulative impacts on the recreational experience of non-motorized users in these areas. However, the potential for impacts will vary somewhat within the Covered Land depending on the nature and extent of local zoning and restrictions on local, state and federal public lands.

5.5.6 Visual Resources

Potential cumulative impacts of past, present, and future actions on visual resources throughout the Covered Land area and surrounding environs relates primarily to urbanization, as well as industrial development and associated transportation and infrastructure development. Past and present development and land management activities have cumulatively changed the visual landscape and visual features by introducing man-made elements and altering natural forms. These changes include urbanization along rivers and streams, rural residential development, agriculture, timber clearing and harvest, and the development of roads and utility infrastructure. Reasonably foreseeable future actions involving development and resource use would continue this trend.

Reasonably foreseeable residential development likely would further encroach into open spaces that are currently considered to have intrinsic scenic value. As new residents move into the area and greater numbers of sensitive viewers perceive cumulative changes in the landscape, existing and new developments may be received more negatively. Land conversion due to increased urbanization of private lands and an increase in commercial and industrial activity could result in an increase of contrasting surrounding landscapes which in turn could impact or degrade the visual quality in some areas, although visual quality regulations do not necessary apply to all areas within NiSource's Covered Land.

5.5.7 Noise

Cumulative impacts from noise occur when actions occur simultaneously and relatively close to each other. Past and present actions in the Covered Land only have the potential to have a

combined cumulative noise effect if they are continuing to generate or result in noise today. Typical examples of such past and present actions are natural gas development, industrial development, transportation and infrastructure development, as well as urbanization throughout the area. The contribution of future construction activities proposed by NiSource or other entities to these general types of impacts would likely be fairly localized and short in duration. Localized impacts could include a short-term contribution to ambient noise levels due to earthmoving, blasting, as well as general construction activities. Future operation and maintenance activities would not likely produce a long term impact on ambient noise levels.

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Chapter 6 Consultation and Coordination

6.1 Consultation and Coordination Overview

Public participation, agency consultation, and tribal outreach and involvement specific to the NiSource MSHCP EIS are summarized in this chapter. The Service used several media to notify the public and potentially interested parties to provide them with the opportunity to participate in the scoping and public involvement process.

6.1.1 Agency Notification

On May 17, 2007, formal invitations were sent to both the FERC in Washington, DC, and to the USACE in Washington, DC, inviting them to become cooperating agencies as per regulations set forth in 40 CFR 1501.6. On September 17, 2008, formal invitations were sent to NPS and USFS, inviting them to cooperate on the EIS. On September 11, 2009, a Memorandum of Understanding (Appendix G) was finalized, articulating the responsibilities of all five cooperating agencies, NiSource, and AMEC, relative to preparation of this EIS.

6.1.2 Notice of Intent

To solicit participation of responsible federal, state, and local agencies, Tribes, and the public in determining the scope of this EIS, the Service's formal scoping process began on October 11, 2007, with the publication in the FR of a *Notice of Intent to Prepare an Environmental Impact Statement, Announcement of Public Scoping Meetings, and Request for Comments* (FR Vol. 72, No. 196 [October 11, 2007]). The notice provided information about:

- The MSHCP and the EIS;
- Species proposed for inclusion in the NiSource MSHCP; and,
- The website link for specific locations, dates, and times of the 13 public scoping meetings; how comments could be mailed, faxed, or e-mailed to the Service until December 8, 2007; and contact information for two key Service representatives for further information (their names, e-mail addresses, and telephone numbers).

In addition, both the NOI and the public scoping/*Dear Interested Party* letter (see **Section 6.1.4**) sent to over 1,300 known interested parties, contained a paragraph that asked for "federal, state, tribal, and local agencies with jurisdiction and/or special expertise with respect to environmental issues to cooperate with [the Service] in the preparation of the EIS".

Persons needing reasonable accommodations in order to attend and participate in the scoping meetings were asked to contact the Service a minimum of one week in advance of the meeting such that appropriate arrangements could be made.

