Biological Opinion and Incidental Take Statement for the Fanshell (*Cyprogenia stegaria*) for the Lowell Lock and Dam Water Power Project and the Sheepnose (*Plethobasus cyphyus*) and Fanshell for the Devola Lock and Dam Water Power Project, Muskingum River, Washington County, Ohio

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INTRODUCTION

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion based on our review of the Federal Energy Regulatory Commission's (FERC's) proposed issuance of licenses to Rye Development to construct and operate hydroelectric facilities on the Lowell and Devola Lock and Dams. This Biological Opinion analyzes the effects of the Lowell project on the fanshell (*Cyprogenia stegaria*) and the effects of the Devola project on the sheepnose (*Plethobasus cyphyus*) and fanshell in accordance with section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). FERC's request for formal consultation was received on October 23, 2015.

This BO is based on information provided in the Environmental Assessment (EA) and information provided to the Service by the applicant. A complete administrative record of this consultation is on file at the Service's Columbus Ohio Field Office (COFO).

CONSULTATION HISTORY

FERC determined that the Lowell project is likely to adversely affect the fanshell and the Devola project is likely to adversely affect the sheepnose and fanshell. FERC submitted a request for initiation of formal consultation to the Service on October 23, 2015. In a November 20, 2015 response letter, the Service concurred with FERC's determinations and agreed that the initiation package was complete in accordance with 50 CFR §402.14, and that the timeframe for formal consultation had begun effective October 23, 2015.

April 16, 2010	COFO receives questionnaire for Interested Parties requesting environmental data regarding Muskingum and Scioto River projects
September 29, 2010	Email from Free Flow Power (FFP) notifying COFO of October 20, 2010 Public Outreach Meeting for 9 proposed hydroelectric projects on the Muskingum River
October 1, 2010	FFP phone call with COFO to discuss FFP's 9 proposed Muskingum River projects
October 20, 2010	COFO meets with FFP regarding the 9 Muskingum River projects
October 21, 2010	COFO sends letter to FFP providing ESA technical assistance for the 9 proposed Muskingum River projects
November 16, 2010	FFP emails COFO meeting minutes from October 20, 2010 meeting
December 7, 2010	COFO receives Pre-Application Document (PAD) and NOI for the 9 proposed Muskingum River projects from FERC
December 16, 2010	COFO sends letter to FERC regarding the December 7, 2010 Pre-Application Document (PAD) and NOI for the 9 proposed

	Muskingum River projects
January 28, 2011	COFO receives Environmental Review (ER) request from the Department of Interior (DOI) regarding FFP's Notice of Intent to File License Application with FERC for the 9 proposed Muskingum River projects
February 15, 2011	FFP email to COFO announcing Public Scoping meetings
February 18, 2011	FFP email to COFO notifying of change in start time of Scoping Meetings for the Muskingum River projects
February 16, 2011	COFO submits comments to the Service's R3 Regional Office regarding DOI's January 28, 2011 ER request
July 5, 2011	COFO receives email from FFP announcing Planned Studies Document
July 6, 2011	COFO receives email with mussel survey proposal from Ecological Specialists, Inc. (ESI) for the Muskingum River projects
July 11, 2011	COFO provides written approval to ESI to perform the survey for the Muskingum River projects
October 2011	COFO and ESI coordinate via email regarding preliminary results of the Muskingum River mussel survey
April 2012	COFO and ESI coordinate via email regarding preliminary results of the Muskingum River mussel survey
May 2012	COFO receives ESI's final report for the Muskingum River mussel survey
May 15, 2012	COFO received copy of FFP's Draft License Applications for 7 Muskingum River Water Power Projects
August 6, 2012	COFO sends letter to FFP regarding their Draft Application for 7 Muskingum River Water Power Projects.
November 14, 2012	COFO receives ER from DOI regarding the FERC Notice of Tendering of Applications for 7 Muskingum River projects
November 20, 2012	COFO sends letter to FERC regarding November 14, 2013 ER request from DOI
February 5, 2013	FFP emails COFO the Deficiency of License Applications and Request for Additional Information issued by FERC on January 29,

	2013
April 5, 2013	COFO received a letter from HDR Engineering to FFP containing a summary of the Fish Valuation Analysis for the 7 proposed Muskingum River facilities
May 6, 2013	FFP submits draft Biological Assessments (BAs) on the Lowell and Devola projects to COFO for review and comment
May 21, 2013	COFO receives ER request from DOI regarding the FERC Notice of Applications on 7 Muskingum River projects
June 4, 2013	COFO and FFP phone call to discuss draft BAs
June 14, 2013	COFO sends letter to FFP providing comments on draft BAs for Lowell and Devola projects
June 18, 2013	COFO sends letter to FERC regarding May 21, 2013 ER request from DOI
May 8, 2014	COFO and FFP phone call to discuss draft BAs
November 4, 2014	Rye Development (successor entity to FFP) submits information to COFO in response to COFO's June 14, 2013 comments on the draft BAs
January 6, 2015	Rye Development emails COFO providing notification that FERC intends to have the Environmental Assessment (EA) for 6 proposed Muskingum River project serve as their BA for section 7 consultation
August 27, 2015	FERC issues EA for 6 Muskingum River projects
August 31, 2015	COFO receives FERC request for section 7 consultation for 6 Muskingum River projects
September 17, 2015	COFO e-files comments on EA and response to FERC request for consultation for 6 Muskingum River projects
October 23, 2015	COFO receives FERC letter in response to COFO's September 17, 2015 comments submitted on the EA to FERC
October 30, 2015	COFO e-files a request with FERC for a teleconference to discuss FERC's October 2015 letter
November 19, 2015	Teleconference between COFO, FERC, and the applicants to discuss consultation for 6 Muskingum River projects

November 20, 2015	COFO e-files a letter to FERC acknowledging receipt of complete initiation package for the Lowell and Devola projects. Formal consultation initiated October 23, 2015
January 12, 2016	COFO email to applicant requesting additional information on project footprints
January 13, 2016	Applicant emails COFO additional information on Devola project footprint
January 15, 2016	Applicant emails COFO additional information on Lowell project footprint
January 27, 2016	Meeting at COFO between COFO, applicant, and Ohio Division of Wildlife to discuss mussel salvage and monitoring plans for 6 Muskingum River projects
February 12, 2016	COFO efiles draft BO and requests FERC review
February 25, 2016	COFO receives comments on draft BO from Rye Development
March 1, 2016	COFO received comments on draft BO from FERC
March 1, 2016	COFO issues final BO to FERC

The Lowell and Devola projects lie within the ranges of the federally listed endangered Indiana bat (*Myotis sodalis*), sheepnose (*Plethobasus cyphyus*), fanshell (*Cyprogenia stegaria*), pink mucket pearly mussel (*Lampsilis abrupta*), and the threatened northern long-eared bat (*Myotis septentronalis*).

The Service received a letter on August 31, 2015 from FERC requesting consultation for the Malta/McConnelsville, Philo, Rokeby, Beverly, Lowell, and Devola Lock and Dam Water Power Projects. In the August request, FERC determined that: 1) all six projects are "not likely to adversely affect" the Indiana bat and northern long-eared bat; 2) the Malta McConnelsville, Philo, Rokeby and Beverly projects will have "no effect" on any federally listed mussel species; 3) the Lowell project is "likely to adversely affect" the fanshell but will have "no effect" on any other federally listed mussel species; and 4) the Devola project is "not likely to adversely affect" the sheepnose and fanshell and will have "no effect" on any other federally listed mussel species. FERC requested our concurrence on these effect determinations.

In a September 17, 2015 letter to FERC, the Service requested the following in order to complete consultation on the six projects: 1) A request for clarification regarding seasonal clearing of "bat habitat trees" with respect to seasonal tree clearing and tree size; 2) A request for initiation of formal consultation for the sheepnose and fanshell as species that are "likely to be adversely affected" by the Beverly project; 3) A request for initiation of formal consultation for the

sheepnose mussel, in addition to the fanshell, as a species that is "likely to be adversely affected" by the Lowell project; and 4) a request for initiation of formal consultation for the sheepnose and fanshell as species that are "likely to be adversely affected" by the Devola project.

