DRAFT Environmental Assessment

Incidental Take Permit and Conservation Strategy for the Federally Listed Snuffbox in the Tobacco and Tittabawassee Rivers (Michigan) due to the Edenville Dam Restoration Project

U.S. Fish and Wildlife Service

Michigan Ecological Services Field Office

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ACRONYMS AND ABBREVIATIONS

^{o}C	degrees Celsius
^{o}F	degrees Fahrenheit
Applicant	Four Lakes Task Force
BGEPA	Bald and Golden Eagle Protection Act
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
CPUE	catch per unit effort
DEA	Draft Environmental Assessment
EA	Environmental Assessment
EGLE	Michigan Department of Environment, Great Lakes, and Energy
ESA	Endangered Species Act
FLTF	Four Lakes Task Force
GHG	Greenhouse gases

GIS	geographic information system
HAPs	hazardous air pollutants
HCP	Habitat Conservation Plan
ITP	Incidental Take Permit
LID	Low Impact Development
m^2	square meter
MBTA	Migratory Bird Treaty Act
MDNR	Michigan Department of Natural Resources
mg/L	milligrams per liter
MNFI	Michigan Natural Features Inventory
MPSC	Michigan Public Service Commission
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRCS	U.S. Department of Agriculture, Natural Resource Conservation Service
NREPA	Michigan Natural Resources and Environmental Protection Act
P.L.	Public Law
Plan	FLTF Recovery and Restoration Plan
PM	particulate matter
PM_{10}	PM less than or equal to 10 microns in aerodynamic diameter
ppm	parts per million
Project	Edenville Dam Restoration Project
Proposed Action	Proposed Federal Action
SAD	Special Assessment District
Service	U.S. Fish and Wildlife Service
SO_2	sulfur dioxide
SSA	Species Status Assessment
U.S.	United States
USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1.0 PROJECT OVERVIEW, BACKGROUND, PURPOSE, AND NEED

1.1 Introduction

The U.S. Fish and Wildlife Service (USFWS or Service) received an application for an Incidental Take Permit (ITP) to authorize the incidental take of one federally listed species, the snuffbox mussel (*Epioblasma triquetra*) (the Covered Species), resulting from activities associated with the repair, maintenance, and operations of the Edenville Dam Restoration Project in Gladwin and Midland Counties, Michigan (Project) and associated return of normal legal lake levels to Wixom Lake. This Environmental Assessment (EA) has been prepared by the Service pursuant to the National Environmental Policy Act (NEPA) (42 U.S. Code [USC] Section [§] 4321 et seq), to evaluate the effects of issuing an ITP pursuant to Section 10(a)(1)(B) of the Federal Endangered Species Act of 1973 (ESA), as amended (16 USC § 1531 et seq.) for the Project, as discussed further below.

The Four Lakes Task Force (FLTF or Applicant) is responsible for managing the repair, operations, and maintenance of the Project. The FLTF was established and became the Delegated Authority of the Edenville Dam and three other dams (Secord, Smallwood, and Sanford) in Midland and Gladwin Counties, based on a Lake Level Order under Part 307 of Michigan Public Act 451 of 1994 (Part 307) issued in June 2019 that legally determined summer and winter lake levels on Wixom Lake, created a Special Assessment District (SAD), and designated FLTF as the Delegated Authority to repair, maintain, and operate the Edenville Dam and other dams located within the Four Lakes system. To address the goals of repair, maintenance, and operation of the dams, FLTF developed a Recovery and Restoration Plan (Plan) that includes flood recovery, environmental recovery, dam and lake rebuilding plans, and results of a public survey conducted within the SAD. The Plan identifies the primary purpose of the Edenville Dam as the management of Wixom Lake's normal and legal lake levels. The Applicant is requesting take coverage for the snuffbox mussel in their ITP application based on the likelihood of occurrence and potential for take to result from restoring the legal lake levels, as discussed in Section 3.7.

The ESA and its implementing regulations prohibit the take of any fish or wildlife that is designated as a threatened species or endangered species under Section 4 of the ESA (federally listed species) without prior approval pursuant to either Section 7 or Section 10(a)(1)(B) of the ESA. The ESA defines "take" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 USC § 1532(19)). Pursuant to the Code of Federal Regulations (CFR), "incidental taking" means "any taking otherwise prohibited, if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity" (50 CFR 17.3). "Harm" is defined in the CFR as "an act which actually kills or injures [federally listed] wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures [federally listed] wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering" (50 CFR 17.3).

Under Section 10 of the ESA, applicants may be authorized, through issuance of an ITP, to conduct activities that may result in take of a listed species as long as the take is incidental to, and not the purpose of, otherwise lawful activities. Under Section 10 of the ESA, any application for an ITP must include a habitat conservation plan (HCP) that details, among other things, the impacts of the take and the steps taken to minimize and mitigate such impacts. As part of the ITP application, the Applicant has developed an HCP that includes measures to ensure that impacts to the Covered Species are minimized and mitigated to the maximum extent practicable in accordance with the requirements of Section 10 of the ESA. The HCP will be made available online at https://ecos.fws.gov/ecp/report/conservation-plans-region-summary?region=3&type=HCP. The ITP, if issued, would authorize the incidental take of the Covered Species during Project repair, operations, and

maintenance, including proposed conservation strategies, minimization and mitigation measures, and monitoring and adaptive management for the 30-year permit term. For this action, the Covered Species is the snuffbox mussel.

Issuance of a Section 10 ITP constitutes a discretionary Federal action by the Service and is thus subject to NEPA, which requires Federal agencies to assess the effects of their actions on the human environment by preparing an EA or an Environmental Impact Statement to document the potential effects of the Federal action (42 USC § 4332). The USFWS determined that an EA is the appropriate level of review for this proposed action, and has prepared this Draft EA (DEA) to evaluate and inform the public of the potential impacts associated with issuance of an ITP for the Project and the implementation of the Applicant's HCP, to evaluate alternatives, to seek information from the public, and to use information collected and analyzed to ensure that information regarding environmental impacts is available to Federal decision-makers before a decision is made on the ITP application. The DEA will be distributed for public review and comment and published in the Federal Register. All comments received on the DEA related to the issuance of an ITP will be addressed in the Final EA.

Three alternatives are considered in this EA and include:

- Alternative 1, the No Action Alternative, that leaves Edenville Dam and the Tobacco River in an interim stabilized and present-day condition;

- Alternative 2, Removal of the Edenville Dam, considers the removal of the dam and restoration of the Tobacco River to a restored and stable riverine system; and

- Alternative 3, Restore Edenville Dam and Wixom Lake (the Proposed Alternative), that repairs the Edenville Dam and returns Wixom Lake to its normal (legal) lake levels.

The effects of these alternatives on various resources are discussed throughout this EA.

1.2 Edenville Dam Restoration Project

The Project is in Gladwin and Midland Counties, Michigan. Edenville Dam impounds both the Tobacco and Tittabawassee Rivers, creating Wixom Lake. The dam structure, which includes earth embankments, concrete spillways with three Tainter gates on the Tobacco River side, three Tainter gates on the Tittabawassee River side, and the powerhouse, is approximately 6,600 feet long and 54 feet high at its tallest point. The earthen embankments are the longest feature of the dam, totaling 5,800 feet in length. The Edenville Dam was originally constructed to provide hydroelectric power generation and operated for this purpose until 2018 when the Federal Energy Regulatory Commission revoked the license to produce hydroelectric power due to non-compliance issues and failure to meet safety standards. The dam was considered to be a High Hazard Potential Dam by the Michigan Department of Environment, Great Lakes, and Energy (EGLE).

Significant rainfall in May 2020, in combination with saturated and frozen ground conditions, led to flood conditions that brought Wixom Lake to within crest levels, causing failure of the Edenville Dam. The dam failure in addition to other damaged dams in the area led to a national disaster declaration and the evacuation of 10,000 people downstream of the dam. After the dam failure, the FLTF was created and was given authority to repair and operate Edenville Dam. A Court Order was issued in 2019, establishing legal summer and winter lakes for Wixom Lake under Part 307 of the Michigan Public Act 451 of 1994.

Once the legal levels were established, a Plan was developed, which includes environmental recovery plans, as well as dam and lake rebuilding plans. This Plan states the primary purpose of rebuilding Edenville Dam is to manage Wixom Lake water levels.

Several phases of dam repair and construction have been completed. To date, the dam spillway has been constructed and a cutoff wall installed to increase embankment stabilization and mitigate liquefaction potential. Remaining work includes the construction of a low-level outlet to pass base flows and completion of the remaining spillway. The dam is currently operating in a post failure interim stabilized condition. Further detail on the progress of dam repair is provided on FLTF's website (https://www.four-lakes-taskforce-mi.com/).

1.3 Proposed Federal Action

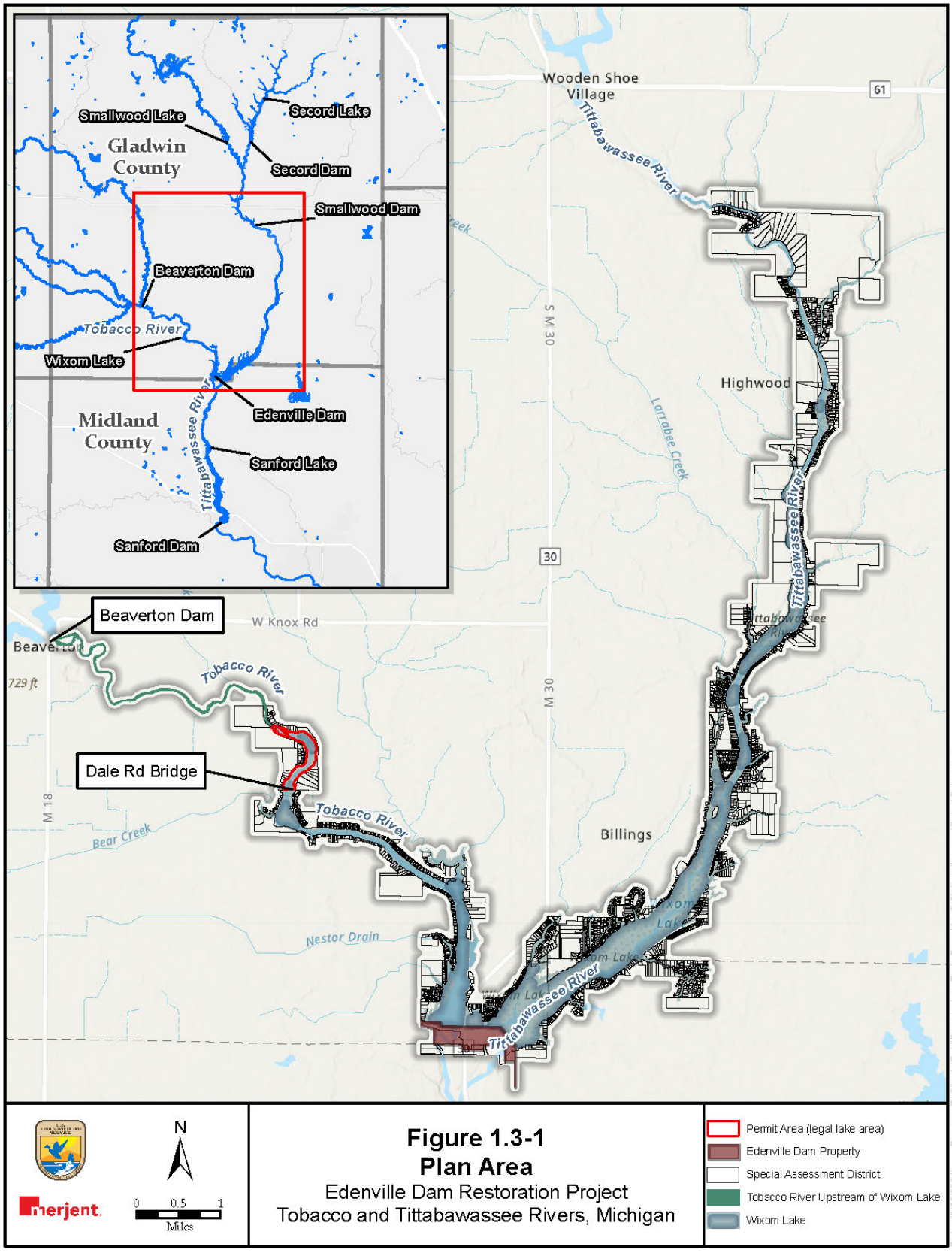
The Proposed Federal Action (Proposed Action) is issuance of an ITP by the Service pursuant to the provisions of Section 10(a)(1)(B) of the ESA that will authorize the incidental take of the Covered Species resulting from Project and implementation of the HCP. As noted above, under Section 10 of the ESA, applicants may be authorized, through issuance of an ITP, to conduct activities that may result in take of listed species, as long as the take is incidental to, and not the purpose of, otherwise lawful activities. The purpose of the Section 10 ITP is to ensure that any incidental taking that might occur will be minimized and mitigated to the maximum extent practicable and will not appreciably reduce the likelihood of the survival and recovery of the species in the wild. The Applicant is seeking a 30-year permit term for Project repair, operation, and maintenance and implementation of their HCP. At the end of the 30-year term, the Applicant may apply for a new ITP or for an ITP renewal.

The implementing regulations for ESA Section 10, as provided at 50 CFR 17.22, specify the requirements and issuance criteria for obtaining an ITP. The submission of the ESA Section 10 ITP application requires the development of an HCP designed to ensure that the (1) take is incidental; (2) applicants will, to maximum extent practicable, minimize and mitigate the impacts of the taking; (3) applicant will ensure adequate funding is provided; and (4) the take will not appreciably reduce the likelihood of survival and recovery of the species in the wild, while allowing for any limited, incidental take of the species that might occur. The Applicant has prepared an HCP to support their permit application. Within the HCP, the Applicant defines the HCP Covered Activities as all activities resulting from the repair, operations, and maintenance of the Edenville Dam, including proposed conservation strategies, minimization and mitigation measures, and monitoring and adaptive management. For this Project, the Plan Area (see Figure 1.3-1) consists of three distinct and connected areas in which the Covered Activities will occur:

1. Wixom Lake at and below its normal (legal) lake level, as well as lakefront property owners within the defined SAD. This includes the entirety of the Permit Area.

2. The Edenville Dam property area where dam construction activities are planned to occur and that would ultimately influence the water levels of Wixom Lake.

3. The Tobacco River upstream of Wixom Lake, from the end of Wixom Lake's normal (legal) lake level influence to the next upstream physical barrier, the Beaverton Dam.


Smallwood Lake
Secord Lake
Gladwin County
Secord Dam
Smallwood Dam
Beaverton Dam
Tobacco River
Wixom Lake
Edenville Dam
Midland County
Sanford Lake
Tittabawassee River
Sanford Dam
Wooden Shoe Village
61
Tittabawassee River
S M 30
Highwood
Larrabee Creek
Tittabawassee River
30
Beaverton Dam
W Knox Rd
Beaverton
729 ft
Tobacco River
Dale Rd Bridge
M 18
Bear Creek
Tobacco River
M 30
Billings
Nestor Drain
Tittabawassee River
N
0 0.5 1
Miles
Figure 1.3-1
Plan Area
Edenville Dam Restoration Project
Tobacco and Tittabawassee Rivers, Michigan
Permit Area (legal lake area)
Edenville Dam Property
Special Assessment District
Tobacco River Upstream of Wixom Lake
Wixom Lake

The Service will analyze the impacts of the proposed Covered Activities and the HCP on all elements of the natural and human environment that could be affected, including other wildlife species that occur within the Plan Area. Consistent with Service guidance, it will also consider, among other things, the effectiveness of action alternatives in reducing impacts to the natural and human environment.