6.1.3 Local Newspaper Announcements

Both a legal notice and an open house/public scoping meeting notification were published in the following local newspapers one to two weeks prior to the public scoping meetings:

- *Binghamton Press* (Binghamton, NY);
- *Charleston Gazette* (legal notice only); *Charleston Daily Mail* (Open House/Public Scoping Meeting notification) (Charleston, WV);
- *Cleveland Sun* (Cleveland, OH);
- *All Around Cleveland* (Cleveland, OH);
- *The Daily Legal News* (Cleveland, OH);
- *The Plain Dealer* (Cleveland, OH);
- *Cleveland Free Times* (Cleveland, OH);
- *The Clarion-Ledger* (Jackson, MS);
- *The Advertiser* (Lafayette, LA);
- *Lexington Herald-Leader* (Lexington, KY);
- *The Tennessean* (Nashville, TN);
- *The City Paper* (Nashville, TN);
- *Philadelphia Daily News* (Philadelphia, PA);
- *Pittsburgh Tribune-Review* (Pittsburgh, PA);
- *New Pittsburgh Courier* (Pittsburgh, PA);
- *Pittsburgh Post Gazette* (Pittsburgh, PA);
- *Portsmouth Herald* (Portsmouth, NH);

- *Richmond Times-Dispatch* (Richmond, VA);
- *The Hill* (Washington, DC);
- *The Examiner* (Washington, DC);
- *Washington City Paper* (Washington, DC); and
- *Washington Times (Washington, DC).*

6.1.4 Public Scoping/Interested Party Letter

On October 18, 2007, a public scoping/*Dear Interested Party* letter was sent to over 1,300 known interested parties. In addition, the public scoping letter was sent to federally recognized Native American Tribes in Louisiana, Maine, Massachusetts, Mississippi, and New York. The letter provided information on the project and the EIS, and included the dates of the 13 scoping meetings with the times and locations of the meetings provided on a separate enclosed *"Venues for Open Houses"* document. In addition, notification was given that written comments would be received until December 8, 2007, through either U.S. Postal Mail, facsimile or the Service's website.

For those people requiring further information, the names, e-mail addresses, and telephone numbers of two key Service representatives, along with a 1-800 number, were also provided.

6.1.5 Website

To support distribution of the NOI and notice of the public meetings, documents and the meeting information was posted on the Service's Region 3 website at the following link: http://www.fws.gov/midwest/Endangered/permits/hcp/hcp_nisource.html

6.1.6 Draft EIS Public Review

In accordance with NEPA, a draft EIS was circulated for public review and comment. The public review period was initiated with the publication of the Notice of Availability (NOA) in the Federal Register on July 13, 2011, (FR 76, No. 134, 41288-41293) and the public comment period was extended for an additional 90 days (FR 76, No. 199, 63950). The comment period closed on December 13, 2011, culminating a 150-day public comment period.

In August 2011, public meetings were held to facilitate information exchange in Columbus, Ohio; Lexington, Kentucky; and Charleston, West Virginia.

A variety of comments were received on the DEIS which are available at http://www.fws.gov/midwest/endangered/permits/hcp/nisource/index.html. Written responses to public comments are appended to this document.

6.1.7 Final EIS

In June 2013, the Service published an NOA in the Federal Register advising the public of the availability of a Final EIS, MSHCP, and Implementing Agreement (IA) associated with the ITP application received from NiSource, pursuant to the ESA. The notice was provided under Section 10(c) of the ESA (16 U.S.C. 1531, 1539(c)) and its implementing regulations (50 CFR 17.22 and 17.32), and the NEPA (42 U.S.C. 4321 *et seq.*) and its implementing regulations (40 CFR 1506.6; 43 CFR Part 46). The Service's decision on whether to issue NiSource an ITP occurred no sooner than 30-days after publication of the notice in the Federal Register and completion of the Record of Decision. If the Service determined that all requirements were met, an ITP to NiSource would be issued for incidental take of 10 species in accordance with their MSHCP and associated IA.