FERC responded to the Service's request in a letter received October 23, 2015. FERC provided clarification regarding seasonal clearing of trees and tree size. More specifically, the applicants committed to only clearing trees ≥3 inches diameter at breast height (dbh) between October 1 and March 31. Based on the applicants' commitment to seasonal clearing of all trees ≥3 inches dbh, FERC determined that the six proposed projects are "not likely to adversely affect" the Indiana bat and northern long-eared bat. The Service provided written concurrence with FERC's determination regarding the Indiana bat and northern long-eared bat on November 20, 2015. Therefore, consultation for all six projects with respect to the Indiana bat and northern long-eared bat was concluded on November 20, 2015.

A conference call was held on November 19, 2015 for the Service, FERC, and the applicant to discuss FERC's October 2015 letter to the Service regarding consultation on federally listed species. Based on discussions during the call and FERC's October 2015 letter, the Service understands that FERC maintains it original determination that the Beverly Lock and Dam Water Power Project will have "no effect" on the sheepnose and fanshell and that the Lowell Lock and Dam Water Power Project will have "no effect" on the sheepnose. The Service continues to object to these determinations based on the rational provided in our September 17, 2015 letter. It remains the Service's opinion that these rare federally listed mussels have a likelihood of occurrence in mussel beds documented below the Beverly and Lowell projects because of the species' occurrence downstream, the low probability of detection during standardized surveys, as well as the large size, species diversity and abundance, and mussel density in the mussel beds below these projects. Fish movement upstream can also facilitate establishment of mussel species in new locations by transport of juvenile mussels in glochideal form from downstream locations. Because FERC is not formally consulting on the sheepnose and fanshell for the Beverly project and the sheepnose for the Lowell project, no incidental take will be exempted for these species for the respective projects.

Thus, this Biological Opinion only considers the fanshell for the Lowell project and sheepnose and fanshell for the Devola project.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTIONS

The federal actions evaluated in this Biological Opinion (BO) are FERC's proposed issuance of licenses to the applicant to authorize the construction and operation of the Lowell and Devola Lock and Dam Water Power Projects on the existing Lowell and Devola Lock and Dams on the Muskingum River in Washington County, Ohio (Figure 1). Both projects are being evaluated in one BO due to the similarity of the effects the projects will have on the sheepnose and fanshell.

The Service is issuing this BO pursuant to section 7 of the ESA. Direct and indirect effects of the federal actions (licensing by FERC) and the interrelated or interdependent activities are analyzed to ensure they are not likely to jeopardize the continued existence of federally listed or proposed endangered or threatened species. Indirect effects of a federal action includes, "…effects that are caused by or result from the action, are later in time but are reasonably certain to occur…" Interdependent actions have no independent utility apart from the proposed action, and interrelated action are part of a larger action and depend on the larger action for their justification (50 CFR §402.02).

The applicants would use the Ohio Department of Natural Resources' (DNR's) existing lock and dam features along with the new facilities described below. The minimum and maximum hydraulic capacity of each project's powerhouse would be 750 and 5,500 cubic feet per second (cfs), respectively. At each of the projects, the entire dam crest functions as an uncontrolled spillway that passes all reservoir inflow downstream. As a result, the existing reservoir water surface elevation at each project varies with inflow. The following descriptions of the specific proposed actions are taken from FERC's Environmental Assessment (EA). Additional information can be found in the EA, which is incorporated by reference.

<u>Lowell Lock and Dam Water Power Project</u>
The proposed Lowell project would be located at RM 14.2 on the Muskingum River at the Ohio DNR's existing Lowell Lock and Dam, also known as the Muskingum River Lock and Dam No. 3. The Lowell Lock and Dam consists of an 18-foot-high by 840-foot-long timber crib and concrete dam with a full-length, uncontrolled spillway and a 35-foot-wide by 160-foot-long navigation lock with hand-operated miter gates at both ends. Because the entire dam crest functions as an uncontrolled spillway that passes all reservoir inflow downstream, the reservoir water surface elevation varies with inflow. The median water surface elevation of the reservoir is 608.6 feet NAVD 88.

The proposed project would use existing Lowell Lock and Dam features along with the following new facilities: (1) a 215-foot-long by 165-foot-wide by 23-foot-deep excavated intake channel located immediately upstream of the powerhouse that would be excavated to convey water from the Lowell reservoir into the powerhouse; (2) a 37-foot-long by 80-foot-wide by 52-foot-high intake structure; (3) a 160-foot-long by 75-foot-wide by 66-foot-high concrete powerhouse that would be located slightly downstream of the left side of the dam; (4) a 143.5-foot-long dam abutment located adjacent to the powerhouse; (5) two 2.5-MW horizontal Kaplan

turbine/generator units; (6) a 100-foot-long by 125-foot-wide by 24-foot-deep tailrace channel located immediately downstream of the powerhouse that would be excavated to discharge water from the powerhouse to the Devola reservoir downstream; (7) a 40-foot-long by 40-foot-wide substation located adjacent to the powerhouse on the left river bank; (8) a 135-foot-long, 4.16-kV cable that connects the powerhouse to the substation, and a 1,200-foot-long, 69-kV overhead transmission line that connects the substation to the local utility distribution line; (9) a 150-foot-long access road; (10) an approximately 1,800-square-foot parking lot located adjacent to the north end of the dam; and (11) appurtenant facilities. The minimum and maximum hydraulic capacities of the powerhouse would be 750 and 5,500 cfs, respectively.

The Lowell project will be operated in a run-of-river mode, such that outflow from the project approximates inflow on an instantaneous basis. When the project is operating and inflow is less than the maximum hydraulic capacity, reservoir fluctuations would be minimized by maintaining a reservoir elevation at the crest of the dam or at an elevation sufficient to maintain the proposed minimum spill flows from April through October. During project operation, the applicant is proposing to maintain a 0.5-inch minimum spill flow over the dam during the recreation season (i.e., April through October) to protect aesthetic resources.

To generate power, the project would divert a portion of the water that currently passes uncontrolled over the dam to the proposed turbine/generator units. From November through March, when available flows are less than the minimum hydraulic capacity of the project, the project would cease operating and all inflow would be passed over the dam. From April through October, when available flows are less than the minimum hydraulic capacity of the project and those needed to provide the applicant's proposed minimum spill flows over the dam, the project would cease operating and all inflow would be passed over the dam. Flows exceeding the maximum hydraulic capacity of the project would be passed over the dam. During flood conditions, the applicant proposes to suspend generation when excessive debris conditions exist, or when tailwater levels rise to the point where insufficient head exists for the turbines to operate effectively. Under proposed project operation, the reservoir would have a surface area of 628 acres and a volume of about 4,492 acre-feet at a normal water surface elevation of 607.40 feet NAVD 88. The proposed project would have an estimated average annual generation of 30,996 MWh.

Approximately 204 feet of the existing Lowell Dam would be removed to accommodate the installation and integration of the powerhouse as part of the existing dam structure. The dam abutment would serve as an overflow weir to maintain the existing overflow capacity of Lowell Dam. The proposed project boundary (Figure 2) would fully enclose all permanent project features, including the dam, powerhouse, substation, access road, parking lot, and transmission line, except for the reservoir.

Devola Lock and Dam Water Power Project

The proposed Devola project would be located at RM 5.8 on the Muskingum River at the Ohio DNR's existing Devola Lock and Dam, also known as the Muskingum River Lock and Dam No. 2. The Devola Lock and Dam consists of a 17-foot-high by 587-foot-long timber crib and concrete dam with a full-length, uncontrolled spillway and a 35-foot-wide by 160-foot-long navigation lock with hand-operated miter gates at both ends. Because the entire dam crest functions as an uncontrolled spillway that passes all reservoir inflow downstream, the reservoir

water surface elevation varies with inflow. The median water surface elevation of the reservoir is 594.9 feet NAVD 88.