1.3.1 Covered Activities

As noted in Section 1.2, the Proposed Action is issuance of an ITP by the Service pursuant to the provisions of the ESA to authorize the incidental take of the snuffbox mussel resulting from the repair, maintenance, and operations of Project and the implementation of the HCP conservation strategy (see Section 1.3.4), mitigation measures, monitoring, and adaptive management proposed in the HCP. The Plan Area includes all areas that would be affected directly or indirectly by the Covered Activities and includes the geographic area that is analyzed in the NEPA analysis and the ESA Section 7 intra-Service consultation.

1.3.2 Covered Species

FLTF has requested take coverage for the snuffbox mussel, which is the only federally listed species that could be affected by the Covered Activities. The snuffbox mussel is also state listed as endangered in Michigan. Section 3.7.1 describes the snuffbox mussel's life history, distribution, and reasons for decline.

1.3.3 Permit Area

The Permit Area is the geographic area under which Covered Activities will result in take of the Covered Species and the need for an ITP. For the Project, the Permit Area includes the Tobacco River arm of Wixom Lake north of Dale Road bridge to the upstream legal lake limit of Wixom Lake (see Figure 1.3-1). Habitat north of the legal lake limit would not be affected by the Project and is not included in the Permit Area. As described in the HCP, habitat south of the Dale Road bridge is not suitable snuffbox habitat and is not included in the Permit Area. We[1] have reviewed survey information and the analysis in the HCP and concur that suitable snuffbox habitat is not present south of Dale Road bridge. The Permit Area consists of 69.21 acres of habitat with a current wetted area of 18.17 acres. Restoring Wixom Lake to its legal lake levels would wet the entire Permit Area during the summer months and 50.64 acres during winter drawdowns.

1.3.4 HCP Conservation Strategy

Within their HCP, FLTF outlined a Conservation Strategy that focuses on maintaining and improving snuffbox suitable habitat within Permit Area, and more broadly, the Tobacco River portion of the Plan Area. While the FLTF is limited in their authority to implement measures within the HCP outside of the Wixom Lake normal (legal) lake level, the FLTF would employ several strategies to maintain and potentially improve snuffbox habitat. The FLTF would also seek opportunities to learn about the species, its ecology, and the limiting factors of lacustrine habitat on the species and to assist with future conservation efforts. These measures are included as Covered Activities of the Proposed Action. Within the Conservation Strategy, the FLTF identified five biological goals with associated objectives, as outlined below:

[1] Throughout this document, "we" and "our" refer to the U.S. Fish and Wildlife Service.

I. **Biological Goal 1**: Ensure water quality parameters remain at levels that can maintain or improve the existing snuffbox mussel population and promote a healthy freshwater mussel community within the Plan Area.

   a. Objective 1: Monitor water quality parameters such as temperature, dissolved oxygen, pH, conductivity, flow, total suspended solids, and nutrient concentrations within the Plan Area for the permit term.

   b. Objective 2: Develop, provide, and promote an annual information campaign focused on water quality best management practices that can be acted on by the general public and/or local governing bodies (municipalities, lake boards) aimed at maintaining or improving the existing snuffbox mussel population and promoting a healthy freshwater mussel community within the Plan Area for the term of the permit.

   c. Objective 3: Develop a Lake Management Plan through partnerships with willing stakeholders that provides a process for applicants to receive up to $280,000 in FLTF funding to implement projects that focus on maintaining or improving water quality for the existing snuffbox mussel population and promote a healthy freshwater mussel community within the Plan Area according to the provided implementation schedule. The $280,000 fund will also be utilized for biological goals 2 and 3.

   d. Objective 4: Avoid impacting water quality in areas containing the known snuffbox mussel population and healthy mussel communities within the Plan Area during physical construction activities associated with Edenville Dam for the term of the permit.

II. **Biological Goal 2**: Ensure bank erosion and bed integrity remain at levels that can maintain or improve the existing snuffbox mussel population and promote a healthy freshwater mussel community within the Plan Area.

   a. Objective 1: Monitor bank stability and bed integrity throughout the nearshore areas of the Plan Area to provide data related to bank height, vegetated condition, bank angle, root density, and bank material as they relate to erosion and sedimentation that could affect waters and their suitability for snuffbox mussels and freshwater mussel populations. These measures would occur in the spring of every year following the refill of Wixom Lake for the permit term.

   b. Objective 2: Develop, provide, and promote an annual public information campaign focused on bank stability and bed integrity best management practices that can be acted on by the general public and/or local governing bodies (municipalities, lake boards) aimed at maintaining or improving the existing snuffbox mussel population and promoting a healthy freshwater mussel community within the Plan Area for the term of the permit.

   c. Objective 3: Develop a Lake Management Plan through partnerships with willing stakeholders that provides a process for applicants to receive up to $280,000 in FLTF funding to implement projects that focus on maintaining or improving bank stability and bed integrity in areas where the known snuffbox mussel population and healthy freshwater mussel communities exist within the Plan Area according to the provided implementation schedule.

d. Objective 4: Avoid impacts to the banks and bed of areas containing the known snuffbox mussel population and healthy mussel communities within the Plan Area during physical construction activities associated with Edenville Dam for the term of the permit.

III. **Biological Goal 3**: Ensure the preservation of the aquatic conditions necessary for maintaining and/or improving existing habitat for the extant snuffbox mussel population, and which will promote a healthy freshwater mussel community within the Plan Area.

a. Objective 1: Develop, provide, and promote an annual information campaign focused on preservation of suitable aquatic habitat that can be acted on by the general public and/or local governing bodies (municipalities, lake boards). The campaign would be aimed at maintaining or improving the existing habitat for the extant snuffbox mussel population and promoting a healthy freshwater mussel community within the Plan Area for the term of the permit.

b. Objective 2: Develop a Lake Management Plan through partnerships with willing stakeholders that provides a process for applicants to receive up to $280,000 in FLTF funding to implement projects that focus on maintaining or improving suitable aquatic habitat for the existing snuffbox mussel population and promote a healthy freshwater mussel community within the Plan Area according to the provided implementation schedule.

c. Objective 3: Avoid impacts to suitable aquatic habitat in areas containing the known snuffbox mussel population and healthy mussel communities within the Plan Area during physical construction activities associated with Edenville Dam for the term of the permit.

IV. **Biological Goal 4**: Ensure water levels and their rate of change remain within prescribed parameters that would maintain necessary hydrology within Wixom Lake for snuffbox mussels and healthy freshwater mussel communities. Monitor Tobacco River water levels upstream of Wixom Lake's influence to assist in early detection of potential risk (due to lack of hydrology) to the known existing snuffbox mussel population.

a. Objective 1: FLTF would install and maintain or would fund and contract U.S. Geological Survey (USGS) to install and maintain one new water level gauge at the Dale Road intersection of the Permit Area. Monitor water levels at this new location and the existing USGS gage at Glidden Road (located on the Tobacco River) on a weekly basis following the refill of Wixom Lake to the legal lake level for the term of the permit.

b. Objective 2: Construct the Edenville Dam to a 5,000-year flood standard and operate the dam as run-of-the-river to maintain hydrology of the Permit Area and promote healthy mussel communities for the term of the permit.

c. Objective 3: Conduct court-ordered normal (legal) lake level winter drawdowns and summer refills within prescribed parameters to limit the water level rate of change and to provide a set minimum elevation that is suitable for maintaining healthy freshwater mussel communities for the term of the permit.

For each of the objectives outlined within the HCP, the FLTF describes conservation measures to detail how each biological goal will be addressed. In addition, the HCP includes biological effectiveness

monitoring to assess if that the FLTF is achieving the HCP's biological goals and objectives, to ensure that the HCP's Conservation Strategy is effective at minimizing and mitigating impacts, and to evaluate the need for to revise conservation measures.

1.4 Purpose and Need for Proposed Action

Section 9 of the ESA prohibits the "take" of any fish or wildlife species listed under the ESA as endangered (16 USC 1538). Under Federal regulation, take of fish or wildlife species listed as threatened is also prohibited unless otherwise specifically authorized by regulation (50 CFR 17.31). The 1982 amendments to the ESA established a provision in Section 10 that allows for "incidental take" of endangered and threatened species or wildlife by non-Federal entities (16 USC 1539).

Under Section 10 of the ESA, the Secretary of the Interior may, where appropriate, authorize the taking of federally listed fish or wildlife if such taking occurs incidentally to otherwise legal activities. The Service was charged with regulating the incidental taking of listed species under its jurisdiction, and Section 10 of the ESA specifically directs the Service to issue an ITP to non-Federal entities for incidental take of endangered and threatened species when the criteria in Section 10(a)(2)(B) are satisfied by the applicant. After the Service receives an application for an ITP, they need to review the application to determine if it meets issuance criteria. They also need to ensure that issuance of the ITP and implementation of the HCP complies with other applicable Federal laws and regulations.

Generally, ESA Section 10(a) allows the Service to issue permits. The 1982 ESA amendments restructured Section 10(a) to provide a mechanism for issuance of permits to non-Federal entities to authorize take of listed species that would otherwise be prohibited under Section 9. Section 10(a)(1)(A) provides for the issuance of enhancement of survival permits associated with conservation actions that are beneficial to the species. Section 10(a)(1)(B) was added to allow for the issuance of incidental take permits to authorize take that is incidental to, but not the purpose of, carrying out otherwise lawful activities.

The need for the Proposed Action (i.e., issuance of an ITP) is based on the documented occurrences of Covered Species within the Permit Area (see Section 3.7.1). Restoring Wixom Lake may result in the incidental take of snuffbox mussel through modifications of suitable habitat and mortality through winter drawdowns that lower water levels.

The Service's purpose in considering the Proposed Action is to fulfill our authority under the ESA and Section 10(a)(1)(B) and to respond to an application requesting an ITP for the incidental take of snuffbox mussel pursuant to the ESA Section 10(a)(1)(B) and its implementing regulations and policies. The permit decision should ensure the issuance of the ITP and the implementation of the HCP provide for the long-term conservation of the snuffbox mussel and its ecosystem in the Plan Area. The permit decision should also ensure the Applicant will not appreciably reduce the likelihood of survival and recovery of the Covered Species in the wild, within the context of the ITP and associated HCP.

1.5 Decision to Be Made by Responsible Official

The Service must decide whether to issue or deny the proposed ITP. The Service shall issue the ITP to the Applicant if the issuance criteria and implementing regulations for the ESA and general permitting are met. The issuance criteria for an ITP are contained in Section 10(a)(2)(B) of the ESA and the implementing regulations for the ESA (50 CFR 17.22(b)(2) and 17.32(b)(2), and 50 CFR 222.307(c)(2)). The Service may decide to issue a permit conditioned upon implementation of the HCP as submitted by the Applicant, or

to issue a permit conditioned upon implementation of the HCP as submitted, together with other measures specified by the Service. We are required to deny the permit if these criteria are not satisfied. FLTF would serve as the permittee under the ITP (if issued) and is liable for all obligations assigned to them under the ITP and HCP. The USFWS will provide a summary of its rationale for issuing the ITP in the Biological Opinion, which is its findings document for the intra-USFWS Section 7 consultation/conference.

1.6 Regulatory and Policy Background

The Council on Environmental Quality (CEQ) is currently engaged in a comprehensive review of its 2020 rule to update its NEPA implementing regulations, pursuant to Executive Order 13990 (January 20, 2021). The CEQ is using a phased approach to amending the NEPA regulations; Phase I of the final rule was issued on April 20, 2022, which generally restores the regulations that were in effect prior to the 2020 rule. Guidance for its current NEPA implementing regulations was issued on May 20, 2022. This EA is written to comply with these implementing regulations. A proposed final rule for Phase 2 of the NEPA implementing regulations was published on July 31, 2023, with a public comment period until September 29, 2023. Primary goals of the proposed Phase 2 implementing regulations include ensuring an efficient and effective environmental review with transparent and efficient decision-making, meaningful public involvement, informed science-based evaluation, increased regulatory certainty, and improved evaluation of impacts on environmental justice, climate change, and the environment (CEQ 2023). This EA was developed in compliance with and consideration of the following guidance resources, laws, and regulations.

1.6.1 NEPA

NEPA requires Federal agencies to evaluate the environmental effects of their proposed actions prior to making decisions (https://www.epa.gov/nepa/what-national-environmental-policy-act). Major provisions of NEPA include (1) requirements for Federal agencies to develop and evaluate alternatives of major Federal actions that have the potential of significantly affecting the human; (2) ensuring that all environmental factors are assessed and considered for each identified reasonable alternative; and (3) public participation in the process including Federal, state, and local agencies and Native American tribes to allow the public involvement in the decision-making.

1.6.2 ESA

Federally listed threatened and endangered species and designated critical habitat are governed by the ESA and its implementing regulations (50 CFR Parts 13 and 17). Sections 4 and 9 of the ESA prohibit certain activities that directly or indirectly affect federally listed species.

Because issuance of an ITP under Section 10 of the ESA constitutes a Federal action involving potential take of federally listed species, the USFWS is required to conduct a formal intra-agency consultation for federally listed species and an intra-agency conference for proposed species under Section 7 of the ESA (50 CFR Part 402). This consultation and conference occur between the Assistant Regional Director for Ecological Services and the field office responsible for reviewing the ITP application and HCP (in this instance, the Michigan Ecological Services Field Office). Formal consultation terminates with preparation of a Biological Opinion, which will provide a USFWS determination as to whether the Proposed Action is likely to jeopardize the continued existence of a listed or proposed species or result in the destruction or adverse modification of designated critical habitat. The USFWS will provide a summary of its rationale for issuing or not issuing the

ITP in the Biological Opinion, which will be made available at https://ecos.fws.gov/ecp/report/conservation-plans-region-summary?region=3&type=HCP.

The 1982 amendments to the ESA established a provision in Section 10 that allows for "incidental take" of endangered and threatened species of wildlife by non-Federal entities (16 USC §1539) (https://www.fws.gov/law/endangered-species-act). The 2016 HCP Handbook provides comprehensive guidance to applicants on the ITP process (https://www.fws.gov/library/collections/habitat-conservation-planning-handbook).

1.6.3 Migratory Bird Treaty Act of 1918 (MBTA)

The MBTA makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to Federal regulations (https://www.fws.gov/birds/policies-and-regulations/laws-legislations/migratory-bird-treaty-act.php).

1.6.4 Bald and Golden Eagle Protection Act of 1940 (BGEPA)

The BGEPA prohibits the take of a bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*), including their feathers, nests, or eggs. BGEPA defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." Regulations further define disturb as agitating a bald or golden eagle to an extent that results in injury, a decrease in its productivity, or nest abandonment (50 CFR 22.6). BGEPA also prohibits alterations of a nest site when it is not in use if when the eagle returns to the nest the alteration may take, or otherwise cause injury, decrease in productivity, or nest abandonment. In 2024, the USFWS revised the regulations for permits for eagle nest take and eagle incidental take under BGEPA. The revised regulations provide a new system of general permits, in addition to the specific permits that have been available in the past. These general permits are for projects with low risks to eagles and provide an alternative approach to permitting incidental take related to power line infrastructure, wind energy projects, projects that may disturb breeding bald eagles, and bald eagle nest take.

1.6.5 National Historic Preservation Act (NHPA)

The NHPA mandates that all Federal agencies must consider the effects of their projects and programs on cultural resources listed or eligible for inclusion in the National Register of Historic Places. Later amendments include Public Law (P.L.) 91-243, P.L. 93-54, P.L. 94422, P.L. 94-458, P.L. 96-199, P.L. 76-244, and P.L. 96-515. Section 106 of the NHPA requires Federal agencies to consult with the State Historic Preservation Office, Native American Tribes, and other interested parties on the effects of their undertakings on historic properties.