Chapter 7 List of Preparers

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Chapter 9 Acronyms and Abbreviations

Acronym	Definition
AAR	All-American Road
ACHP	Advisory Council on Historic Preservation
AHPA	Archaeological and Historic Preservation Act
AIRFA	American Indian Religious Freedom Act
AMM	Avoidance and Minimization Measures
ARPA	Archaeological Resources Protection Act
asl	Above Sea Level
BA	Biological Assessment
BCR	Bird Conservation Region
BGEPA	Bald and Golden Eagle Protection Act
BMP	Best Management Practices
BO	Biological Opinion
CAA	Clean Air Act
CEC	Council for Environmental Cooperation
CEQ	Council of Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CP	Conservation Plan
CUP	Coastal Use Permit
CWA	Clean Water Act
CWCS	Comprehensive Wildlife Conservation Strategy
CZM	Coastal Zone Management
dB	Decibels
dBA	A-Weighted Decibel Scale
DOD	Department of Defense
DOW	Defenders of Wildlife
DEIS	Draft Environmental Impact Statement
EAC	Early Action Component
ECS	Environmental Construction Standards
EDF	Environmental Defense Fund
EIS	Environmental Impact Statement
EM&CP	Environmental Management & Construction Plan
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FLPMA	Federal Land Policy and Management Act
FR	Federal Register
GIS	Geographic Information Systems
GSA	General Services Administration
HCP	Habitat Conservation Plan

HDD	Horizontal Directional Drilling
HUC	Hydrologic Unit Code
IA	Implementation Agreement
INGT	Interstate Natural Gas Transmission
IPaC	Information, Planning, and Consultation System
ITP	Incidental Take Permit
Ldn	Day-Night Average Sound Level
MBPP	Migratory Bird Protection Plan
MBTA	Migratory Bird Treaty Act
MM	Modified Mercalli
MMLHS	Mild Mid-Latitude Humid Subtropical
NAAQS	National Ambient Air Quality Standards
NABCI	North American Bird Conservation Initiative
NAGPRA	Native American Graves Protection and Repatriation Act
NBP	National Battlefield Park
NCDC	National Climate Data Center
NCL	NiSource Covered Lands
NEPA	National Environmental Policy Act of 1969
NF	National Forest
NFMA	National Forest Management Act
NFS	National Forest System
NFWF	National Fish and Wildlife Foundation
NGA	Natural Gas Act
NGO	Non-Governmental Organizations
NHL	National Historic Landmark
NHP	National Historic Park
NHPA	National Historic Preservation Act
NHS	National Historic Site
NL	National Lakeshore
NLCD	National Land Cover Database
NMP	National Military Park
NO_2	Nitrogen Dioxide
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NP	National Park
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRA	National Recreation Area
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRI	Natural Resources Inventory
NSB	National Scenic Byway
NSR	National Scenic River
NST	National Scenic Trail

NWI	National Wetlands Inventory
NWR	National Wildlife Refuge
O_3	Ozone
O&M	Operation and Maintenance
OPS	Office of Pipeline Safety
Pb	Lead
PEIF	Project Environmental Information Form
PGA	Peak Ground Acceleration
PHMSA	Pipeline and Hazardous Materials Safety Administration
PIF	Partners in Flight
PM_{10}	Particulate Matter with an Aerodynamic Size Less Than or Equal to 10 Microns
$PM_{2.5}$	Particulate Matter with an Aerodynamic Size Less Than or Equal to 2.5 Microns
PSA	Natural Gas Pipeline Safety Act
ROD	Record of Decision
ROW	Right-of-Way
SEQRA	State Environmental Quality Review Act
SF	State Forest
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Office
SLOPES	Standard Local Operating Procedures for Endangered Species
SMLHC	Severe Mid-Latitude Humid Continental
SO_2	Sulfur Dioxide
SP	State Park
SPCC	Spill Prevention Control and Countermeasures
SRR	Scenic & Recreational River
SSA	Sole Source Aquifer
SWPPP	Storm Water Pollution Prevention Plan
T&E	Threatened and Endangered
TCF	The Conservation Fund
THPO	Tribal Historic Preservation Office
TNC	The Nature Conservancy
TVA	Tennessee Valley Authority
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USDI	U.S. Department of Interior
USDOT	U.S. Department of Transportation
USFS	U.S. Forest Service
USFWS	U.S. Fish & Wildlife Service
USGS	U.S. Geological Survey
WAP	Wildlife Action Plan
WHPA	Wellhead Protection Area
WMA	Wildlife Management Area
WSR	Wild & Scenic Rivers

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