The proposed project would use existing Devola Lock and Dam features along with the following new facilities: (1) a 165-foot-long by 130-foot-wide by 26-foot-deep excavated intake channel located immediately upstream of the powerhouse that would be excavated to convey water from the upstream Devola reservoir into the powerhouse; (2) a 37-foot-long by 80-foot-wide by 52-foot-high intake structure; (3) a 160-foot-long by 80-foot-wide by 66-foot-high concrete powerhouse that would be located slightly downstream of the right side of the dam; (4) a 154-foot-long dam abutment located adjacent to the powerhouse; (5) two 2.0-MW horizontal Kaplan turbine/generator units; (6) a 125-foot-long by 140-foot-wide by 24-foot-deep tailrace channel located immediately downstream of the powerhouse that would be excavated to discharge water from the powerhouse to the Muskingum River upstream of its confluence with the Ohio River; (7) a 40-foot-long by 40-foot-wide substation located on the left river bank; (8) a 1,000-foot-long, 4.16-kV submerged cable that connects the powerhouse to the substation, and a 3,600-foot-long, 69-kV overhead transmission line that connects the substation to the local utility distribution line; (9) two access roads, each approximately 140 feet long; (10) an approximately 4,500-square-foot parking lot located adjacent to the south end of the dam; and (11) appurtenant facilities. The minimum and maximum hydraulic capacities of the powerhouse would be 750 and 5,500 cfs, respectively.

The Devola project will be operated in a run-of-river mode, such that outflow from the project approximates inflow on an instantaneous basis. When the project is operating and inflow is less than the maximum hydraulic capacity, reservoir fluctuations would be minimized by maintaining a reservoir elevation at the crest of the dam or at an elevation sufficient to maintain the proposed minimum spill flows from April through October. During project operation, the applicant is proposing to maintain a 0.5-inch minimum spill flow over the dam during the recreation season (i.e., April through October) to protect aesthetic resources.

To generate power, the project would divert a portion of the water that currently passes uncontrolled over the dam to the proposed turbine/generator units. From November through March, when available flows are less than the minimum hydraulic capacity of the project, the project would cease operating and all inflow would be passed over the dam. From April through October, when available flows are less than the minimum hydraulic capacity of the project and those needed to provide the applicant's proposed minimum spill flows over the dam, the project would cease operating and all inflow would be passed over the dam. Flows exceeding the maximum hydraulic capacity of the project would be passed over the dam. During flood conditions, the applicant proposes to suspend generation when excessive debris conditions exist, or when tailwater levels rise to the point where insufficient head exists for the turbines to operate effectively. Under proposed project operation, the reservoir would have a surface area of 301 acres and a volume of about 3,024 acre-feet at a normal water surface elevation of 592.91 feet NAVD 88. The proposed project would have an estimated average annual generation of 20,760 MWh.

The proposed project boundary (Figure 3) would fully enclose all permanent project features, including the dam, powerhouse, substation, parking lot, and transmission line, except for the

reservoir.

Figure 1. Proposed locations for the Lowell and Devola Lock and Dam Projects on the Muskingum River (Source: Google Maps, 2015, as modified by COFO).

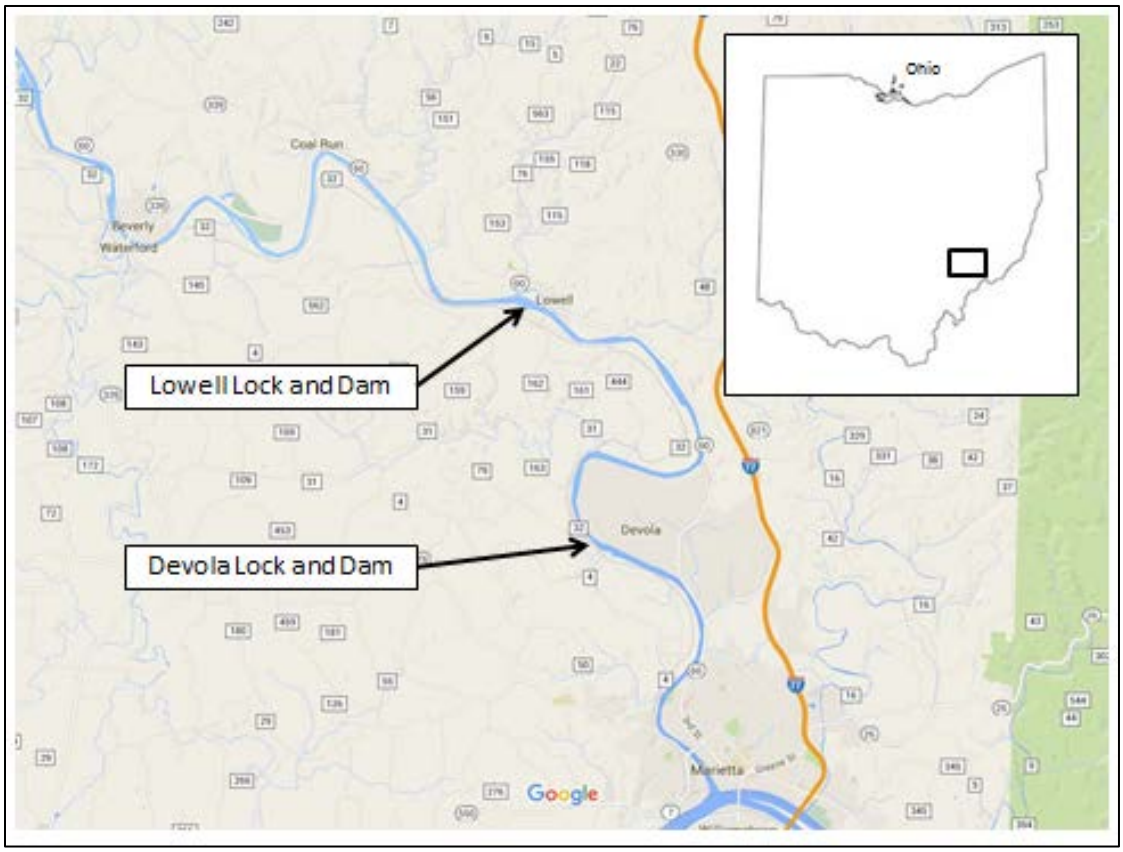


Figure 2. Lowell Lock and Dam Water Power Project (Source: FERC EA)

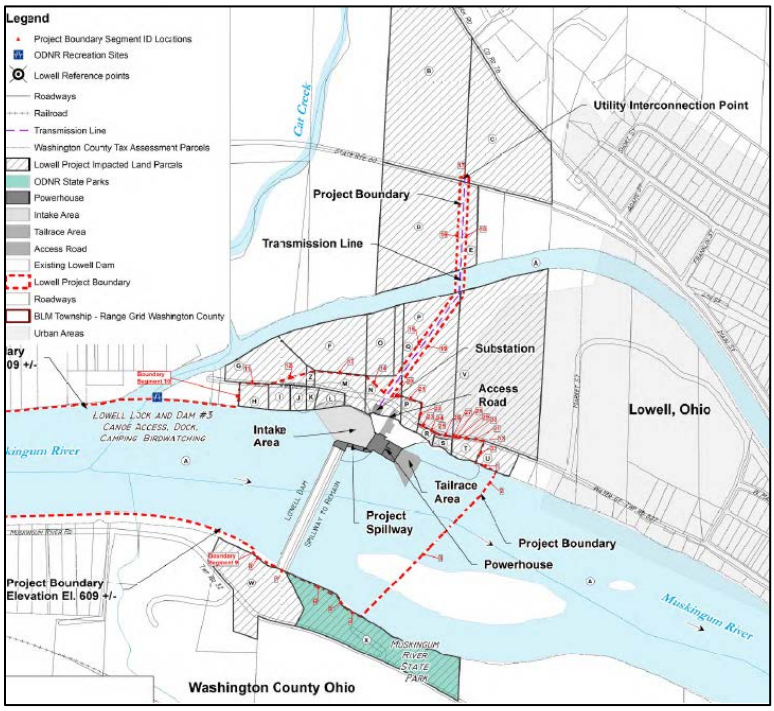
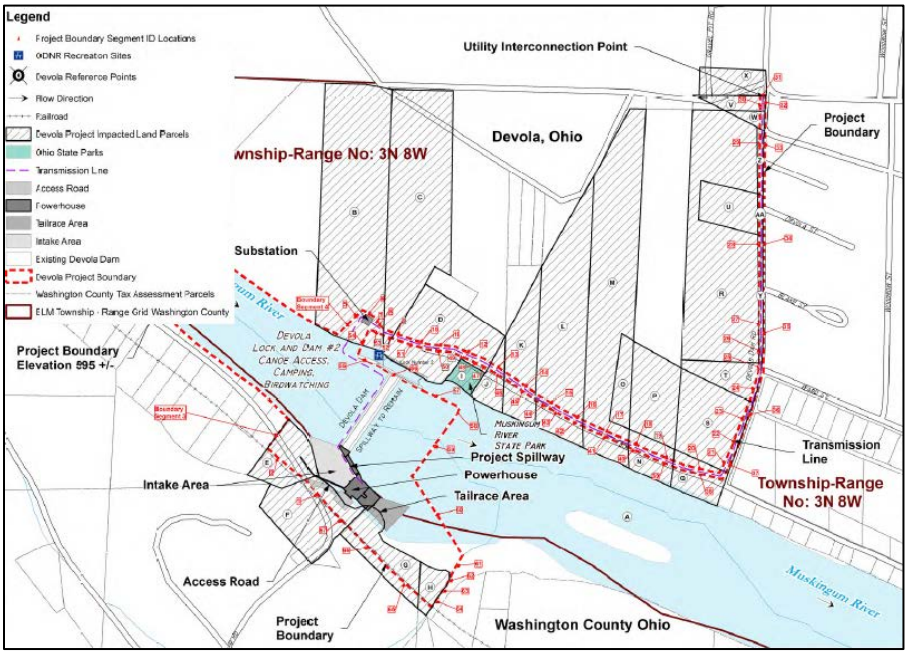