1.6.6 Michigan Natural Resources and Environmental Protection Act (NREPA) (Act 451 of 1994)

A person shall not take, possess, transport, import, export, process, sell, offer for sale, buy, or offer to buy, and a common or contract carrier shall not transport or receive for shipment, any species of fish, plants, or wildlife appearing on the list of endangered or threatened species for the state of Michigan or the U.S. (http://www.legislature.mi.gov/(S(defp11104wj4u4db2dw3zbl2))/mileg.aspx?page=GetObject&objectname=mcl-324-36505).

2.0 ALTERNATIVES

NEPA requires the environmental documents prepared for a proposed action discuss a range of alternatives. This chapter introduces and describes the alternatives explored and evaluated in this EA relevant to the Proposed Action (i.e., issuance of an ITP by the Service).

Reasonable alternatives include those that meet the purpose and need of the Proposed Action and are practical or feasible from both a technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant. Reasonable alternatives must also be guided by the goals and objectives of the acting agency, in this case, the Service. As stated in Section 1.2, the Proposed Action includes the issuance of an ITP for the snuffbox mussel. Therefore, reasonable alternatives would include alternatives that reduce or eliminate the take of snuffbox mussels or aid in the species recovery.

One potential alternative to reduce or eliminate take of snuffbox mussel is to restore Wixom Lake to a lower lake level that does not extend north of Dale Road. A lower restored lake level would allow the Tobacco River north of Dale Road to remain in a riverine system and unaffected by the lake refill; therefore, take of snuffbox mussel may not occur. However, this alternative would not meet the requirements of the Court Order and the purpose and need of the Project and would likely not receive funding from the SAD. For these reasons, we do not believe this alternative could be implemented, nor is it reasonable, and have not carried it forward for further analysis.

FLTF has identified the removal of the Edenville Dam as a potential alternative to restoring Wixom Lake to its legal lake level. Although this alternative does not meet the purpose and need of the Project and 2019 Court Order, we concur that technical, legal, or financial issues associated with repair, operation, and maintenance of the dam could make the dam and lake restoration efforts impractical or infeasible. Therefore, we have included the removal of the Edenville Dam as a feasible alternative for further evaluation in this EA (see Section 2.2).

Through the No Action Alternative, the refilling of Wixom Lake would not occur, and the Service would not be required to issue an ITP for the Project. Because leaving the lake in its current condition would have indirect effects to habitats within and adjacent to the lake, we have included the No Action Alternative for further evaluation in this EA.

We have not identified other reasonable alternatives that would meet the purpose and need of the Project and 2019 Court Order, avoid or minimize take of snuffbox mussel, or guide the goals and objectives of the acting agency.

2.1 Alternative 1: No Action Alternative

Under the No Action Alternative, the Project would continue operation under post-dam failure interim stabilized conditions. The dam has been operating under this alternative since its failure in 2020. Maintaining the Tobacco River in its current condition would provide suitable habitat for the snuffbox mussel, particularly upstream of the Dale Road bridge to the Beaverton Dam. Current conditions in the Tobacco River provide desired habitat features (swift flowing water, riffles within medium sized rivers, coarse substrate, gradually sloped and stable shoreline, and sufficient oxygen concentrations). We anticipate that the Tobacco River channel within the Plan Area will continue to stabilize and provide future riverine habitat that can support all life stages of snuffbox mussels. Therefore, the No Action Alternative would not result in take of snuffbox mussels and may over time improve habitat and riverine conditions

for the snuffbox mussel. However, the No Action Alternative would not comply with the Court Order and meet the purpose and need for the Project.

2.2 Alternative 2: Removal of Edenville Dam

If funding or technical issues make repair, operation, and maintenance of the Edenville Dam infeasible, future petitions or court orders could require the Edenville Dam to be removed. Under Alternative 2, the Edenville Dam would be removed and the riverine and riparian habitat around the Edenville Dam property would be restored. As outlined in Section 3.7, the Tobacco River downstream of the Dale Road bridge does not contain suitable snuffbox mussel habitat and is not likely to contain live snuffbox individuals based off the sampled mussel community (Woolnough et al. 2022). Additionally, no snuffbox or shells of snuffbox were identified during 2022 surveys completed immediately upstream and downstream of Edenville Dam and no suitable snuffbox habitat was identified (Woolnough et al. 2022). Therefore, activities associated with the removal of the Edenville Dam (Alternative 2) would not result in take of snuffbox mussels and would not require the issuance of an ITP.

We note that the HCP states that if the dam was removed, significant restoration work would be necessary to stabilize the river channel that has been created since the dam failure. We cannot confirm the need and legal requirements that would require river stabilization in the Permit Area should the dam be removed. As stated in the HCP, within the Permit Area, shorelines are lined with trees and vegetation unlike most of the surveyed sites in other parts of the Plan Area. The river contains riffles, gradually sloping shorelines, and is lacking eroded channelized vertical banks that were typically identified in other portions of Wixom Lake. Within the Permit Area, a live snuffbox mussel and several snuffbox valves were identified, and suitable riverine habitat for snuffbox mussel is currently present. Considering these factors, we would recommend that should the dam be removed, the Permit Area is allowed to naturally stabilize, which would avoid take of the snuffbox mussel and the need for an ITP.

Removal of the dam, potential river restoration upstream and downstream of the dam, and natural restoration of the riverine system once the dam impediment is removed could, over time, create suitable habitat for the snuffbox mussel. The restored riverine system may benefit from reduced sediment load, increased natural riffle conditions, increased oxygen levels, and natural fish passage and habitat for the logperch. Therefore, over time, removal of the dam may potentially benefit the snuffbox mussel.

2.3 Alternative 3: Restore Edenville Dam and Wixom Lake

Under Alternative 3, FLTF would repair the Edenville Dam, refill Wixom Lake to the normal (legal) lake level and conduct seasonal drawdowns and refills to maintain the summer and winter elevations. The Edenville Dam would operate as a “run-of-the-river” facility where the dam gates are operated to maintain the normal (legal) lake level, such that the outflow from the dam is equal to the water flowing into it for drought, normal, and flood flows. Whenever possible, FLTF would match system outflows with system inflows when there is an excess of water in the system. As such, there would be no foreseeable scenario where water levels would fluctuate beyond the legally established lake levels.

The normal (legal) lake levels are defined by Court Order and Part 307. The summer legal lake level is an elevation of 675.2 feet and the winter drawdown legal level is 672.2 feet. The Court Order also mandates that the maximum change in levels cannot exceed 0.7 feet within 24 hours. As such, Wixom Lake will be refilled at no more than 1 foot per day, depending on natural flow conditions into the lake. Wixom Lake will not be refilled to levels higher than what conditions were prior to the May 2020 flood and water will

not be stored in the lake. The re-designed dam will be constructed so that an auxiliary spillway will be used in case of flood conditions, permitting the lake to stay within legal levels. Dam outflow will also be regulated to prevent downstream shoreline erosion.

Impounding the Tobacco River would not impact the snuffbox population upstream of the Permit Area. The Edenville Dam would have an impact from its location to the upstream extent of Wixom Lake by creating an impounded environment. Upstream of this location, the riffles, mussel community, and suitable habitat that is currently present would not be changed due to this refill. The high-quality mussel community that currently exists in this stretch of the Tobacco River between Beaverton Dam and Wixom Lake was established and existed prior to the draining of the impoundment. As such, the refill of the impoundment would not change the community or the habitat. If host fish species have migrated into the Permit Area or downstream reaches of Wixom Lake due to the lowering of the impoundment, they would be able to migrate back upstream as Wixom Lake is slowly refilled to the normal (legal) lake level.

Refilling Wixom Lake to the legal lake level may affect the snuffbox mussel and lead to potential take and loss of habitat within the Permit Area. This area is currently characterized by riverine habitat and diverse substrates, gradually sloping shorelines lined with vegetation, and lack the eroded and channelized banks created downstream when water retreated during the flood event and rapid drawdown of Wixom Lake. Mussel surveys from 2022 indicate a diverse mussel community was present within the Permit Area. Therefore, while the restored portions of Wixom Lake would not be ideal habitat for snuffbox mussels, there is evidence to support that the species is able to survive within the Permit Area under proposed refill conditions. As further described in Section 3.7.2, the proposed Alternative 3 would result in a take of snuffbox mussel.

2.4 Summary of the Alternatives

As described above, each of the alternatives describes different scenarios and associated potential take of snuffbox mussels. Alternative 1, the No Action Alternative, would not result in take of snuffbox mussels, but this option is not reasonable as FLTF is required to restore the legal lake level of Wixom Lake as outlined in the 2019 Court Order. Alternative 2, Removal of the Edenville Dam, is also a limited option due to legal constraints related to dam removal and the rescinding of lake-level Court Order. However, it is likely Alternative 2 would not result in a take of snuffbox mussel and the need for an ITP. Alternative 3, Restore Edenville Dam and Wixom Lake, is the legally binding option and will result in take of snuffbox mussel.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Affected Environment

The affected environment is the area and its resources (i.e., biological, physical, and socioeconomic) potentially impacted by the Proposed Action, including all three alternatives. The affected environment analyzed in this EA includes the Permit Area where take would occur, and the Plan Area, which includes areas where conservation strategies, minimization and mitigation measures, and monitoring and adaptive management proposed in the HCP may affect resources.

The purpose of describing the affected environment in the sections below is to define the context in which the impacts of the Proposed Action would occur. To make an informed decision about which alternative to select, it is necessary to first understand which resources would be affected and to what extent. The

affected environment sections of this document provide the basis for this understanding. In defining potentially affected resources, we considered the potential impacts associated with the Covered Activities for all three alternatives.

The Service determined that the following resources have the potential to be affected by the Covered Activities or alternatives and require analysis in this EA: vegetation, soils, terrestrial wildlife, aquatic resources, Federal- and state-listed species, air quality and climate change, and socioeconomics and environmental justice. The Covered Activities or alternatives should not result in changes to geology, ground water, land use, cultural resources, noise, and transportation from their current condition under any alternative; therefore, these resources are not analyzed further in this EA.

3.1.1 Overview of the Project Area

The Project is located in Gladwin and Midland Counties, Michigan. The Plan Area is the area in which all Covered Activities being analyzed in this EA would take place and is defined in Section 1.3 and shown on Figure 1.3-1. The Edenville Dam impounds both the Tittabawassee and Tobacco Rivers, which created Wixom Lake. Wixom Lake historically had a shoreline of approximately 84 miles and a surface area of 1,908 acres. After the dam failure, water surface area was reduced to about 398 acres. Wixom Lake and the Permit Area currently exists in a riverine state and provides suitable habitat for snuffbox mussels. However, with the proposed alternative or restoring Wixom Lake, lacustrine habitat would be restored and suitable habitat for snuffbox mussels in the Permit Area would be diminished or removed.

The Plan Area is located within the Saginaw Lake Plain and Tawas Lake Plain ecoregions (U.S. Environmental Protection Agency [USEPA] 2007). The Saginaw Lake Plains Ecoregion consists of forested areas on poorly drained soils, coastal marshes along Saginaw Bay, and conifer swamps. Common forest types include hemlock (*Tsuga* spp.), beech (*Fagus* spp.), pines (*Pinus* spp.), and oaks (*Quercus* spp.) (USEPA 2007). The Tawas Lake Plain region is comprised of forested areas and pine plantations as well as wetlands on similarly poorly drained soils. The climate is cooler than the Saginaw Lake Plain ecoregion (USEPA 2007). Land cover in Gladwin County generally includes woody wetlands (130,900 acres), primarily forest (88,800 acres), cultivated crops (53,800 acres), and developed area (23,700 acres) (National Land Cover Database 2021). Land cover in Midland County generally includes woody wetlands (140,000 acres), cultivated crops (78,800 acres), forested areas (61,500 acres), and developed areas (23,000 acres).

The Permit Area is 69.21 acres and consists of the Tobacco arm of Wixom Lake north of Dale Road. The area was previously lacustrine and was bordered by emergent wetlands, shrub scrub wetlands, forested area, and residential properties prior to the dam failure. In its current condition, the Permit Area has returned to a riverine system with gently sloping banks and adjacent bottomland wetlands.

3.1.2 Planned Actions and Environmental Trends

In accordance with 40 CFR § 1502.15, we evaluated the effect of other reasonably foreseeable actions on affected resources within the Project Area. As defined by the CEQ, a cumulative effect is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of the agency or party undertaking such other actions. Cumulative impacts can result from individually minor, but collectively significant actions, taking place over time.

When determining the significance of a cumulative impact, we consider the duration and timeframe of the impact; the geographic, biological, and/or social context in which the impact would occur; and the magnitude and intensity of the impact. Most of the impacts resulting from the proposed Project would be temporary and localized, and when added to the impacts of other foreseeable projects are not expected to result in significant cumulative impacts. For each environmental resource evaluated in the following sections, the potential impacts of the Project are cumulatively evaluated with other reasonably foreseeable projects.

The scope of the cumulative impact assessment depends in part on the availability of information about other projects. For this assessment, other projects were identified from the Service's knowledge of other planned, pending, and ongoing projects; communications with Federal, state, and local agencies; and database and agency website searches. We encourage anyone that is aware of other projects in the area to provide the project information via comments on this DEA, and your comment will be addressed in the Final EA.

The most notable foreseeable actions in the Project Area include the replacement of the M-30 bridge over the Tobacco River near the Edenville Dam (Michigan Department of Transportation 2024), the widening of Dale Road over the Tobacco River (Gladwin County Road Commission 2024), and the final Edenville Dam repair activities that are currently underway as discussed in Section 1.3. Other potential actions include minor light industrial, commercial, and residential development in Gladwin County, as outlined in the Gladwin County Comprehensive Master Plan (Gladwin County 2007), which includes goals to:

- Provide for residential development in a manner that results in both housing and neighborhoods that are safe, healthy, and attractive, while also providing a diverse and adequate supply of dwelling units; and

- Encourage sound commercial and light industrial development that is compatible with the County's character.

On a broader scale, Michigan's renewable portfolio standard set forth by the Michigan Public Service Commission (MPSC) Public Act 342 of 2016 established a requirement of 15 percent renewable energy procurement in 2021, a goal that was met according to the MPSC. On December 4, 2023, Michigan Governor Gretchen Whitmer signed a package of clean energy and climate action legislation, including a bill that creates a clean energy standard requiring the state to produce 100 percent of its energy from clean sources by 2040. It is reasonable to assume that clean energy projects such as wind and solar farms may be developed in the Project Area; however, we have not identified any current or proposed projects near the Project Area.

3.2 Environmental Consequences

The environmental consequences sections analyze the environmental impacts of each of the three alternatives in Chapter 2 that were retained for detailed analysis. The effects of each alternative (if applicable, some impacts are the same under all alternatives) are described in each resource section. Effects include those that are caused by the Proposed Action (issuance of an ITP) and occur at the same time and place as the action (defined as direct effects by the CEQ, per 40 CFR §1508.8a). They also include those that are caused by the action (issuance of an ITP) but occur later in time or are further removed in place, but still reasonably foreseeable (defined as indirect effects by the CEQ, per 40 CFR §1508.8b). Long-

term effects persist through the life of the Project; short-term effects would be limited in time and duration.

3.3 Vegetation

3.3.1 Affected Environment

Vegetation resources include all plant species that make up the vegetation communities in the Plan Area, including rare, threatened, and endangered plants. The Service is not aware of any records of occurrence of plants afforded protection under either the Federal ESA or Michigan's NREPA; Michigan Act 451 Part 365, nor have any sensitive plant species been identified in the Plan Area during field surveys or public outreach.

The Plan Area is within the Tawas Lake Plain and Saginaw Lake Plain ecoregions. Pre-settlement vegetation within these ecoregions consisted of beach ridge forest communities dominated by hemlock, beech, sugar maple, red oak, red pine, and white pine populations. Poorly drained areas within the region influenced diverse wetland habitats. The region contained vast areas of swamps, coastal marshes, wet prairies and depressional wetlands. Today, the region supports cut-over areas of aspen, black cherry, tamarack, paper birch, and red maple. The majority of properties within the Plan Area are comprised of residential lots consisting of maintained yards and scattered hardwood trees. Other vegetation types include forested and emergent wetlands, hardwood stands less than 20 acres, and limited pasture and agriculture field.

In 2021, FLTF completed a Wixom and Sanford Lake Post-Disaster Created Wetlands Investigation Report to evaluate, refine, and define the types and extent of vegetation communities present on the present-day exposed Wixom Lake bottomlands. Seven distinct vegetation community types were identified, as described in Table 3.3-1 below.

Table 3.3-1
Wixom Lake Bottomland Vegetation Community Types

Community Type; Acreage	Description
Dense Shrubland, Mesic; 300 acres	A mesic shrub dominated community that contains both wetland and upland portions. Vegetation differences between upland and wetland community types are difficult to interpret. Dominant shrubs include several types of willows (*Salix* spp.) and poplars (*Populus* spp.). Herbaceous vegetation that persists below thick shrubland canopy cover is often sparse. Soils typically are sand underlain by a loamy/clayey layer. The water table is either located within the upper 24 inches of the soil profile or not observed at all. The water table depth appears dependent on soil structure, where the water table is likely to be present where loamy/clayey layers are at or near the soil surface. Soil saturation on aerial imagery is present in some locations.
Dense Shrubland, Upland; 384 acres	An upland shrub dominated community that is dominated by several types of willows and poplars. Closely related to the Dense Shrubland, Mesic community type, soils are typically a mixture of sand and loamy/clay. However, the water table was not observed and indicators of wetland hydrology, such as saturation visible on aerial imagery, are not present.

Community Type; Acreage	Description
Herbaceous, Sand, Upland; 213 acres	An upland, very dry herbaceous community dominated by a variety of adventive species including red clover (*Trifolium pratense*), lambs-quarters (*Chenopodium album*), nodding smartweed (*Persicaria lapathifolia*), and horseweed (*Conyza canadensis*). Few remnants, very stressed native herbaceous species are present. Sandy soils with no water table observed or any evidence of wetland hydrology indicators.
Herbaceous, Upland; 192 acres	An upland, herbaceous community dominated by a mixture of upland and wetland vegetation. Dominant herbaceous vegetation includes very wet species such as rice cut grass (*Leersia oryzoides*) and blue vervain (*Verbena hastata*), at times, but is primarily dominated by upland, advantageous species including several types of nut rushes (*Cyperus* spp.), clovers (*Trifolium* and *Melilotus* spp.), tall fescue (*Schedonorus arundinaceus*), and smartweeds (*Persicaria* spp.). Sandbar willow (*Salix exigua*) and eastern cottonwood (*Populus deltoides*) observed invading the herbaceous layer. Soils typically sandy, sometimes with a loamy/clayey component. The water table is not present or rarely observed. Hydrology indicators other than passing of the FAC-Neutral Test, are rarely present.
Herbaceous, Wetland; 165 acres	A wetland, herbaceous community dominated by primarily wetland vegetation. Dominant herbaceous vegetation primarily consists of early-successional and weedy species (sometimes upland species) including sow-thistle (*Sonchus arvensis*), reed canary grass (*Phalaris arundinacea*), cattails (*Typha* spp.), barnyard grass (*Echinochloa crus-gallii*), willow-herbs (*Epilobium* spp.), smartweeds, and purple loosestrife (*Lythrum salicaria*). At times, eastern cottonwood saplings dominate the herbaceous layer. Soils typically loamy/clayey. The water table is typically observed in the upper 3 feet of the soil profile, sometimes near surface.
Scattered Shrubland, Upland; 262 acres	An upland community with scattered shrubs at <50% cover. Dominant shrubby vegetation includes several types of willows and poplars. Dominant herbaceous vegetation includes a mixture of wetland and upland vegetation, from hydrophytic species including soft-stemmed rush (*Juncus effusus*), purple loosestrife, and fox sedge (*Carex vulpinoidea*), to upland species including clovers, sow-thistle, nodding smartweed, and crab grasses (*Digitaria* spp.). Soils typically sandy or sand underlain by gravel or loamy/clayey material. The water table is not present or rarely observed. Hydrology indicators other than passing of the FAC-Neutral Test, are not present.
Shrub-Carr, Wetland; 249 acres	A wetland, shrub dominated community that primarily consists of wetland vegetation. Dominant shrubs include a variety of willow and poplar species. Herbaceous vegetation dominating the understory includes purple loosestrife, soft-stemmed rush, reed canary grass, water horehound (*Lycopus americanus*), willow-herbs, and fox sedge. Soils are typically loamy/clayey underlain by a sandy material. The water table is typically within 2 to 3 feet, sometimes nearer the soil surface.

Invasive plants are weed species that are typically non-native and whose introduction is likely to cause economic or environmental harm or harm to human health (Executive Order 13112). Invasive plants can adversely affect vegetation communities by outcompeting native vegetation, leading to a reduction in biodiversity and degradation of habitats. Humans are the primary source of invasive plant introduction, and once established, invasive plants are often difficult to contain, control, and eradicate. Invasive plants are typically found in areas where the ground or soil has been disturbed, and are commonly found along transportation corridors (e.g., roads, highways, rail lines); utility corridors (e.g., transmission lines and

pipelines); in residential, commercial, and industrial areas; around agricultural lands; and in other developed, disturbed, or human-influenced areas. Purple loosestrife was the only invasive plant that was identified in the Plan Area.

3.3.2 Environmental Consequences

3.3.2.1 Impact Criteria

Vegetation can be impacted at the individual, population, or community level. Major impacts to vegetation typically occur when:

- Naturally occurring populations are reduced in numbers below levels for maintaining viability at local or regional level;
- There is substantial loss or degradation of soils or soils become unstable;
- There is substantial loss or degradation of habitat for a rare, threatened, or endangered species; or
- Invasive species outcompete and substantially replace native species.

3.3.2.2 Direct and Indirect Impacts to Vegetation Resources

Issuance of the ITP would not affect vegetation resources. Conservation and mitigation measures proposed by FLTF in the HCP, such as the establishment of vegetation buffers and restoration activities to minimize sedimentation into the Tobacco River and Wixom Lake would promote and enhance vegetation communities in the Plan Area. Outside of current landowner vegetation management practices (e.g., yard maintenance and agricultural practices) we do not anticipate a change in vegetation composition or quality over the 30-year permit term.

The No Action Alternative would not directly affect vegetation communities in the Plan Area. The Tobacco River and the bottomland vegetation communities would continue to develop and transition into riparian habitat. Floristic quality would likely remain similar to the current early successional community without restoration or enhancement initiatives. Wetlands and riparian habitats that were formerly influenced by Wixom Lake hydrology would continue to naturally transition into a mix of upland and wetland habitat types over time.

Removal of Edenville Dam Alternative would have similar vegetation effect as the No Action Alternative, although some vegetation enhancement may occur along the Tobacco River and Tittabawassee River where the dam is removed and river banks and riparian habitats are restored.

3.3.2.3 Cumulative Impacts to Vegetation

The foreseeable road widening and development projects identified in Section 3.1.2 would result in minor vegetation loss. However, none of the Project alternatives, in combination with the foreseeable actions, would have discernible impacts on vegetation at a scale that would contribute to or be exacerbated by environmental trends in the area.

3.4 Soil

3.4.1 Affected Environment

The U.S. Department of Agriculture, Natural Resource Conservation Service's (NRCS) Soil Survey Geographic Database was reviewed to identify predominant soil types within Gladwin and Midland Counties. As presented in Table 3.4-1, the primary soil types within these counties consist of sands and loams.

Table 3.4-1
Soil Characteristics in the Project's Plan Area

Dominant Soil Texture	Acreage	Percent Area within the Plan Area
Sand	3,382.1	39
Water	2,377.6	28
Loamy sand	1,386.3	16
Loam	545.4	6
Moderately decomposed plant material	310.2	4
Sandy loam	199.9	2
Silt loam	186.4	2
Silty clay loam	86.5	1
Slightly decomposed plant material	73.0	1
Fine sand	47.0	1
Very fine sandy loam	7.6	<1
Muck	5.3	<1

Relict soils are present throughout the current-day Wixom and Sanford Lake bottomlands. In certain locations, mucky soils were present in areas that did not exhibit wetland hydrology. Most areas where sediment had deposited during the May 2020 flood event consisted of sands.

3.4.2 Environmental Consequences

3.4.2.1 Impact Criteria

The following section analyzes potential impacts of each alternative on soils in the Plan Area. Major impacts to soils typically occur when:

- Disturbance or loss of vegetation cover increases erosion potential and soils are lost to wind or water erosion;
- Soils are degraded by contaminants or mixing of topsoil and subsoil layers; or
- Soils become compacted by human activities, which reduces soil porosity and increases runoff potential and sedimentation into low-lying areas.

3.4.2.2 Direct and Indirect Impacts to Soil

Issuance of the ITP would not affect soil resources. Conservation or mitigation measures proposed in the HCP to improve water quality and reduce sedimentation into the Tobacco River and Wixom Lake systems would likely preserve soils in the Plan Area and result in a positive, beneficial effect on soils.

Alternative 2, Removal of Edenville Dam, would require additional and prolonged soil disturbances within the dam property than the remaining dam repair work. However, FLTF would implement best management practices to manage stormwater and soil movement in accordance with Michigan Stormwater and Soil Erosion and Sediment Control regulations, and restoration of the dam property would likely improve overall soil management and preservation within the property once vegetation is restored and the site is stabilized.

The No Action Alternative would have no effect on soils.

3.4.2.3 Cumulative Impacts to Soil

Current environmental trends and reasonably foreseeable actions could affect soils, particularly actions that disturb soils. Clearing, grading, excavating, and soil stockpiling associated with road, utility, and development projects would cumulatively affect soil resources in the Plan Area. These activities would likely occur in separate locations and over different timeframes across the Project Area, which would minimize the local cumulative impacts on soils. These projects along with the proposed Project would implement best management practices to manage stormwater and soil movement to further minimize cumulative impacts on soils.

None of the alternatives would involve activities that would have discernible impacts on soils at a scale that would substantially contribute to or be exacerbated by other actions or environmental trends in the Plan Area. Conservation or mitigation measures proposed in the HCP to improve water quality and reduce sedimentation into the Tobacco River and Wixom Lake systems would preserve soils in the Plan Area and result in a positive, beneficial effect on soils.

3.5 Terrestrial Wildlife

This section addresses terrestrial wildlife that may occur within the Plan Area. State and Federal threatened and endangered species are addressed in Section 3.7.

3.5.1 Affected Environment

The terrestrial environment within and surrounding the Plan Area currently consists of riverine bottomland wetlands, bordered by adjacent residential areas, forests, and cropland. Common mammals that may occur within or near the Plan Area include coyote (*Canis latrans*), muskrat (*Ondatra zibethicus*), raccoon (*Procyon lotor*), and white-tailed deer (*Odocoileus virginianus*). Bird species that may be encountered include Canada Geese (*Branta canadensis*), Mallards (*Anas platyrhynchos*), Belted Kingfishers (*Megaceryle alcyon*), and Great Blue Herons (*Ardea herodias*), among many other species that can be found near aquatic and riparian areas. Various species of amphibians, insects, and reptiles are also likely to occur in and adjacent to the Plan Area.

3.5.1.1 Birds of Conservation Concern

The Fish and Wildlife Conservation Act of 1980, as amended (16 USC 2901, et seq.), mandates the Service to "identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the [ESA]" (16 USC 2912). The USFWS has identified those migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent the highest conservation priorities (USFWS 2021).

The USFWS' Information for Planning and Consultation lists the following species as birds of conservation concern in the Plan Area, which means these bird species require the highest conservation strategies based on population trends and threats: Black-Billed Cuckoo (*Coccyzus erythropthalmus*), Bobolink (*Dolichonyx oryzivorus*), Canada Warbler (*Cardellina canadensis*), Chimney Swift (*Chaetura pelagica*), Connecticut Warbler (*Oporornis agilis*), Golden-Winged Warbler (*Vermivora chrysoptera*), Lesser Yellowlegs (*Tringa flavipes*), Olive-sided Flycatcher (*Contopus cooperi*), Pectoral Sandpiper (*Calidris melanotos*), Red-headed Woodpecker (*Melanerpes erythrocephalus*), Rusty Blackbird (*Euphagus carolinus*), Veery (*Catharus fuscescens fuscescens*), and Wood Thrush (*Hylocichla mustelina*). The Michigan Natural Features Inventory (MNFI) lists the Red-shouldered Hawk (*Buteo lineatus*) and Bald Eagle as species of concern in Gladwin and Midland Counties as well as the Osprey (*Pandion haliaetus*) in Midland County.

3.5.1.2 Bald and Golden Eagles

Suitable bald eagle nesting habitat is present throughout the Project Area. The Plan Area contains numerous large white pine and other suitable nest trees along the Tittabawassee and Tobacco Rivers and large tracts of undisturbed land are present within 2 miles of the Plan Area.

3.5.2 Environmental Consequences

3.5.2.1 Impact Criteria

Major impacts to wildlife are those that substantially affect a species' population (locally, regionally, or range-wide) or reduce its habitat quality or quantity. Examples of effects include disturbance, injury, mortality, and habitat alteration. Other effects include habitat loss or degradation over time or effects to resources used by wildlife in different life stages (i.e., alterations to surface water or alterations to plant composition). Another potential effect may be the creation of habitat such as edges and openings that favor a different mix of species and, in some cases, increase predation pressure, thereby causing displacement or avoidance.

3.5.2.2 Direct and Indirect Impacts to Terrestrial Wildlife

The Proposed Action of issuing an ITP and implementing the HCP for the snuffbox mussel will not impact bald and golden eagles, birds of conservation concern, or terrestrial wildlife. Similarly, implementation of the No Action Alternative or Removal of the Edenville Dam Alternative would not impact bald and golden eagles, birds of conservation concern, or terrestrial wildlife.

3.5.2.3 Cumulative Impacts to Terrestrial Wildlife

Current environmental trends and reasonably foreseeable actions could have a minor impact on terrestrial wildlife. However, the issuance of an ITP and implementation of the HCP would not affect

terrestrial wildlife populations (locally, regionally, or range-wide) or reduce habitat quality or quantity, either singly or when aggregated with past, present, and reasonably foreseeable actions.

3.6 Aquatic Resources

This section addresses aquatic wildlife that may occur within the Permit and Plan Area; state and federally threatened and endangered species are addressed in Section 3.7.

3.6.1 Affected Environment

The Permit Area and the Tobacco River upstream to Beaverton Dam contain a high species richness and high number of live mussels. The river contains riffles, diverse substrates, gradually sloping shorelines, and is lacking eroded channelized vertical banks that were typically identified in other portions of Wixom Lake. Shorelines are lined with trees and vegetation unlike most of the surveyed sites in other parts of the Plan Area.