Figure 3. Devola Lock and Dam Water Power Project (Source FERC EA)



Conservation Measures

Conservation measures are those actions taken to benefit or promote the recovery of the species. These actions taken by the federal agency and/or applicant serve to minimize or compensate for project effects on the species under review and are included as an integral portion of the proposed action.

The Service recognizes that, individually and/or cumulatively, these conservation measures could contribute to the avoidance and minimization of adverse effects to the sheepnose and fanshell but that these measures do not necessarily eliminate all adverse effects that may result from the proposed actions. In the EA, FERC staff recommended other conservation measures for mussels be included in the licenses issued to the applicants in addition to the applicant's proposed measures. The applicant's and FERC's proposed conservation measures are as follows:

1. Prepare an erosion and sedimentation control plan that contains provisions to: (1) minimize erosion and sedimentation during project construction; (2) stabilize the banks of the Muskingum River after project construction; (3) perform soil sampling and testing prior to project construction in proposed construction areas to determine the presence of contaminants; (4) properly manage and dispose of contaminated soils during project construction; and (5) conduct water quality monitoring upstream and downstream of each project during (i.e., turbidity) and after (i.e., water temperature, dissolved oxygen, and turbidity) project construction, and implement appropriate mitigation strategies, in consultation with the resource agencies, if necessary

2. Operate the project in a run-of-river mode, such that outflow from the project approximates inflow on an instantaneous basis. When the project is operating and inflow is less than 5,500 cfs (i.e., the maximum hydraulic capacity), minimize reservoir fluctuations by maintaining reservoir elevations at the crest of the dam or at the following project-specific reservoir elevations sufficient to maintain the proposed minimum spill flows from April through October:

Lowell Project: 607.10 feet NAVD 88
Devola Project: 592.91 feet NAVD 88

3. Install riprap and/or vegetation, as necessary, to minimize project operation-related effects on shoreline areas susceptible to erosion.

4. Install trashracks at the powerhouse intake with a 2-inch clear bar spacing and an approach velocity of less than 2.2 fps to minimize the impingement and entrainment of fish.

5. Schedule construction activities to avoid disturbances in water levels and flows during the recreation season and any sensitive fish spawning periods identified by the resource agencies.

6. Relocate mussels from areas that would potentially be affected by project construction

activities.

7. Limit in-water construction work between May 1 and October 31, to the extent possible, to minimize construction-related effects on mussels.

8. Conduct post-construction monitoring of mussel populations (for a period of at least 3 years) in areas where in-water construction has taken place, when limiting in-water construction work between May 1 and October 31 is not possible.

9. Consult with Ohio DNR and the Service regarding appropriate protection and/or mitigation measures for affected mussels, including the federally listed sheepnose and fanshell, to minimize the effects of project construction and operation on mussels.

10. Modify the proposed erosion and sedimentation control plan to include site-specific provisions for monitoring the erosion control measures following project construction to ensure the measures are effective.

11. Prepare a shoreline stabilization and monitoring plan that includes the applicant's proposal to install riprap and/or vegetation to minimize project operation-related effects on shoreline areas susceptible to erosion and additional provisions for: (1) identifying existing areas of active shoreline erosion within the project impoundment; (2) *monitoring project impoundment shorelines for five years after the start of project operation to identify areas of erosion;* and (3) *mitigating areas of project-related shoreline erosion.*

12. Prepare a contaminated sediment testing and disposal plan to specify the procedures, guide implementation, and ensure compliance with the applicant's proposal to perform soil sampling and testing, prior to project construction in proposed construction areas, to determine the presence of contaminants and to minimize the redistribution of contaminated sediments to protect aquatic resources.

13. Prepare a spill prevention, containment, and countermeasures plan that contains site-specific measures for minimizing the potential for hazardous material spills and ensuring that procedures are in place to minimize the extent and adverse effects of any hazardous materials spills that may occur.

14. Prepare an operation compliance monitoring plan that includes a description of the equipment and procedures to be used to maintain and monitor compliance with the operational mode required in any license issued.

15. Prepare a water quality monitoring plan to specify the procedures, guide implementation, and ensure compliance with the applicant's proposals to monitor turbidity during project construction, and dissolved oxygen, water temperature, and turbidity during project operation (for a minimum of two years); and incrementally bypass flows around the project powerhouse via the dam when dissolved oxygen concentrations downstream of the project is below levels

stipulated by current state water quality standards.

16. Prepare a freshwater mussel salvage and relocation plan to specify the procedures, guide implementation, and ensure compliance with the applicant's proposal to collect and relocate mussels located within construction areas to minimize project construction-related effects on freshwater mussels.

17. Prepare a freshwater mussel monitoring and protection plan to specify the procedures, guide implementation, and ensure compliance with the applicant's proposal to conduct post-construction monitoring of freshwater mussel populations (for a period of at least three years) in areas where in-water construction has taken place when limiting in-water construction work between May 1 and October 31 is not possible; and include a provision within the plan to describe the threshold (e.g., specified number of days of in-water construction work within a defined period between May 1 and October 31) that would be used to trigger implementation of mussel monitoring. Include provisions within the freshwater mussel monitoring and protection plans for (1) conducting long-term monitoring of the mussel communities located downstream of each of these projects to assess potential project operation-related effects on mussels; and (2) using the monitoring results to help inform the need for protection, mitigation, and enhancement measures to further minimize project effects on mussels.

Action Areas

In 50 CFR §402.02 "action area" is defined as, "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." The action area is not limited to the footprint of the action and should consider the effects to the environment resulting from the action. Within a set action area, all activities that can cause measurable or detectable changes in land, air, and water or to other measurable factors that may elicit a response in the species or critical habitat are considered. The action area is not defined by the range of the species that would be impacted; rather it is defined by the impacts to the environment that would elicit a response in the species (USFWS and NMFS 1998). Therefore, the action area for each project includes the Lowell and Devola project footprints and the geographic extent of the area that could be affected by the construction, operation, and maintenance of the facilities either directly, indirectly, or through interrelated or interdependent actions.

The action areas for the Lowell and Devola projects include the existing lock and dams to 500 m downstream. This action area includes the intake channels located immediately upstream of the powerhouses, intake structures, powerhouses, dam abutments, and tailrace channels located immediately downstream of the powerhouses (Figures 4 and 5).

The construction, operation, and maintenance of the Lowell and Devola projects will result in direct and indirect effects throughout the action areas with the exception of the upland facilities

(transmission lines, substations, access roads, parking lots, and appurtenant facilities). Construction, operation, and maintenance of these upland facilities are not anticipated to have any effect on the fanshell for the Lowell project and sheepnose and fanshell for the Devola project. Therefore, this BO will only analyze the effects of the construction, maintenance, and operation of the in-water and shoreline features of the projects.