In August 2022 and February 2023, Streamside Ecological Services completed a desktop and field evaluation of surface water stream features associated with Wixom Lake. In total, 22 defined streams were identified based on the criteria set forth in Part 301 of Michigan's NREPA. Of these streams, 5 are currently considered perennial, and 17 are intermittent and may only flow during heavy precipitation or runoff events. Several of the channels exist due to concentrated runoff that sculpted the erosion-prone lakebed following dam failure, while other sites have indicators of being perennial but appear to have lost permanent flow due to the dam failure and loss of groundwater input. At all of these sites, erosion of the streambanks and streambed is common, and the substrates are still mostly unstable. All of these streams are small, averaging only a few feet in width and several inches in depth when water is present. The aquatic habitat for fish, macroinvertebrates, amphibians, or reptiles is severely limited.

Prior to dam failure, the Wixom Lake impoundment was dominated by cool- to warm-water fishes that are indicative of lake rather than riverine environments (Schrouder et al. 2009). Sunfishes, including black (*Pomoxis nigromaculatus*) and white crappie (*Pomoxis annularis*), bluegill (*Lepomis macrochirus*), pumpkinseed (*Lepomis gibbosus*), green sunfish (*Lepomis cyanellus*), and rock bass (*Ambloplites rupestris*) dominated the fish community and fishery prior to May 2020. Top predators in these systems were black bass [largemouth bass (*Micropterus salmoides*) and smallmouth bass (*Micropterus dolomieu*)], northern pike (*Esox Lucius*), muskellunge (*Esox masquinongy*), walleye (*Sander vitreus*), and channel catfish (*Ictalurus punctatus*). Additionally, the impoundment also had sizable populations of a variety of redhorse sucker species (*Moxostoma* spp.), white sucker (*Catostomus commersonii*), common carp (*Cyprinus carpio*), black bullhead (*Ameiurus melas*), brown bullhead (*Ameiurus nebulosus*), and yellow bullhead (*Ameiurus natalis*). Age distributions for the predator species were balanced with good survival to older ages, resulting in desirable numbers of large individuals to attract fishing activity. Periodic stocking of walleye and muskellunge by Michigan Department of Natural Resources (MDNR) supported the fisheries for those predatory species.

Three recent mussel surveys have been completed within the Plan Area. In December 2019, the MDNR conducted quantitative and semi-quantitative survey efforts for mussels associated with a water drawdown of Wixom Lake, at a point located approximately 0.4 mile downstream of the normal (legal) lake level extent of Wixom Lake within the Tobacco River (MDNR 2019). This survey identified six live species and seven species only represented by weathered shells. The survey identified one articulated snuffbox mussel and one valve, indicating that live snuffbox may be present in the area. Further evaluation

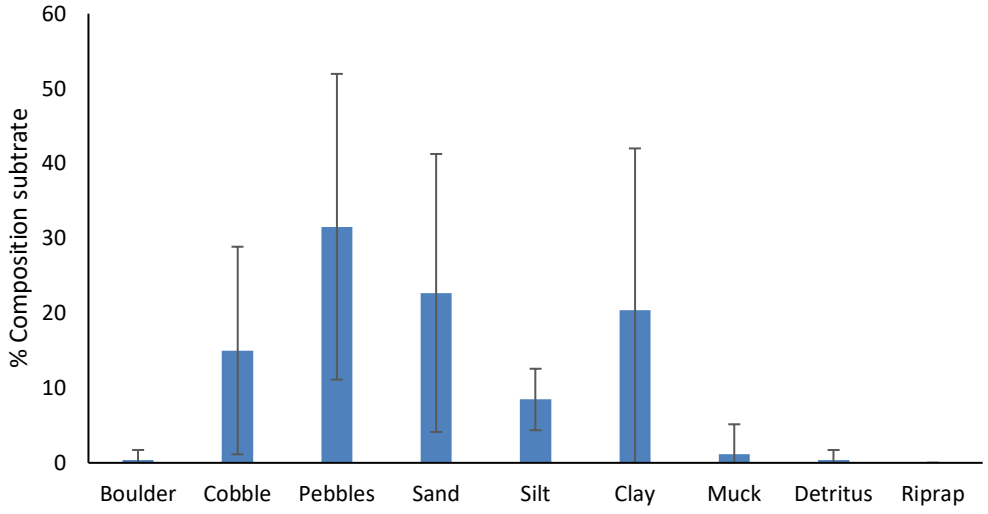
was completed in the vicinity of these findings in December 2019, searching specifically for snuffbox shells, and resulted in the identification of 6.5 fresh snuffbox shells (i.e., fresh nacre, periostracum, or hinge attached), two of which were articulated, and nine valves (MDNR 2019). In the third study, LaValley (2022) conducted surveys within the Tobacco River and 73 snuffbox shells were identified from 2 sites, with both male and female snuffbox shells present (LaValley 2022).

In 2022, FLTF initiated a mussel survey within Wixom Lake, Sanford Lake, and downstream of the Sanford Dam (Woolnough et al. 2022). A total of 87 sites were surveyed and utilized semi-quantitative search methods. A total of 17 live species were collected and an additional 6 species were detected only by weathered shells. Survey efforts identified one live snuffbox individual at the upstream extent of the Tobacco River arm of Wixom Lake within the Permit Area. During these assessments, Central Michigan University divers collected water quality measurements, generally characterized the aquatic habitat, and collected percentages of substrate types as presented in Table 3.6-1 and Figure 3.6-1.

Table 3.6-1
Plan Area Water Quality Data

Parameter	June	July	August
Water Temperature	22.68 degrees Celsius (^{o}C)	21 ^{o}C	23.8 ^{o}C
Degree of Silt	Medium – Heavy	Heavy	Heavy
Total Dissolved Sediments	326 parts per million (ppm)	330 ppm	332 ppm
Aquatic Macrophytes	Absent – Low	Medium	Absent – Low
Algal Growth	None – Medium	None	Slight

Figure 3.6-1
Substrate Composition within the Plan Area (Wentworth Scale + Riprap)



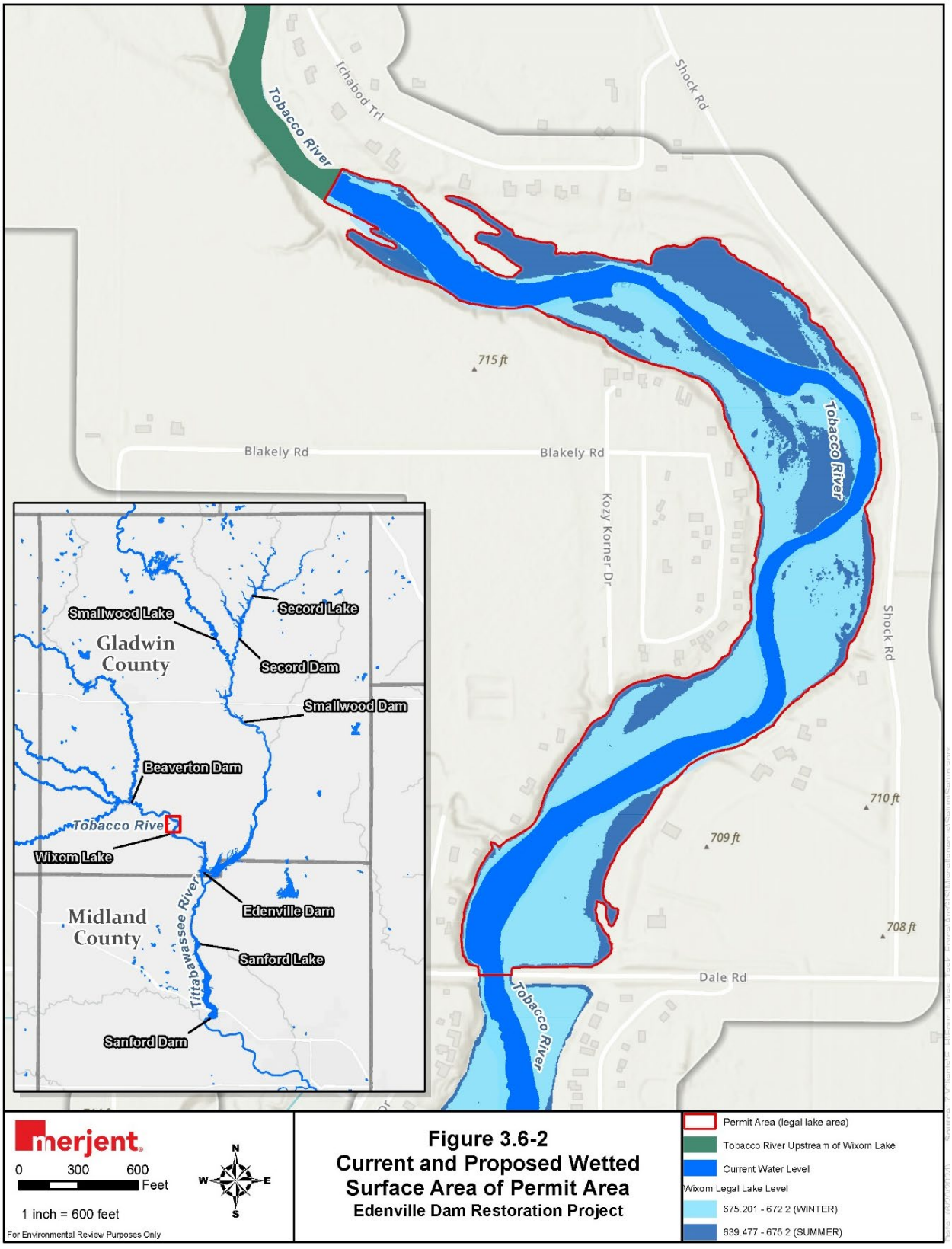
The most recent water quality data available from the Tobacco River portion of the Plan Area was collected in May 2023 by the Service's Sea Lamprey Control Program (USFWS 2023a). Program staff sampled various sites within the Tobacco River and select tributaries from the Beaverton Dam to below the Edenville Dam to assess water quality characteristics associated with potential sea lamprey control applications. Table 3.6-2 provides a summary of the collected parameters at Tobacco River sites and are

organized from upstream to downstream. Water temperature over the 2-day sampling period ranged from 15-20 ^{o}C and dissolved oxygen ranged from 7.5 to 11.7 milligrams per liter (mg/L). Within a given sampling day the range of water temperatures varied by 2 ^{o}C and therefore are not suggested to change significantly from upstream to downstream. Dissolved oxygen also showed limited change from upstream to downstream sites with a range of 3.3 mg/L and 2.7 mg/L on sampling days. Alkalinity and pH were similar between sampling sites and showed no significant change from upstream to downstream.

Table 3.6-2
Tobacco River Water Quality Data

Site	Sample Date	Temperature °C	Dissolved Oxygen (mg/L)	pH	Alkalinity (mg/L)
Tobacco River at Beaverton Dam spillway	5/11/2023	17.0	7.5	8.38	200
Tobacco River (Powerhouse Channel) at Beaverton Dam Powerhouse	5/10/2023	18.0	11.6	8.39	199
Tobacco River (Powerhouse Channel) at Beaverton Dam Powerhouse	5/11/2023	16.0	10.2	8.41	202
Tobacco River below Beaverton Dam spillway	5/10/2023	20.0	8.4	8.39	200
Tobacco River at Glidden Road	5/10/2023	18.4	10.2	8.41	199
Tobacco River at Glidden Road	5/11/2023	16.0	9.5	8.39	202
Tobacco River at Dale Road	5/10/2023	20.0	10.2	8.63	202
Tobacco River at Dale Road	5/11/2023	15.0	8.5	8.26	201
Tobacco River at Public Access Site	5/10/2023	19.4	11.7	8.65	197
Tobacco River at Public Access Site	5/11/2023	15.0	8.2	8.23	197
Tobacco River at Edenville Dam	5/10/2023	19.6	10.3	8.54	194
Tobacco River below Edenville Dam	5/11/2023	16.0	9.3	8.38	197

Within the Permit Area, the present-day Tobacco River has a wetted surface area of 18.17 acres. This 18.17 acres is not influenced by the downstream Edenville Dam in its current status. This water level may fluctuate depending on climatic conditions but is not influenced by downstream impoundments. Upon refill of the impoundment as a part of the Project, this area is anticipated to increase to a total wetted lake surface of 69.21 acres. At this point, the wetted surface area would be impacted by the downstream Edenville Dam during yearly winter drawdowns. The winter drawdown would decrease the total wetted area from 69.21 acres to 50.64 acres. Current wetted areas versus the proposed wetted areas are displayed on Figure 3.6-2.


Tobacco River
Ichabod Trl
Shock Rd
715 ft
Blakely Rd
Blakely Rd
Kozy Korner Dr
Tobacco River
Shock Rd
710 ft
709 ft
708 ft
Dale Rd
Tobacco River
Smallwood Lake
Secord Lake
Gladwin County
Secord Dam
Smallwood Dam
Beaverton Dam
Tobacco River
Wixom Lake
Midland County
Tittabawassee River
Edenville Dam
Sanford Lake
Sanford Dam
merjent
0 300 600
Feet
1 inch = 600 feet
For Environmental Review Purposes Only
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E
S
Figure 3.6-2
Current and Proposed Wetted Surface Area of Permit Area
Edenville Dam Restoration Project
Permit Area (legal lake area)
Tobacco River Upstream of Wixom Lake
Current Water Level
Wixom Legal Lake Level
675.201 - 672.2 (WINTER)
639.477 - 675.2 (SUMMER)

3.6.2 Environmental Consequences

3.6.2.1 Impact Criteria

Major impacts to aquatic resources are those that substantially affect a species' population (locally, regionally, or range-wide) or habitat. Impacts to aquatic resources would be considered significant when:

- Naturally occurring populations are reduced in numbers below levels for maintaining viability at local or regional level;
- There is substantial loss or degradation of habitat; or
- Invasive species outcompete and substantially replace native species.

3.6.2.2 Direct and Indirect Impacts to Aquatic Species

Issuance of the ITP would not have a measurable effect on aquatic resources in the Plan Area. The conservation strategies, mitigation measures, and monitoring proposed in the HCP would likely improve water quality within the Tobacco River, Wixom Lake, and downstream portions of the Tittabawassee River and result in beneficial effects on aquatic species that use these systems.

Implementation of the No Action Alternative, or not issuing the ITP, would keep the Tobacco River in a riverine condition, which would benefit the current riverine aquatic species that have adapted to this environment since the dam failure. Restoring Wixom Lake would negatively affect riverine aquatic species by decreasing the length of free-flowing river with the historic Wixom Lake reach of the Tittabawassee and Tobacco Rivers. Aquatic species that prefer lacustrine systems would benefit from the restoration of Wixom Lake.

Aquatic resources have been periodically impacted by dam repair activities within the Tittabawassee and Tobacco Rivers over the past 3 years. The Edenville Dam Removal Alternative would have continued and prolonged impacts on aquatic resources within these rivers until the dam was removed and the rivers were restored or stabilized. However, the removal of the dam would not require an ITP.

3.6.2.3 Cumulative Impacts to Aquatic Species

Current environmental trends and reasonably foreseeable actions could have a minor impact on aquatic resources if erosion, sedimentation, or contaminants enter surface waters. However, the issuance of an ITP for snuffbox mussel would not affect other aquatic resources (locally, regionally, or range-wide) or reduce habitat quality or quantity, either singly or when aggregated with past, present, and reasonably foreseeable actions. Implementation of the HCP may reduce erosion, sedimentation, or contaminants impacts that would otherwise negatively impact aquatic resources.

3.7 Federal- and State-Listed Species

3.7.1 Affected Environment

3.7.1.1 Federal-listed Species

The USFWS' Information for Planning and Consultation was queried for a list of threatened, endangered, proposed, and candidate species with ranges within the Plan Area and where impacts may occur. Six species have the potential to occur within the Plan Area: northern long-eared bat (*Myotis septentrionalis*), tricolored bat (*Perimyotis subflavus*), Rufa Red Knot (*Calidris canutus rufa*), eastern massasauga rattlesnake (*Sistrurus catenatus*), snuffbox (*Epioblasma triquetra*), and monarch (*Danaus plexippus*) (Table 3.7-1). There are no federally designated or proposed critical habitats within the Plan Area.