Figure 4. Lowell Lock and Dam Water Power Project Action Area

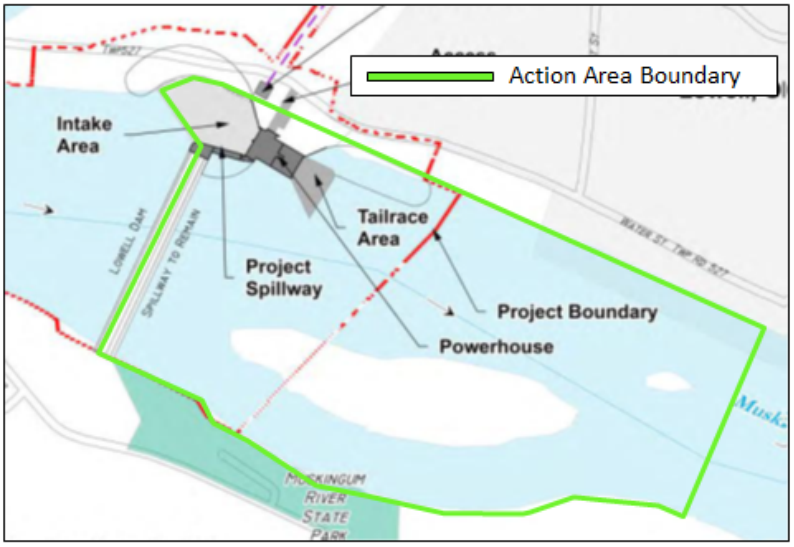
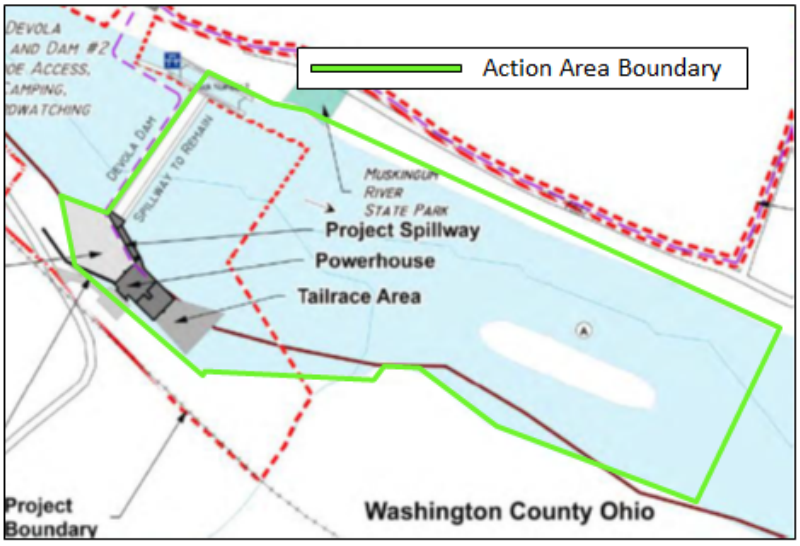


Figure 5. Devola Lock and Dam Water Power Project Action Area



STATUS OF THE SPECIES

This BO covers the fanshell for the Lowell project and the sheepnose and fanshell for the Devola project.

Species Descriptions

Sheepnose

The sheepnose is a federally listed endangered species (77 FR 14914). No critical habitat has been designated for this species.

The following taxonomic and descriptive information is summarized from the status review and final rule (Butler 2002; 77 FR 14914). The sheepnose was described by Constantine Rafinesque in 1820. The type locality is the Falls of the Ohio River near Louisville, Kentucky and adjacent Indiana.

The following description is summarized from Oesch (1984) and Parmalee and Bogan (1998). This medium sized mussel reaches nearly 5.5 inches in length, and the shape of the shell is elongate ovate, moderately inflated, with the valves thick and solid. The anterior end of the shell is rounded and the posterior is truncate to bluntly pointed. The posterior ridge is gently rounded and flattened ventrally, and there is generally a row of large, broad tubercular swelling on the center of the shell extending from the beak to the ventral margin. A shallow sulcus lies between the posterior ridge and central swellings. Beaks are high and located near the anterior margin. In young individuals the periostracum is often light yellow to yellowish brown, becoming darker with age. The beak cavity is shallow to moderately deep and generally white in color. The right valve contains a large triangular pseudocardinal tooth and the lateral teeth are heavy, long and slightly curved.

Fanshell

The fanshell is a federally listed endangered species (55 FR 25591). No critical habitat has been designated for this species.

The following taxonomic and descriptive information is summarized from Parmalee and Bogan (1998). The fanshell was described by Constantine Rafinesque in 1820. The type locality is reported as “Ohio.”

The following description is summarized from Parmalee and Bogan (1998). This mussel may reach up to 2.8 inches in length, and the shape of the shell is rounded, inflated, with the valves thick and solid. The ventral margin is long and broadly rounded. The posterior margin is bluntly angled or slightly truncated. The posterior ridge is well developed producing a sharp angle behind the umbo, becoming rounded toward the ventral-posterior margin; sometimes having a shallow sulcus on the flattened posterior slope. The periostracum is a pale greenish yellow, covered with a pattern of darker green flecks or dots which may appear as rays. The posterior

two-thirds of the shell is covered with numerous irregular knobs and rounded pustules which may appear in rows on the center of the valve. Beaks are elevated and full with sculpture consisting of a few indistinct ridges. The left valve has two low, thick divergent, roughened pseudocardinal teeth with two slightly curved, short, heavy lateral teeth. The right valve has a low, triangular, deeply serrated pseudocardinal tooth with a short, low, finely striated lateral tooth with an indicated of a second inner, flattened tooth.

Life History

The sheepnose and fanshell are filter-feeding species from the Unionidea family with a diet likely consisting of a mixture of algae, detritus, bacteria, and microscopic zooplankton. Most mussels, including these species, have separate sexes. Age at sexual maturity is highly variable among and within species. However, the age at sexual maturity for each of these species is not known. Fertilization success for these species is influenced by mussel density and flow conditions.

Both species are difficult to detect in many of the streams where they remain, with portions of their populations occurring below the substrate surface. Sparsely distributed juveniles and/or subadults, indicative of successful reproduction, are even more difficult to detect than adults.

<u>Sheepnose</u>
The following life history information is from Butler (2002). Females are thought to be short-term brooders, with most reproduction taking place in early summer with glochidial release presumably occurring later in the summer. Little is known regarding host fishes of the sheepnose. The sauger (*Stizostedion canadense*) is the only known natural host, but others must be available.

The sheepnose is primarily a larger-stream species. It occurs primarily in shallow shoal habitats with moderate to swift currents over coarse sand and gravel. Habitats with sheepnose may also have mud, cobble, and boulders. Specimens in larger rivers may occur in deep runs.

Extant populations of the sheepnose are known from 26 streams in the upper and lower Mississippi River sub-basins (including the lower Missouri River system), and Ohio River basin. In the Muskingum River, the sheepnose is rarely observed and only appears to occur in the lower portion of the river in Washington County, Ohio.

<u>Fanshell</u>
The following life history information is from the species Recovery Plan (USFWS 1991), 5-year review (USFWS 2009), and Parmalee and Bogan (1998). Females are considered to be long-term brooders. They become gravid in the fall and hold their glochidia in their marsupia until spring or summer when they spawn. Nine host fish have been identified: mottled sculpin (*Cottus bairdi*), banded sculpin (*Cottus carolinae*), greenside darter (*Etheostoma blennioides*), snubnose

darter (*Etheostoma simoterum*), banded darter (*Etheostoma zonale*), tangerine darter (*Percina aurantiaca*), blochside logperch (*Percina burtoni*), logperch (*Percina caprodes*), and Roanoke darter (*Percina roanoka*).

The fanshell inhabits medium to large rivers of the Ohio River basin. It buries itself in coarse sand or gravel in deep water of moderate or swift currents.