Table 3.7-1
Federally Listed, Proposed, and Candidate Species in the Plan Area [a]

Species	Federal Status
Mammals	
Northern Long-eared Bat	Endangered
Tricolored Bat	Proposed Endangered
Birds	
Rufa Red Knot	Threatened
Reptiles	
Eastern Massasauga Rattlesnake	Threatened
Mussels	
Snuffbox	Threatened
Insects	
Monarch Butterfly	Candidate Species
[a] https://ecos.fws.gov/ipac/	

3.7.1.2 State-listed Species

The MNFI was queried for a list of state-listed threatened and endangered species in Gladwin and Midland Counties. Seventeen species have the potential to occur within the counties: Black Tern (*Chlidonias niger*), Common Loon (*Gavia immer*), Common Tern (*Sterna hirundo*), Henslow's Sparrow (*Centronyx henslowii*), Northern Goshawk (*Accipiter gentilis*), Peregrine Falcon (*Falco peregrinus*), pugnose shiner (*Notropis anogenus*), spotted turtle (*Clemmys guttata*), wood turtle (*Glyptemys insculpta*), black sandshell (*Ligumia recta*), slippershell (*Alasmidonta viridis*), snuffbox (*Epioblasma triquetra*), American bumblebee (*Bombus pensylvanicus*), rusty-patched bumble bee (*Bombus affinis*), weak stellate sedge (*Carex seorsa*), forked aster (*Eurybia furcata*), and Virginia spiderwort (*Tradescantia virginiana*) (Table 3.7-2). Common Loons, Peregrine Falcons, wood turtles, black sandshells, slippershells, and snuffbox have documented occurrences within the last 10 years (since 2014) (MNFI 2024).

Table 3.7-2
Michigan State-Listed Species Documented to occur in the Plan Area

Species	State Status	County	Last Observation in Gladwin County	Last Observation in Midland County
Birds				
Black Tern	T	Midland	-	2001
Common Loon	T	Gladwin	2022	
Common Tern	T	Midland	-	2002
Henslow's Sparrow	E	Gladwin	2007	-
Northern Goshawk	T	Midland	-	2001
Peregrine Falcon	T	Midland	-	2020
Fish				
Pugnose Shiner	E	Gladwin	1953	-
Amphibians				
Spotted Turtle	T	Gladwin	1998	
Wood Turtle	T	Gladwin, Midland	2020	2022
Mussels				
Black Sandshell	T	Midland	-	2020
Slippershell	T	Gladwin	1981	2020
Snuffbox	E	Midland	-	2020
Insects				
American Bumblebee	E	Midland	-	1935
Rusty-patched Bumble Bee	E	Gladwin, Midland	1959	1965
Plants				
Weak Stellate Sedge	T	Midland		1934
Forked Aster	T	Midland		2014
Virginia Spiderwort	T	Midland		1977

[a] MNFI 2024.

This EA is focused on the Federal action of issuance of a Section 10 ITP by the USFWS and the associated conservation strategy, including minimization and mitigation measures, monitoring, and adaptive management. The federally listed species with the potential to be affected by the Federal action is the snuffbox. A description of this species status, natural history, range, threats, and occurrence within the Plan Area is provided below.

3.7.1.3 Snuffbox Status, Natural History, Range, and Threats

The snuffbox was listed as federally endangered under the ESA in 2012; in the final listing rule, the USFWS concluded that critical habitat was not determinable (USFWS 2012). The USFWS published a Draft Recovery Plan for the species in 2023 (USFWS 2023b). It is also state listed as endangered and protected under Part 365 of Michigan's NREPA.

The federally endangered snuffbox ranges in size from a maximum of 1.8 inches long for females to 2.8 inches long for males (USFWS 2024b). The species is sexually dimorphic with males having a more elongated oval shaped shell, whereas female shells are more triangular (USFWS 2024a). The external shell is typically yellow-green and smooth but darkens as the individual ages (USFWS 2024b). Similar to other mussel species, snuffbox rely on host fish to translocate glochidia (larval mussels) to different reaches of waterbodies. The larvae specifically rely on its primary host, logperch (*Percina caprodes*), and occasionally blackside darters (*P. maculata)*, for dispersal. Studies on logperch indicated they move on average less than 246 feet (75 meters) within their home range (Schwalb et al. 2011). The snuffbox will capture a host and form a seal around the fish's head while it releases glochidia; some of these glochidia attach to the gills of the host fish species; because logperch have a sturdier skull than other species, they are likely to survive capture (Barnhart et al. 2008).

Snuffbox can be found in rivers and medium-sized streams as well as lake shores with flowing water. They prefer swift currents and substrates consisting of gravel, sand, and cobble where they can often be found buried (USFWS 2022). Water quality features found in snuffbox habitat generally include higher oxygen levels (found in areas with adequate water flow), low turbidity levels, and low suspended solids (USFWS 2022). Within the Plan Area, suitable habitat that supports a diverse array of mussel species exists in Wixom Lake's current condition including in the Tobacco River north of the Dale Road bridge (Table 3.6-1; Table 3.6-2; Figure 3.6-1). Within the Permit Area in Wixom Lake north of the Dale Road bridge and south of the northern boundary of the Lake is 1.3 linear miles of snuffbox habitat that in its current condition provides riverine habitat with suitable substrate and water conditions capable of supporting snuffbox. The 0.25 linear mile of habitat at the northern end of the Permit Area contains highly suitable habitat with appropriate substrate composition, water quality, and bedform diversity. The remaining 1.05 linear miles of habitat in the Permit Area is considered marginal habitat that is not as suitable for snuffbox.

The historic range in the United States for the snuffbox includes Alabama, Arkansas, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Mississippi, Missouri, New York, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin. It is currently known to exist in all the aforementioned states except Iowa, Kansas, Mississippi, and New York (USFWS 2022). In Michigan, the historical river systems included the St. Lawrence River within Lake Erie, Lake Huron, and Lake Michigan drainages (Zanatta and Murphy 2008).

There are currently 56 extant populations within the known snuffbox range (USFWS 2022). The 2022 Species Status Assessment (SSA) (USFWS 2022) assigns both a demographic condition and a risk factor to 55 of the known population to determine their status and likelihood of survival. The demographic conditions are:

- high (>75 individuals distributed over 30 or more river miles with juveniles present with the likelihood of the population persisting over 40 years at over 90 percent probability);
- moderate (25 to 75 individuals distributed throughout 10 to 30 river miles with juveniles present with 60 to 90 percent probability that the population will persist over 40 years);
- low (1 to 25 individuals occurring in less than 10 river miles with no juveniles and a 10 to 60 percent probability of persistence over 40 years); and

- very low (no live or recently deceased individuals collected in the last 20 years, with observations at two or less locations, no juveniles, and a less than 10 percent probability that the population persists for 40 years).

The risk factor analysis looked at five categories that could threaten the persistence of known populations. These included water quality/contaminants, land use in the population area, hydrologic regime, habitat connectivity, and presence of invasive species. Risk factors were defined as:

- high (contaminants exceed acute toxicity levels in mussels in more than 2 percent of samples, landscape is severely altered by humans, hydrologic regime is highly altered by humans, habitat is highly fragmented, and a high abundance of invasive species was present);

- moderate (contaminants exceed acute toxicity levels in less than 2 percent of samples, landscape moderately altered, hydrological regime moderately altered, some habitat fragmentation, and invasive species present); and

- low (contaminant levels below acute toxicity, landscape is slightly altered or unaltered, hydrological regime remains under natural conditions, few to no fragmentation, and absence of invasive species).

In an ideal scenario, populations would have a high demographic condition (healthy population with good recruitment) and a low risk factor (unaltered suitable habitat with few threats).

Across the range, the demographic condition is considered high for 8 populations, moderate for 9 populations, low for 32, and very low/functionally extirpated for 6 populations. The risk factor condition across the known populations considers 27 populations to be at high risk, 23 to be at a moderate risk, 4 populations a low risk, with 1 population status unknown. The SSA defines the known populations within six representation units, including the Great Lakes Basin, Ohio, Tennessee, Upper Mississippi, Lower Mississippi, and the Arkansas-White-Red region. The Great Lakes Basin unit encompasses 11 of the 56 extant populations, with several of these at risk of persisting into the future. Of the 11, 4 are considered to have low demographic condition and 4 are considered high risk. The Tittabawassee population is 1 of the 11 populations within the Great Lakes Basin; snuffbox in the Plan and Permit Area in the Tobacco River are a part of the Tittabawassee population. This population is considered to have a low demographic condition and to be at moderate risk.

The draft species recovery plan recommends that 40 populations with a high demographic condition and moderate to low risk level or moderate condition and low risk are established before the species can be removed from the Federal endangered species list (USFWS 2023b). At least six of these should be in the Great Lakes Basin, with other stable populations spread out across the range. Although there are currently more than 40 populations, more than half are either a low demographic level or a high risk and therefore do not meet the criteria to establish a viable and sustainable population of snuffbox across its range.

Potential threats to the snuffbox mussel across the species range includes exposure to contaminants and heavy metals. These contaminants end up in the waterbodies through runoff from various sources such as road salts, fertilizers, pesticides, and wastewater treatment plants. Both acute and chronic exposure to a variety of contaminants and heavy metals can alter biological processes and behavior, thus affecting survival and recruitment or lead directly to mortality (USFWS 2022). Sedimentation is a threat to mussels as it smothers individuals and affects their ability to perform respiration and to feed. Additional threats

to mussels include low dissolved oxygen levels and temperature changes outside their thermal tolerance. Altered hydrological regimes can change preferred habitat; increased flooding can cause scouring and loss of suitable substrate while drought can lead to changes in temperature and dissolved oxygen levels (USFWS 2022). Invasive species also pose significant threats to snuffbox mussels. Zebra mussels (*Dreissena polymorpha*) compete with native freshwater mussels for resources and can directly harm native species by attaching directly to the native species and impeding biological functions. Asian clams (*Corbicula fluminea*) can also compete with native mussels for resources. Other invasive species with potential negative impacts include non-native carp species, which prey directly on mussels, and the spiny waterflea (*Bythotrephes longimanus*), which can alter the planktonic community that mussels rely on (USFWS 2022).

Several threats to the snuffbox and snuffbox habitat are potentially problematic in the Plan Area. One of the primary threats to the snuffbox in the Plan Area is loss of habitat and habitat degradation that is expected from the alteration to the hydrologic regime with the change from a riverine to lacustrine system and subsequent loss of suitable habitat. The expected change in water flow may lead to increased sedimentation and accumulation of contaminants. Agricultural runoff from farms surrounding the Plan Area can increase the presence of pesticides and fertilizers within the aquatic environment. There is potential for invasive species to affect the survival of the snuffbox population. Aquatic hitchhikers can be transferred from nearby waterbodies by boaters or non-native species can be introduced for stocking the lake for sporting purposes when the lake is returned to legal levels. Zebra mussels have been documented within the same areas as snuffbox mussels (Woolnough et al. 2022).

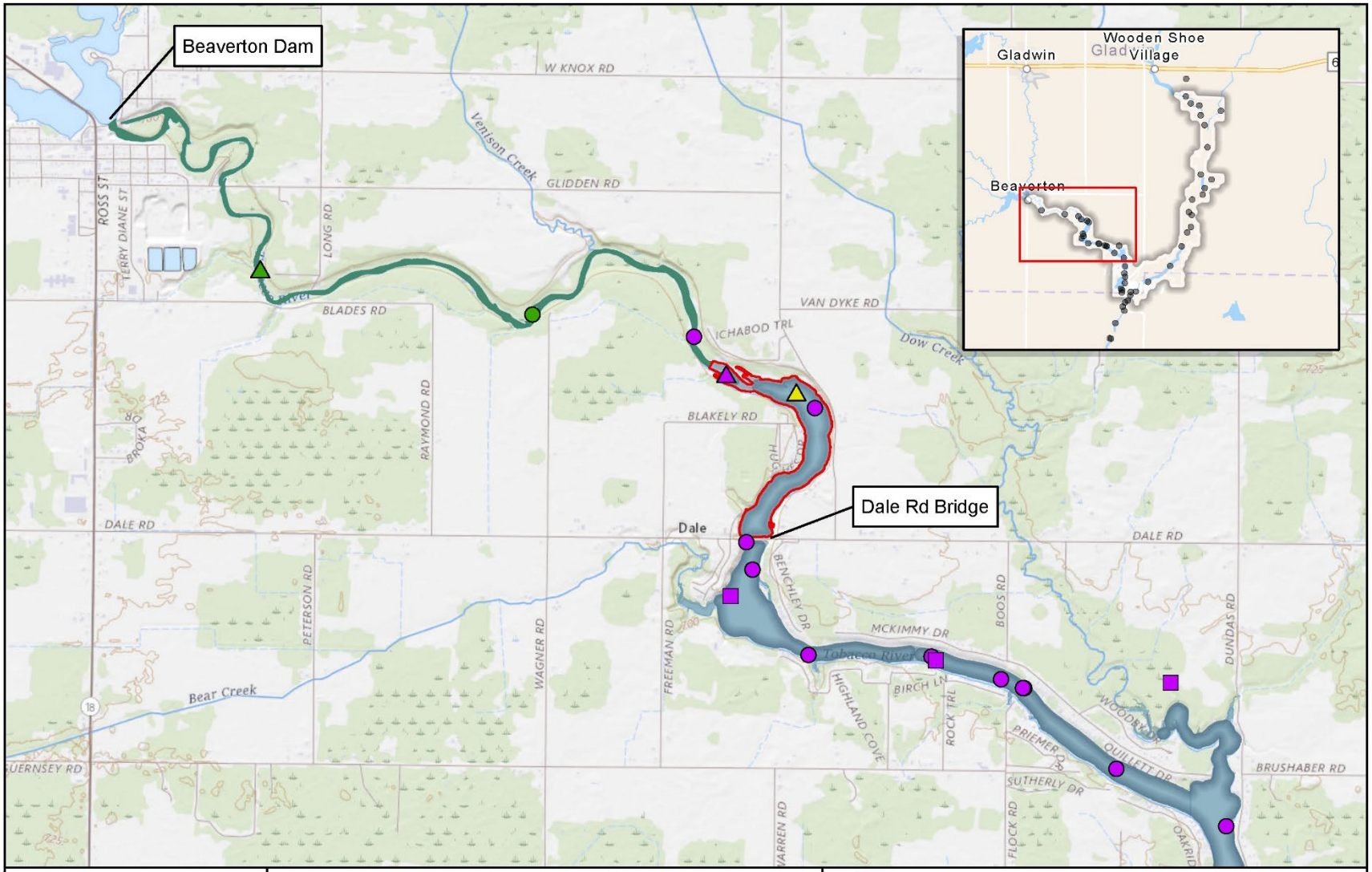
3.7.1.4 Snuffbox Occurrence within the Plan Area

A total of four live snuffbox mussels were identified between 2019 and 2022 in the Tobacco River between the Beaverton Dam and Edenville Dam (Table 3.7-3 and Figure 3.7-1). One live snuffbox was identified in Wixom Lake within the Tobacco River in 2019 during a drawdown period (MDNR 2019). The MDNR performed a mussel survey in December 2019 to search for additional snuffbox in the vicinity of the live observation. The survey identified two articulated snuffbox shells and nine snuffbox valves, but no additional live specimens (MDNR 2019).