The fanshell is currently known to occur in 14 rivers, all of them in the Ohio River basin. In the Muskingum River, the fanshell is rarely observed and only appears to occur in the lower portion of the river in Washington County, Ohio.

ENVIRONMENTAL BASELINE

The Environmental Baseline analyzes the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and the ecosystem within the action area. In order to assess the potential for the sheepnose and fanshell to occur within the action areas, the Service must formulate reasonable assumptions. These assumptions must be made in order to analyze the potential effects of the actions. It is important to note that the Service has been mandated by Congress to provide the benefit-of-the-doubt to federally listed species (H.R.Conf. Report No. 697, 96th Cong., 2d Session, 1979). That is to say, the Service must err on the conservative side (the side of the species) when making reasoned assumptions.

Status of the Sheepnose and Fanshell in the Action Areas

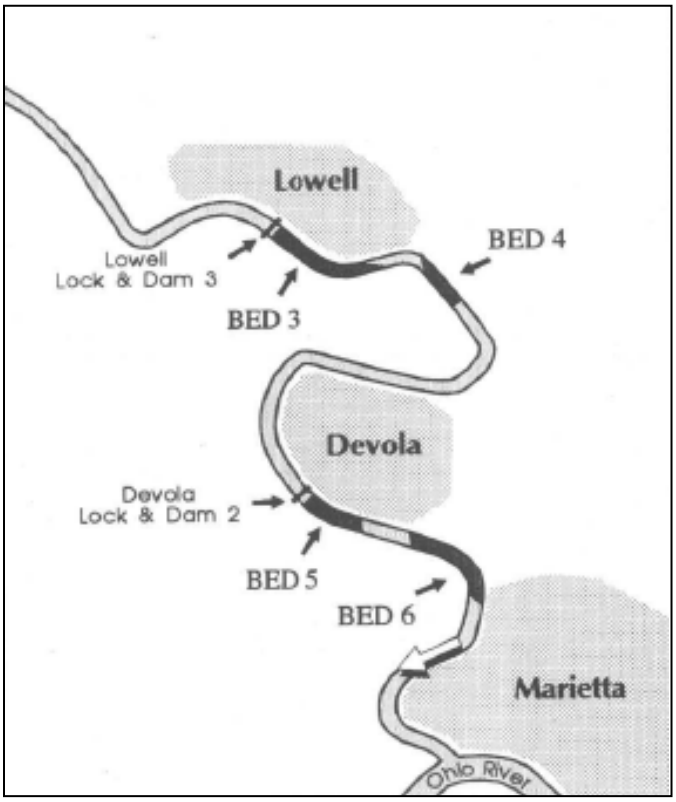
Sheepnose and fanshell are difficult to detect as portions of their populations can occur below the substrate surface. Therefore, qualitative population estimates must take into account the possibility that individuals are buried and qualitative estimates likely underestimate the number of individuals. In addition, where sheepnose and fanshell occur in low population densities, population estimates may have large margins of error due to undetected mussels. Sparsely distributed juveniles and/or subadults, indicative of successful reproduction, are even more difficult to find than adults. Successful recruitment of sheepnose and fanshell populations are difficult to detect when densities are very low and/or when survey efforts are inadequate to detect rare species. Therefore, populations with densities near or below the detection rate may not be practically assessed with quantitative techniques. Difficulty in detecting sheepnose and fanshell can result in poorly defined information about the species' distribution and abundance in streams where the species is known to occur.

In general, the lower Muskingum River has historically supported a species-rich unionid mussel fauna, including sheepnose and fanshell. Three comprehensive surveys have been conducted in the river in the past 50 years (Bates 1970; Stansbery and King 1993; Watters and Dunn 1993-1994). In 2011, Ecological Specialists Inc. (ESI 2012) conducted a mussel study for the

proposed Lowell and Devola projects. The objective of the study was to determine the distribution of unionids from 500m upstream to 1000m downstream of each proposed project. The study involved divers taking qualitative and quantitative samples to characterize unionids communities in unionids beds downstream of dams.

The three comprehensive studies found that the lower Muskingum River from Luke Chute to the Ohio River harbors dense species-rich unionid beds, including two downstream of the Lowell Lock and Dam (Beds 3 and 4) and two downstream of the Devola Lock and Dam (Beds 5 and 6) (Watters and Dunn 1993-1994). Of these mussel beds, a portion of Beds 3 and 5 occur within the action areas for the Lowell (Bed 3) and Devola (Bed 5) projects (Figure 6). Beds 4 and 6 occur outside of the action areas for the Lowell and Devola projects.

Figure 6. Lowell and Devola Mussel Beds. (Source: Watters and Dunn 1993-1994)



Lowell Mussel Bed 3

Bed 3 starts approximately 50m downstream of the Lowell Lock and Dam and extends downstream approximately 750m, just upstream of the Lowell Hill Road Bridge (County Highway 60). According to ESI (2012), "scour associated with the bridge may form a hiatus within the bed, and it could continue further downstream." The 2011 survey only extended to 1000m downstream of the dam. Previously, Watters and Dunn (1993-94) documented that Bed 3 actually extended downstream from the dam approximately 1.8 miles (2,897m). Since the 2011 study did not extend beyond 1000m below the dam, it is assumed that the bed continues to the area delineated in the 1993 study.

In the 2011 study, a total of 687 unionids representing 16 live species were collected in this bed. Density averaged 10.4 (±2.3) unionids/m². Recruitment of unionids was documented in this bed with 37.5% of the unionids in quantitative sample being ≤5 years old. One live fanshell, approximately 17 years old, was found in this bed during the study. Fanshell comprised 0.1% of individual mussels collected. Until the 2011 study, the fanshell had not been documented in Bed 3 since 1969 (ESI 2011). However, in 1992, Watters and Dunn (1993-1994) found one freshdead fanshell in Bed 4, downstream of Bed 3 (Figure 6).

Downstream of the dam, substrate consists of cobble, gravel, and sand throughout much of the area, including the area immediately downstream of the dam. The poorest quality mussel substrate occurred along the right descending bank, where substrate was boulder and cobble upstream of the island and sand with detritus and woody debris to the right of the island. Substrate was also sandier along the shallow right descending bank and downstream of the bridge. Due to the quality of the habitat in the bed, fanshell could occur anywhere within this bed.

The exact number of individual fanshell occurring in Bed 3 within the action area is unknown but an estimate can be calculated using the best available information. The portion of Bed 3 occurring in the Lowell action area is from 50m downstream of the lock and dam to 500m downstream. Based on the delineation of the bed in the 2011 survey report, the portion of Bed 3 in the action area is estimated to be 66,025m².

Fanshell accounted for 0.1% of the mussels collected during the 2011 study. The average density of mussels in the bed was 10.4 mussels/m². The total number of individual mussels (all species) estimated to be in the Lowell action area is approximately 686,660 (66,025m² x 10.4 mussels/m²). Therefore, there are an estimated 687 fanshell (at a rate of 0.1%) within the Lowell action area.

Devola Mussel Bed 5

Bed 5 starts approximately 125m downstream of the Devola Lock and Dam. The downstream limit of the bed was not determined by the 2011 study though it was found to extend to at least 1000m downstream of the dam. Watters and Dunn (1993-94) found that Bed 4 extended to approximately 1 mile (1,609m) downstream of the dam. Since the 2011 study did not extend

beyond 1000m below the dam, it is assumed that the bed continues to the area delineated in the 1993 study.

In the 2011 study, a total of 796 unionids representing 20 live species were collected in this bed. Density averaged 10.4 (±3.1) unionids/m². Density in the upstream half of the bed (up end to the down end of the island) averaged 3.4 (±2.4) unionids/m² and density in the downstream half of the bed averaged 13.8 (±3.9) unionids/m². Recruitment of unionids was documented in this bed. One live sheepnose and four live fanshell were found in this bed during the study. Sheepnose comprised 0.1 % and fanshell comprised 0.5% of individual mussels collected.