Table 3.7-3
Live Snuffbox Mussels Identified within the Tobacco River Arm of Wixom Lake Between 2019 and 2022

Year	Number of Live Individuals	Sex	Number of Shells Identified	Catch Per Unit Effort (CPUE)
2019[a]	1	Unknown	2	NA
2020-2021[b]	2	Male	73	0.09
2022[c]	1	Female	46	0.25

[a] MDNR 2019; personal communication, Jess Pruden, USFWS, April 3, 2024.
[b] LaValley 2022.
[c] Woolnough et al. 2022.


Beaverton Dam
Dale Rd Bridge
Dale
Gladwin
Wooden Shoe Village
Beaverton
W KNOX RD
GLIDDEN RD
BLADES RD
VAN DYKE RD
ICHABOD TRL
BLAKELY RD
DALE RD
MCKIMMY DR
BIRCH LN
BRUSHABER RD
SUTHERLY DR
ROSS ST
TERRY DIANE ST
LONG RD
RAYMOND RD
PETERSON RD
WAGNER RD
FREEMAN RD
BENCHLEY DR
BOOS RD
DUNDAS RD
HIGHLAND COVE
ROCK TRL
PRIEMER DR
QUILLETT DR
FLOCK RD
WARREN RD
Venison Creek
Dow Creek
Bear Creek
Tobacco River
N
0 0.35 0.7 Mi
Figure 3.7-1
Snuffbox Survey Results (2019-2022) in the Plan and Permit Area
Edenville Dam Restoration Project
Tobacco and Tittabawassee Rivers, Michigan
Tobacco River
Wixom Lake
Permit Area (legal lake area)
Woolnaugh et al. 2022
Live
Fresh dead, weathered, or subfossil
None
LaValley 2022
Live
Fresh dead, weathered, or subfossil
MDNR 2019
Live and fresh dead, weathered, or subfossil

LaValley (2022) conducted surveys across Michigan to identify populations of snuffbox mussels. Two live, male snuffbox mussels were found during the surveys that took place between 2020 and 2021. Of the two specimens identified, one was a mature adult, the other was a subadult male which, still had byssal threads attached, indicating reproduction had occurred. Although no additional live individuals were located during this effort, snuffbox shells were collected from the same sampling location and an additional site. Within the Tobacco River survey sites, 73 snuffbox shells were identified from 2 sites, with both male and female snuffbox shells present (LaValley 2022). Catch per unit effort (CPUE) is an indirect measurement of species abundance. It is the number of live individuals found divided by the number of person hours searching for the species. The CPUE for the Tobacco River sites was 0.09 (LaValley 2022).

Snuffbox surveys were conducted by Woolnough et al. in 2022 within the Tobacco River arm of Wixom Lake, Wixom Lake, and Sanford Lake. One live female snuffbox was found within the Tobacco River arm of Wixom Lake within the Permit Area. An additional 46 shells, with a mix of female and males present, were found. Four of these shells were considered recently deceased individuals. The CPUE for this study was 0.25 (Woolnough et al. 2022). The number of shells may indicate that there once was a larger population of snuffbox, and this population has experienced a decline (LaValley 2022).

3.7.2 Environmental Consequences

3.7.2.1 Impact Criteria

Section 9 of the ESA prohibits "take" of a federally listed threatened or endangered species. "Take" is defined as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 USC § 1532(19)). "Harm" is additionally defined as "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering" (CFR 50(I)(B)(17)(A) § 17.3). If a proposed action may lead to incidental take as prohibited under Section 9 of the ESA and the proposed project does not have a Federal nexus, an ITP can be applied for under Section 10 of the ESA. Section 10(a)(1)(B) of the ESA states that a permit may be issued if any take otherwise prohibited by Section 9(a)(1)(B) if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity (16 USC § 1532). If an applicant applies for a permit, Section 10(a)(2)(A) specifies that the following requirements be met as part of a conservation plan: the impacts that will result from take, the steps the applicant will take to minimize and mitigate impacts and provide funding to minimize and mitigate, what alternative actions has the applicant considered and why the alternatives were not selected, and any other measures the Secretary of the Interior may deem necessary or appropriate. This DEA is focused on the Federal action of the USFWS' issuance of an ITP for the snuffbox under Section 10(a)(1)(B) of the ESA.

NREPA provides regulation for the protection of threatened and endangered species in Michigan. Take is prohibited (NREPA Section 324.36501), and if activities within the Plan Area cannot avoid endangered or threatened species, a take permit is required and can be obtained from the MNFI. The snuffbox is also listed as a state-endangered species; the FLTF is coordinating with the MDNR regarding a take permit under NREPA.

3.7.2.2 Direct and Indirect Impacts to Federal- and State Listed Species

The direct and indirect impacts of take on Federal- and state-listed species from the Project are limited to impacts on the snuffbox mussel, and this EA focuses on the Federal action of ITP issuance under Section

10 of the ESA for snuffbox individuals. Issuance of the ITP would result in the incidental take of up to 84 snuffbox individuals due to potential direct take of individual snuffbox and indirect impacts on snuffbox suitable habitat due to the Project with a resulting decrease in the population size of the Tittabawassee River population, as described below.

Direct Impacts

Federal issuance of the ITP that authorizes the incidental take of up to 84 snuffbox individuals in the Permit Area from Project implementation includes mortality from direct take from winter drawdowns in areas of Wixom Lake where normal (legal) lake level would be restored (see Figure 3.6.2). Based on FLTF's plans for restoration and operations, the areas of Wixom Lake where winter dewatering will occur are not within the Tobacco River's current wetted channel; at present, snuffbox and the snuffbox's host fish are limited to the current wetted channel. If the Wixom Lake normal (legal) lake level is restored, areas outside of the current wetted channel would become habitat and would be seasonally available for snuffbox and its host species prior to winter drawdown. Mortality of individual snuffbox and host fish species is possible if these individuals move into the winter drawdown areas and are present during annual dewatering. The amount of mortality due to dewatering is expected to be limited. Mussels are not highly mobile, and only a limited number of individuals may migrate laterally into the winter drawdown areas each year. In addition, the portions of Wixom Lake that are subject to winter drawdowns are marginal habitats for freshwater mussels, including backwater areas, channel margins, and mid-channel depositional zones where there may be reduced currents and additional fine sediment loads (sand and silt). Thus, there may also be reduced likelihood that snuffbox glochidia will be brought into the areas on their host fish. Nonetheless, there is potential for limited mortality of snuffbox individuals and host fish species during their annual winter drawdown.

Indirect impacts

Federal issuance of the ITP that authorizes the incidental take of up to 84 snuffbox individuals in the Permit Area from Project implementation also includes mortality from indirect impacts due to degradation and loss of the species suitable habitat; these potential indirect impacts on individuals are outlined below. Subsequent indirect impacts from the incidental take of individuals in the Tittabawassee River population on the recovery of snuffbox are also outlined. Last, potential benefits to the snuffbox due to FLTF's implementation of the HCP Conservation Strategy are discussed; this Conservation Strategy addresses the issuance criteria of the HCP ITP to not appreciably reduce the likelihood of survival and recovery of species in the wild.

Federal Action of Issuance of ITP

The current riverine habitat within the Permit Area will become lacustrine when the legal limit of Wixom Lake is re-established. The expected change in habitat types will result in degradation and loss of snuffbox suitable habitat in the Permit Area and indirect take of snuffbox. The current riverine conditions within the Permit Area that contained snuffbox mussels in the 2022 surveys supported suitable habitat that contained riffles, diverse substrate, and gently sloping, tree lined shores (Woolnough et al. 2022). This is expected to revert to a lacustrine system, which is often associated with decreased water flow, increased sedimentation and potential loss of diverse substrate, and increased turbidity. As water flow is decreased, riffle habitat will be lost. As pools form and the water depth increases with lake re-establishment, sediments in the water will settle to the bottom, likely changing substrate habitat from a heterogeneous combination of sand, gravel, and cobble to silt. Fine sediments can cause implications for freshwater

mussels related to respiration and ability to feed, it limits burrowing capacity, and can interfere with reproduction (Goldsmith et al. 2020, Box and Mossa 1999). Increased sedimentation and suspended solids in the water column can contribute to low dissolved oxygen levels in the water and can affect water temperatures within the lake (Donohue and Molinos 2009).

The loss of riffle habitat will also impact the snuffbox host species, logperch, and may cause them to migrate to more suitable habitat upstream of lake habitat, leaving snuffbox mussels located in the Permit Area with decreased access to host species and the ability for glochidia to mature and disperse. Additionally, with the change from a riverine to a lake system, water quality parameters may change, including dissolved oxygen and water temperature, and accumulation of contaminants and heavy metals. Temperature changes outside of the thermal tolerance for snuffbox may impact reproduction and affect mortality (USFWS 2022). Preferred snuffbox habitat is located within riffles in riverine habitat. Riffles increase the turbulence of water and therefore increase oxygen levels in the water (Cook and Sullivan 2018). When the riffle habitat is lost, sediments may settle into the habitat where mussels are located. Dissolved oxygen can be lower in this interstitial space and decrease when sedimentation occurs. When the water levels deepen, dissolved oxygen may remain higher near the water surface, but decrease lower in the water column. Low levels of dissolved oxygen may affect juvenile growth rates, metabolism, and mussel behavior (USFWS 2022). Heavy metals and other contaminants are often present in the sediments within aquatic systems. The presence of contaminants within the sediments, coupled with increased sedimentation risks exposing snuffbox to additional stressors, affecting long-term survival, reproduction, and other biological processes. Juveniles may be particularly susceptible to the contaminants associated with sediments (Archambault et al. 2017).

Take of snuffbox mussels within the permit area is expected to be 84 individuals. This estimation is based on the mussel density of 0.0003 per square meter (m^2) over 280,082.9 m^2 (69.21 acres) as estimated by Laszlo et al. 2022 and compared to the wetted area of Wixom Lake within the Permit Area. Changes in habitat may cause the loss of individuals over time due to inability to survive if conditions, such as sedimentation, inhibit optimal functioning. Individual snuffbox mussels within the Permit Area are not highly mobile and may not have the ability to move to more suitable habitat.

Changes in habitat will also affect the host species, logperch, that snuffbox mussel rely on to disperse glochidia and that helps maintain connectivity between snuffbox within a river system. Although logperch generally do not move over long distances (Schwalb et al. 2011), they are mobile and will be able to relocate to preferred riverine habitat as Wixom Lake is returned to legal lake levels. Although the logperch population may not be significantly impacted by habitat loss, their potential displacement from the Permit Area may disrupt connectivity of snuffbox between the Permit Area and other population segments within the Tobacco River; these impacts on connectivity may have further implications for the resiliency of snuffbox within the Tobacco River.

Although anticipated changes in habitat may not be beneficial for snuffbox and logperch, these changes may be conducive for zebra mussel in the Tobacco River. Zebra mussels, an invasive aquatic species that has been documented in the Tobacco River, are well suited to low water velocities found in lacustrine environments (LaValley 2022, Benson et al. 2023). Zebra mussels may impact the survival of snuffbox in Wixom Lake for several reasons. Zebra mussels are known to cause biofouling, where they directly attach to the surface of other mussel species, including the snuffbox. This effectively restricts native mussel species movement, filter feeding, and reproduction. Zebra mussels can filter phytoplankton at finer densities than snuffbox, outcompeting them for food resources (USFWS 2022). Zebra mussels have also been documented within the Tobacco River. Zebra mussels were documented in the same vicinity as

snuffbox mussels within the Permit Area. The density of zebra mussels was considered low with only a few groups of zebra mussels documented, and less than 25 zebra mussels attached directly to other species of live mussels at the site where snuffbox were found (Woolnough et al. 2022). Live zebra mussels were also documented within the Tobacco River (LaValley 2022). A transition to a lower-velocity, lacustrine habitat in the Permit Area may result in an increase of zebra mussels, which in turn may pose an increased risk for snuffbox.

Other activities associated with re-establishing the lake have the potential to lead to indirect impacts to snuffbox mussels due to fish-stocking practices and other non-native invasive species. Prior to the dam failure, Wixom Lake was a popular location for fishing and angling and other recreational activities and is expected to be used similarly upon return of the legal lake limits. Fish imported for stocking the lake have the potential to compete with native mussels for resources, and the native mussels may be consumed by these fish. With increased boat traffic after lake levels are restored, there is an increased chance of introduction of aquatic hitch hikers that could become invasive in the lake and compete with snuffbox for resources.

Indirect effects may also impact the snuffbox mussel at the population level. The snuffbox in the Tobacco River are considered to be in decline (LaValley 2022). Additional losses of individuals within the Permit Area will likely accelerate the decline of this population. There is suitable habitat and documented individuals upstream of the Permit Area that are not expected to be impacted directly; however, this upstream population could also be impacted by loss of recruitment from the population in the Permit Area in the long term. Individuals in the Tobacco River are part of the Tittabawassee River population — one of 11 populations remaining within the Great Lakes Basin watershed. This population is considered to have a low demographic condition, meaning that there a few individuals present that occur within less than 10 miles and no juveniles or less than 5 gravid females were detected (between 2000 and 2020) (USFWS 2022). This population is also considered at moderate risk because it has one or more of the following: contaminants exceed acute toxicity levels in less than 2 percent of samples, landscape moderately altered, hydrological regime moderately altered, some habitat fragmentation, or invasive species present (USFWS 2022). The draft recovery plan states that six healthy populations should exist within the Great Lakes Basin for the population to recover (USFWS 2023b); further loss of individuals in the Tobacco River population and/or suitable habitat may not support the recovery objectives for the snuffbox.

Individuals in the Tittabawassee River population also are part of a genetically distinct group of snuffbox in the Lake Huron watershed. Research by Beaver et al. (2019) on the genetic structure of the snuffbox indicated that there were three or more genetically differentiated groups of the species in the Great Lakes Basin. One of these groups is in the Huron–St. Clair–Erie corridor where the Tittabawassee River population is located. Further decline of the Tittabawassee River population through take of individuals in the Tobacco River may pose additional risk to resiliency of this genetic structure.

HCP Conservation Strategy

Within their HCP, FLTF outlined a Conservation Strategy to maintain and improve snuffbox suitable habitat within the Plan Area. The FLTF plans to implement and fund a suite of strategies to maintain and potentially improve suitable habitat for snuffbox habitat to learn more about the species, its ecology, and the limiting factors of lacustrine habitat on the species to assist with future conservation efforts (see Section 1.3.4). As described above, the change from a riverine to lacustrine system will cause the loss and degradation of potential snuffbox habitat. Propagation and relocation of snuffbox from the Permit Area

has the potential to lead to direct take of individuals in the Permit Area and may not be effective in increasing the size and viability of this population of snuffbox, due to the small size of the population and limited number of known individuals. Therefore, the FLTF has developed five biological goals each with a subset of objectives to improve existing habitat and water quality conditions that support the population of snuffbox within the Permit Area (see Section 1.3.4). The biological goals and objectives are further detailed in the following conservation measures.

FLTF will maintain or improve water quality for the snuffbox and native freshwater mussel community. Water quality monitoring sites will be established within the Plan Area at Glidden Road, the location within the Permit Area where snuffbox were identified (TT11), just south of where snuffbox were identified (TT12), and at the Dale Road bridge. For the first 3 years following the completion of the lake refill, these sites will be monitored for water quality parameters including temperature, dissolved, oxygen, pH, conductivity, flow, total suspended solids, and nutrient concentrations. More specifically, water temperature and dissolved oxygen will be monitored from May through October via continuous data logging devices. Water samples will also be collected monthly during this time period to test for water quality, including total phosphorus, dissolved ortho phosphorus, ammonia-nitrogen, nitrate-nitrogen, and total Kjeldahl nitrogen levels. After the initial 3-year monitoring period, FLTF would monitor and obtain water quality data annually after re-watering Wixom Lake impoundment to the summer normal (legal) lake level for the term of the permit.