Previous records for sheepnose and fanshell in Bed 5 include two live sheepnose and six live fanshell collected in 1992 (Watters and Dunn 1993-1994). In 2010, the Service and the Ohio DNR, Division of Wildlife marked and translocated 196 adult fanshell from the Licking River in Kentucky and placed them into Bed 5 in an effort to augment the population in the lower Muskingum River. None of the four live fanshell found in 2011 study were marked individuals from the 2010 translocation. Other recent records include two freshdead fanshell found by a Service biologist in 1999 downstream of Devola Lock and Dam in a muskrat midden. Both specimens were determined to be ≤5 years old when they died. In 1992, Watters and Dunn (1993-1994) also found one live sheepnose and one freshdead fanshell (previously mentioned) in Bed 4, upstream of Bed 5 (Figure 6).

The exact number of individual sheepnose and fanshell occurring in Bed 5 within the Devola action area is unknown but an estimate can be calculated using the best available information. The portion of Bed 5 occurring in the action area is from 125m downstream of the lock and dam to 500m downstream. Based on the delineation of the bed in the 2011 survey report, the portion of Bed 5 in the action area is estimated to be 54,643m².

Sheepnose accounted for 0.1% and the fanshell accounted for 0.5% of the mussels collected during the 2011 study. The average density of mussels in the bed was 10.4 mussels/m². However, the portion of Bed 5 from 125m below the dam to the downstream end of the island had an average density of 3.4 mussels/m². This area includes approximately 46,106m² (84%) of the total area (54,643m²) of Bed 5 within the Devola action area. The total number of individual mussels (all species) estimated to be in the Devola action area from 125m downstream of the dam to the downstream end of the island is estimated to be approximately 156,761 (46,106m² x 3.4 mussels/m²). Therefore, there are an estimated 157 sheepnose (at a rate of 0.1%) and 784 fanshell (at a rate of 0.5%) within the Devola action area from 125m downstream of the dam to the downstream end of the island. The remaining portion of Bed 5 within the action area from the downstream end of the island to 500m downstream of the dam is approximately 8,537m² (16%) the total area (54,643m²) of Bed 5 within the Devola action area. This portion of Bed 5 had an average density of 13.8 mussels/m². The total number of individual mussels (all species) estimated to be in the Devola action area from the downstream end of the island to 500m downstream of the dam is estimated to be approximately 32,441 (8,537m² x 13.8 mussels/m²). Therefore, there are an estimated 118 sheepnose (at a rate of 0.1%) and 589 fanshell (at a rate of

0.5%) within the Devola action area from the downstream end of the island to 500m downstream of the dam. Combining the total estimates from these two sections yield a total estimate of 275 sheepnose (118 + 157) and 1,373 fanshell (589 + 784) within the Devola action area.

EFFECTS OF THE ACTION

This BO evaluates the anticipated effects of the Lowell project on the fanshell and the Devola project on the sheepnose and fanshell. Potential direct and indirect effects to the fanshell are anticipated from the Lowell project and the sheepnose and fanshell from the Devola project.

Direct Effects

Lowell Project

Direct effects of the proposed action on the fanshell include harassment, harm, and mortality from the construction of the intake and tailrace channels, intake structure, powerhouse, and dam abutment. Construction of the proposed in-water facilities would require cofferdam installation and removal and excavation for the intake and tailrace channels.

The in-water construction activities will directly affect fanshell in the immediate construction area through physical disturbance resulting from excavation, crushing or burial by heavy equipment traffic and cofferdam placement, and death from dewatering within the cofferdam area.

Bed 3 starts approximately 50m downstream of the Lowell Lock and Dam and extends downstream throughout the action area. The cofferdam will occur within the upper portion of Bed 3. All of the fanshell in the cofferdam area could be killed due to the construction and operation of the cofferdam. The applicant is proposing to salvage and relocate mussels within and around the cofferdam area. This salvage would minimize lethal take of fanshell for the project. Any fanshell that are relocated from the project area would also be subject to harassment from collection and handling.

Other direct effects to fanshell from the Lowell project include, but are not limited to, habitat modifications such as changes in flow and dissolved oxygen concentrations due to construction, increased turbidity, and sediment deposition which could bury mussels, especially juveniles, and cause injury and/or mortality. These effects could also restrict mussel respiration (e.g. suffocation due to inability to purge sediments from gills), limit feeding (e.g. starvation due to inability to eliminate sediments), and interfere with reproduction (e.g. abortion from stress, host fish absence during critical reproductive periods).

Devola Project

Direct effects of the proposed action on the sheepnose and fanshell include harassment, harm,

and mortality from the construction of the intake and tailrace channels, intake structure, powerhouse, and dam abutment. Construction of the proposed in-water project facilities would require cofferdam installation and removal and excavation for the intake and tailrace channels.

The in-water construction activities will directly affect sheepnose and fanshell in the immediate construction area through physical disturbance resulting from excavation, crushing or burial by heavy equipment traffic and cofferdam placement, and death from dewatering within the cofferdam area.

Bed 5 starts approximately 125m downstream of the Devola Lock and Dam and extends downstream throughout the action area. The cofferdam will occur within the upper portion of Bed 5. All of the sheepnose and fanshell in the cofferdam area could be killed due to the construction and operation of the cofferdam. The applicant is proposing to salvage and relocate mussels within and around the cofferdam and construction barging area. This salvage would minimize lethal take of fanshell for the project. Any sheepnose and fanshell that are relocated from the project area would also be subject to harassment from collection and handling.

Other direct effects to sheepnose and fanshell from the Devola project include, but are not limited to, habitat modifications such as changes in flow and dissolved oxygen concentrations due to construction, increased turbidity, and sediment deposition which could bury mussels, especially juveniles, and cause injury and/or mortality. These effects could also restrict mussel respiration (e.g. suffocation due to inability to purge sediments from gills), limit feeding (e.g. starvation due to inability to eliminate sediments), and interfere with reproduction (e.g. abortion from stress, host fish absence during critical reproductive periods).

Indirect Effects

Increases in shear velocity are expected with the operation of the projects. Shear velocity changes will occur downstream of the dam but be primarily restricted to the upstream few hundred meters downstream of the dams (ESI 2012).

Indirect effects of the proposed actions on the sheepnose (Devola project only) and fanshell (Lowell and Devola projects) and include mortality, harm, and harassment from the redistribution of sediments due to changes in flow regimes during project operation. Sheepnose and fanshell may be injured or killed due to the decreased ability to respire and feed as a result of the redistribution of sediments. Operation activities may also change fish host behavior and/or presence which could impact the ability of glochidia to attach to the fish at the proper time when released from female mussels. This could affect the long-term recruitment and reproductive potential of this population resulting in reduced recruitment.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this BO. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. This section analyzes the added impact from cumulative effects.

The Service is unaware of any other tribal, state, local, or private actions presently occurring or that are reasonably certain to occur in the future, which would destroy, modify or curtail the fanshell habitat within the Lowell project action area and/or the sheepnose and fanshell habitat within the Devola project action area. Therefore we do not anticipate significant cumulative effects from the proposed actions, combined with other reasonably foreseeable non-federal actions.

Summary of Effects

Lowell Project

Direct and indirect effects to fanshell from the project include mortality, harm, and harassment from construction and operation. Effects on individuals will be most severe in the upstream most portion of Bed 3 within and adjacent to the cofferdam. Bed 3 extends downstream of the dam for approximately 1.8 miles (2,897m) (ESI 1993). The majority of Bed 3 is likely to remain undisturbed from the project. Therefore, the population of fanshell in Bed 3 may be slightly reduced in the action area, but the population of fanshell in Bed 3 should persist. The applicant is proposing to relocate mussels from areas affected by construction. Therefore, the amount of lethal take of fanshell from the construction activities will be minimized due to the relocation.

Devola Project

Direct and indirect effects to sheepnose and fanshell from the project include mortality, harm, and harassment from construction and operation. Effects on individuals will be most severe in the upstream most portion of Bed 5 within and adjacent to the cofferdam. Bed 5 extends downstream of the dam for approximately 1.0 miles (1,609m) (ESI 1993). The majority of Bed 5 is likely to remain undisturbed from the project. Therefore, the populations of sheepnose and fanshell in Bed 5 may be slightly reduced in the action area, but the populations of sheepnose and fanshell in Bed 5 should persist. The applicant is proposing to relocate mussels from areas affected by construction. Therefore, the amount of lethal take of sheepnose and fanshell from the construction activities will be minimized due to the relocation.

CONCLUSION

After reviewing the current status of this species, the environmental baseline for the action areas, the effects of the proposed actions, and the cumulative effects, it is our biological opinion that the Lowell project, as proposed, is not likely to jeopardize the continued existence of the fanshell and the Devola project, as proposed, is not likely to jeopardize the continued existence of the sheepnose and fanshell. No critical habitat has been designated for these species; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR § 17.3). Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR § 17.3). Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

AMOUNT OR EXTENT OF TAKE

<u>Lowell Project</u>
Bed 3 starts approximately 50m downstream of the Lowell Lock and Dam and extends downstream throughout the action area. The applicant has determined that up to 1,800m² of Bed 3 will be impacted by the cofferdam and an additional 1,500m² of Bed 3 will be included in the mussel salvage area (10 m buffer around cofferdam), for a total of 3,300m² of Bed 3 impacted by the cofferdam and mussel salvage (Rye Development, pers. comm. 2016). Based on the estimated mussel density of 10.4 mussels per m² (ESI 2012), approximately 34,320 mussels would occur within this portion of Bed 3 (3,300m² x 10.4). Of these mussels, 0.1% is estimated to be fanshell (ESI 2012). Therefore, an estimated **34 fanshell** (0.1% of 34,320) will be taken as a result of the cofferdam construction and mussel salvage. Mussel salvage efforts will help to minimize lethal take of these fanshell.

The effects to fanshell outside of the cofferdam and mussel salvage area will range from

harassment, harm, and mortality with the most severe effects occurring upstream adjacent to the cofferdam. The number of fanshell that will be killed, harassed and/or harmed outside the mussel salvage area is undeterminable.

For this BO, incidental take for the Lowell project would be exceeded when the take exceeds 34 live fanshell found during the salvage and relocation efforts.

Devola Project

Bed 5 starts approximately 125m downstream of the Devola Lock and Dam and extends downstream throughout the action area. The applicant has determined that up to 430m² of Bed 5 will be impacted by the cofferdam, 260m² of Bed 5 will be included in the mussel salvage area (10 m buffer around cofferdam), and 250m² of Bed 5 will impacted by barging activities during construction, for a total of 940m² of Bed 5 impacted by the construction and mussel salvage activities (Rye Development, pers. comm. 2016). Based on the estimated mussel density of 10.4 mussels per m² (ESI 2012), approximately 9,776 mussels would occur within this portion of Bed 5 (940 m² x 10.4). Of these mussels, 0.1% is estimated to be sheepnose and 0.5% to be fanshell (ESI 2012). Therefore, an estimated **10 sheepnose** (0.1% of 9,776) and **49 fanshell** (0.5% of 9,776)) will be taken as a result of the construction and mussel salvage. Mussel salvage efforts will help to minimize lethal take of these sheepnose and fanshell.

The effects to sheepnose and fanshell outside of the cofferdam and mussel salvage area will range from harassment, harm, and mortality with the most severe effects occurring upstream adjacent to the cofferdam. The number of sheepnose and fanshell that will be killed, harassed and/or harmed outside the mussel salvage area is undeterminable.

For this BO, incidental take for the Devola project would be exceeded when the take exceeds 10 live sheepnose and/or 49 living fanshell found during the salvage and relocation efforts.

EFFECT OF THE TAKE

In the accompanying BO, the Service determined that, based on the proposed projects and the conservation measures described within, these levels of anticipated take are not likely to result in jeopardy to the fanshell for the Lowell project and sheepnose and fanshell for the Devola project. No critical habitat will be affected by either project. Therefore, neither project will result in adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures (RPMs) are necessary and appropriate to minimize the impacts of incidental take of fanshell during the construction and operation of the Lowell project and sheepnose and fanshell during the construction and operation of the Devola project.

1. FERC must ensure that the proposed actions will occur as designed, planned, and documented in the EA.

2. FERC must ensure that the licensee implements all of the applicant's proposed conservation measures as described in the EA and included in the Conservation Measures section of this BO.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, FERC must comply with the following terms and conditions, which implement the reasonable and prudent measures. These terms and conditions are non-discretionary.

1. FERC must ensure that the licensee prepare an erosion and sedimentation control plan that contains provisions to: (1) minimize erosion and sedimentation during project construction; (2) stabilize the banks of the Muskingum River after project construction; (3) perform soil sampling and testing prior to project construction in proposed construction areas to determine the presence of contaminants; (4) properly manage and dispose of contaminated soils during project construction; and (5) conduct water quality monitoring upstream and downstream of each project during (i.e., turbidity) and after (i.e., water temperature, dissolved oxygen, and turbidity) project construction, and implement appropriate mitigation strategies, in consultation with the resource agencies, if necessary. The plan should include site-specific provisions for monitoring the erosion control measures following project construction to ensure the measures are effective.

2. FERC must ensure that the licensee operates the projects in a run-of-river mode, such that outflow from the project approximates inflow on an instantaneous basis. When the project is operating and inflow is less than 5,500 cfs (i.e., the maximum hydraulic capacity), minimize reservoir fluctuations by maintaining reservoir elevations at the crest of the dam or at the following project-specific reservoir elevations sufficient to maintain the proposed minimum spill flows from April through October:

Lowell Project: 607.10 feet NAVD 88
Devola Project: 592.91 feet NAVD 88

3. FERC must ensure that the licensee installs riprap and/or vegetation, as necessary, to minimize project operation-related effects on shoreline areas susceptible to erosion.

4. FERC must ensure that the licensee installs trashracks at the powerhouse intake with a 2-inch clear bar spacing and an approach velocity of less than 2.2 fps to minimize the impingement and entrainment of fish.

5. FERC must ensure that the licensee schedules construction activities to avoid disturbances in water levels and flows during the following sensitive fish spawning periods identified by the Ohio Division of Wildlife:

Lowell Project: April 15 – June 30
Devola Project: March 15 – June 30

6. FERC must ensure that the licensee develops and implements a Service-approved plan to salvage and relocate mussels from construction areas downstream of the Lowell and Devola Lock and Dams in advance of conducting any in-water construction. Salvage and relocation of mussels must be conducted by a federal and state permitted malacologist.

7. FERC must ensure that the licensee limits in-water construction work between May 1 and October 31, to the extent possible, to minimize construction-related effects on mussels.

8. FERC must ensure that the licensee develops and implements a Service-approved post-construction monitoring plan for mussels in Beds 3 and 5. Monitoring should occur at years one, three, and five following construction of the Lowell and Devola projects. Mussel monitoring must be conducted by a federal and state permitted malacologist.

9. FERC must ensure that the licensee stipulate in all construction plans that construction equipment should be prohibited from fording the river, as this action could result in direct mortality to mussels and would compact existing sediment and introduce additional sediments into the river.

The RPMs, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes that the action will result in the following:

<u>Lowell Project</u>

1. Mortality and/or harassment of up to 34 fanshell from the mussel salvage

2. Mortality, harm, and harassment of an undeterminable number of fanshell in Bed 3 outside the mussel salvage area

<u>Devola Project</u>

1. Mortality and/or, and harassment of up to 10 sheepnose from the mussel salvage

2. Mortality and/or harassment of up to 49 fanshell from the mussel salvage

3. Mortality, harm, and harassment of an undeterminable number of sheepnose and fanshell in Bed 5 outside the mussel salvage area

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid the adverse effects of a proposed action on listed species or critical habitat, to help carry out recovery plans, or to develop information.

FERC should consider implementing the following conservation recommendations:

1. FERC and/or licensee could provide financial assistance to the Ohio Division of Wildlife to assist with statewide mussel conservation and recovery activities.

2. FERC and/or licensee could provide funding to carryout a comprehensive mussel study of the Muskingum River.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the conservation recommendations carried out.

REINITIATION NOTICE

This concludes formal consultation for FERC's actions outlined in your request received October 23, 2015. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over an action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such a take must cease pending reinitiation.

This BO only authorizes incidental take of fanshell for the Lowell project and sheepnose and fanshell for the Devola project. Incidental take coverage for additional federally listed species for either of these projects can only be sought through reinitiation of consultation.

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