By April 1, 2028, FLTF will begin implementing an annual public information campaign designed to educate the public on the snuffbox, how to improve the status of the known population, and how they can contribute to best management practices for maintaining good water quality. Topics covered may include invasive species management, stormwater management, implications of fertilizer use, other information regarding non-point source pollution, development of practices to improve water quality, and identification of harmful practices that impact water quality (e.g., disposal of contaminants, stormwater runoff from household activities). The program may include social media announcements, outreach to agencies that enact water quality policy within the Plan Area, training, and educational opportunities. FLTF will coordinate at least one event for training of interested public by end of 2029.

FLTF will develop and implement a lake management plan to improve both the snuffbox population and habitat and freshwater mussel community. Grant opportunities will be created by the FLTF to fund projects that improve water quality within the Plan Area, including, but not limited to waterway improvement projects, wastewater and septic improvements, storm sewer maintenance, and programs to reduce non-point source pollution such as roadway runoff. This grant funding will be a portion of the $280,000 that FLTF uses to fund biological goals 1, 2, and 3.

FLTF will implement conservation measures to avoid and minimize impacts to water quality within the Permit Area during dam construction. Construction activities will be limited to the Edenville Dam and immediate surrounding lake area. During construction of the dam, management activities that are designed to protect water quality will be implemented and include the following: erosion protection if the project work is halted other than for normal construction activities during a work week; work will not be conducted during above normal flows except to prevent erosion; dredged soil will be removed and stored in an upland area (unless permitted); all slurry will be removed and located away from wetlands and waters or discharged through a filter; equipment will be cleaned and rinsed prior to use; to combat invasive species, workers will be required to clean and dispose of mud and plants from equipment and workwear; and equipment will be monitored for leaks and/or spills, disturbed areas will be re-seeded with native vegetation, and fill material will be free of contaminants and pollutants.

FLTF will also maintain or improve bank stability and bed integrity within the Plan Area. Bank erosion hazard index assessments will be implemented at four locations where the most significant erosion is identified within the Permit Area. The assessments will be completed in the spring following the drawdown period during the winter months. The assessments will address bank stability issues such as vegetation and root density and bank density and height as it relates to preserving snuffbox habitat and preventing erosion and sedimentation within suitable habitat. Additionally, public information will be provided annually for landowners, municipalities, and agencies to learn about practices that promote healthy streambank integrity.

FLTF will also maintain the hydrologic regime within the Plan Area once the legal lake levels are re-established. The Edenville Dam and Wixom Lake were historically operated as electrical power generation, resulting in large fluctuations in lake water levels. Edenville Dam will now be considered a "run-of-the-river" facility, where inflow and outflow are maintained at equal proportions, even during flood and drought events, preventing significant fluctuations throughout the year. The court mandates that Wixom Lake be returned to legal levels and will be re-filled. This refilling will result in a change from a riverine to lacustrine system and will result in loss of snuffbox habitat. Annual winter drawdowns and subsequent refills of Wixom Lake will be expected on an annual basis. The court also mandates that the legal lake limit be maintained within a specific range and that fluctuations cannot exceed 0.7 foot within 24 hours. This will help prevent substantial changes to the wetted areas. Additionally, the FLTF will be required to develop a plan for the refilling of Wixom Lake, including a maximum fill rate of 1 foot per day. A set minimum elevation will be used to prevent hydrologic changes that could impact the snuffbox population. Dam maintenance and operation activities, including inspections and repairs will be conducted during the annual drawdown period. FLTF would install and maintain or would fund and contract USGS to install and maintain, one water level gauge at the upstream intersection of Dale Road and the Wixom Lake impoundment within the Permit Area, similar to the USGS water level gauge at Glidden Road. FLTF will monitor water levels on a weekly basis at these two gauges.

After final plans have been developed and conservation measures implemented, monitoring and adaptive management activities are expected to determine effectiveness of the conservation measures over time. Water quality parameters will be monitored and analyzed to compare metrics between the Tobacco River and the Permit Area to determine if the conditions continue to provide suitable snuffbox habitat. Additionally, water level data will be collected and monitored for trends that could alter the hydrologic regime and impact snuffbox. The public information campaign will be monitored by documenting and reporting all efforts to the USFWS. For the lake management plan, records will be maintained, reporting will occur, and a system developed to track adherence to the plan, stakeholder involvement, grants accepted, and monitoring of grant-approved projects. Changes in water quality parameters may also be used to determine if improvements were being made in the Plan Area by the public and municipalities. During dam construction, environmental compliance will be monitored and reported on by a qualified inspector. Bank erosion and stability will be monitored similarly to the conservation measure above. Monitoring activities are expected to occur each spring after the winter drawdown has ended and the lake has been refilled. Water quality parameters such as suspended solids can help track if sedimentation and erosion is changing within the Permit Area. Finally, the FLTF will construct the Edenville Dam to a 5,000-year flood standard, resulting in a dam that can withstand hydrologic fluctuation unless there is a greater than 5,000-year rainfall event. This standard will permit the dam to function as a run-of-the-river facility and maintain inflows and outflows in equal proportion. Lake levels will be monitored during all drawdown, refill, drought, and flood events and comply with the court ordered legal lake level maintenance.

If during the compliance monitoring phase, after the construction of the dam, the FLTF does not meet the HCP Biological Goals and Objectives, an adaptive management approach will be implemented to adjust the conservation measures to meet the established parameters. If water quality conditions are not being maintained or are worsening, FLTF will establish more monitoring protocols to discern the cause of changes and create a plan to address the issue. This may involve adjusting and reassessing the lake management plan. If the public outreach is unsuccessful and grant applicants do not pursue available funds for water quality improvement projects, the FLTF will implement projects focused on improving mussel habitat with the remaining funding. Remaining grant funds that have not been awarded to applicants for applicable projects by 2039 would be totaled and used to support alternative mitigation coordinated through the USFWS that would contribute to conservation efforts and recovery actions for snuffbox mussels.

Although direct and indirect take of snuffbox mussels may occur through mortality of individuals and loss of habitat, conservation measures that will be implemented across the Plan Area may improve habitat conditions for both the snuffbox and other native freshwater mussel species present in Wixom Lake once the legal lake level is returned. Direct conservation activities to monitor and improve water quality will benefit snuffbox habitat. Bank stabilization and erosion prevention measures will help maintain the physical habitat conditions within the Permit Area and reduce sedimentation that may result in further loss of habitat or smothering of individuals. Once the lake is refilled to legal levels, the maintenance of the hydrologic conditions within the lake will help prevent large fluctuations in water levels and will keep a consistent-wetted area within the Permit Area. Public education will help reduce overall threats to the species from anthropogenic activities, including but not limited to reduction in non-point source pollution and contamination from stormwater runoff and prevention of the further spread of invasive species. Public awareness and control measures to be implemented during construction can also help reduce the likelihood of introduction of other invasive species that may compete with the snuffbox for available resources. Monitoring and adaptive management of the conservation activities will help ensure that once the legal lake levels are returned, further loss of habitat and habitat degradation are limited.

3.7.2.3 Cumulative Impacts to Federal- and State-Listed Species

The cumulative impact analysis is provided for snuffbox in the Great Lakes region and Plan Area. This assessment includes actions that when combined with other past, present, and reasonably foreseeable future actions, may impact the snuffbox, which include land-use change and climate change.

The expected impacts from land use change and shifting climate scenarios may impact the survival of snuffbox in several ways. This can include loss of individuals, habitat loss and degradation, resulting loss of recruitment and genetic diversity within populations, to loss of currently extant populations or population segments. Land cover in the region has historically been predominantly forested, agricultural, or comprised of wetlands (National Oceanic and Atmospheric Administration 2010). Between 1996 and 2010, the amount of developed area in the Great Lakes region increased. This can lead to additional impervious surface, leading to higher levels of runoff that which can cause increased sedimentation and contaminant levels within water sources depended on by snuffbox. It is likely that the conversion of land to developed areas will continue. Climate change may affect snuffbox in several ways. Change in precipitation levels in the region can cause drought conditions or increased flooding, both creating changes in hydrologic regimes that could impact the mussel. Increased drought can lower water levels, leading to potential loss of habitat. Drought may also lead to negative habitat changes such as increased water temperatures and decreased dissolved oxygen levels that can put stress on snuffbox biological processes. An increase in precipitation levels in the region can lead to flooding, which can contribute

erosion and sedimentation, scouring of suitable habitat, and higher levels of runoff (and potential contaminants) into suitable habitat. A changing climate may create conditions that are highly suitable for invasive species that can outcompete snuffbox for resources and threaten the populations.

Within the Plan Area, there are no other known current or ongoing USFWS permitting projects. The FLTF conducted aerial herbicide spraying in 2022 and 2023 to combat the growth of woody plant species within the Wixom Lake and Sanford Lake bottoms. Herbicide treatments will continue in select areas until the dam is constructed and the lake is refilled. It is unknown if this will continue after the repairs are complete and will be dependent upon coordination with regulatory agencies The active ingredients in the herbicides used were triclopyr and imazapyr (FLTF 2023). In laboratory studies, imazapyr has been shown to have acute toxic effects on biological functions on the catfish (*Rhamdia quelen)* (Golombieski et al. 2016). Herbicides may also affect the life stages of freshwater mussels depending on levels entering the water and longevity in the water column and sediment.

Land use changes and growth within Gladwin and Midland Counties can be expected to change over the timeframe of the ITP. Gladwin County's primary economic industries include auto parts and wood products manufacturing, agriculture, construction, and tourism. Midland County relies on manufacturing, healthcare, and retail services. Current land use and future changes have the potential to impact water quality within the Wixom Lake watershed. However, proposed conservation measures and public education outreach should help promote practices that improve water quality within the Plan Area. Other activities that could impact the snuffbox in the future could include work on dams along the Tobacco and Tittabawassee Rivers. For example, work is expected to take place on the Smallwood Dam, although this would not have direct impacts on the known snuffbox population.

3.8 Air Quality and Climate

3.8.1 Affected Environment

Climatology data collected at the Gladwin, Michigan meteorological station (NRCS 2024) was reviewed to discuss current and historic climate trends that may affect the Project Area. Over the past century, temperatures have become warmer and increased precipitation has occurred in the region. A summary of values reviewed is provided in Table 3.8-1.

Table 3.8-1
Climatic Data in the Project Area

Data	1923 – 2002 Historic Average	2003 – 2023 Recent Average
Frost Data		
Last Freezing Temperature in Spring (1 Yr. in 10 Later than) 32 degrees Fahrenheit (^{o}F) or Lower	May 31	May 22
Last Freezing Temperature in Spring (2 Yr. in 10 Later than) 32 ^{o}F or Lower	May 26	May 18
Last Freezing Temperature in Spring (5 Yr. in 10 Later than) 32 ^{o}F or Lower	May 18	May 11
First Freezing Temperature in Fall (1 Yr. in 10 Earlier than) 32 ^{o}F or Lower	September 11	September 27
First Freezing Temperature in Fall (2 Yr. in 10 Earlier than) 32 ^{o}F or Lower	September 15	October 2
First Freezing Temperature in Fall (5 Yr. in 10 Earlier than) 32 ^{o}F or Lower	September 25	October 10

Data	1923 – 2002 Historic Average	2003 – 2023 Recent Average
Growing Season Days		
Daily minimum Temperature >32 ^{o}F (2 Yr. in 10)	111	134
Daily minimum Temperature >32 ^{o}F (5 Yr. in 10)	117	140
Daily minimum Temperature >32 ^{o}F (8 Yr. in 10)	130	153
Beginning and End of Growing Season Dates (5 Yr. in 10) 32 ^{o}F or Higher	5/18 – 9/25	5/11 – 10/11
Beginning and End of Growing Season Dates (7 Yr. in 10) 32 ^{o}F or Higher	5/14 – 9/29	5/8 – 10/15
Precipitation		
Annual Precipitation in Inches	31.70	34.32
Average Days with >0.10 Inch of Precipitation	68	75
Snowfall		
Annual Snowfall in Inches	48.5	50.4
Snow Depth in Inches	16	11
Temperature		
Average Temperature ^{o}F	45.2	46.2

3.8.2 Environmental Consequences

The Clean Air Act (CAA) of 1970 (42 USC §7401 et seq.) is a comprehensive Federal law that regulates air emissions from stationary and mobile sources. The CAA authorizes the USEPA to establish National Ambient Air Quality Standards (NAAQS) to protect public health (primary standards) and welfare (secondary standards). The USEPA set NAAQS for the following air contaminants designated as criteria pollutants: carbon monoxide (CO); lead; nitrogen dioxide; ozone; particulate matter (PM), including PM less than or equal to 10 microns in aerodynamic diameter (PM_{10}) and PM less than or equal to 2.5 microns in aerodynamic diameter; and sulfur dioxide (SO_2). The states implement and enforce the NAAQS through State Implementation Plans, which are approved by the USEPA. Michigan implements its State Implementation Plan through the EGLE.

The Project takes place in Gladwin and Midland Counties, Michigan. The Project Area is designated as unclassifiable or attainment with the NAAQS for all criteria pollutants (USEPA 2024).

Greenhouse Gases (GHG) are gases that warm the Earth's atmosphere by absorbing solar radiation reflected from the Earth's surface. The most common GHGs are carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Scientists find that increasing GHG concentrations are warming the planet, and rising temperatures may, in turn, produce changes in precipitation patterns, storm severity, and sea level; a phenomenon commonly referred to as "climate change."

3.8.2.1 Impact Criteria

CEQ guidance requires Federal agencies to consider GHG emissions and climate change when evaluating proposed actions. Major impacts to air quality could occur if NAAQS are exceeded.

3.8.2.2 Direct and Indirect Effects to Air Quality and Climate

Issuance of the ITP would not result in air emissions or climate change impacts. Implementation of the HCP may require vehicular traffic and the use of light equipment to complete conservation or mitigation program initiatives. Construction equipment and other mobile sources are sources of combustion-related emissions, including criteria pollutants (i.e., nitrogen oxides, CO, volatile organic compounds, SO_2, and PM_{10}), GHG, and small amounts of hazardous air pollutants (HAPs). Air pollutant concentrations will increase in the immediate vicinity of the construction area due to the combustion equipment exhaust. Emissions would occur intermittently, depending on the work schedule and the specific equipment in use on any particular day. The effects of these emissions would be localized and minor and end once the work is completed.

Removing the Edenville Dam would involve the use of various vehicles, heavy equipment, and small equipment that emit similar criteria pollutants and HAPs as described above. Emissions would occur intermittently, depending on the work schedule and the specific equipment in use on any particular day. Effects of these emissions would tend to be localized and end once the dam is removed. Emissions associated with dam repair are not likely to be large enough to be noticeable or harmful for local residences or cause a violation of NAAQS. PM emissions (e.g., dust) are not anticipated from the Proposed Action or alternatives considered.

3.8.2.3 Cumulative Impacts to Air Quality and Climate

Current environmental trends and reasonably foreseeable actions could have a minor impact on air quality and climate change. For example, construction-related activities require equipment that would generate air pollutants from engine exhaust, GHGs, and fugitive dust from disturbed earth surfaces. However, the issuance of an ITP would not affect air quality or contribute to climate change, either singly or when aggregated with past, present, and reasonably foreseeable actions.

3.9 Socioeconomics and Environmental Justice

This section provides an overview of socioeconomic conditions that might be affected by Covered Activities. The CEQ's NEPA implementing regulations state that the human environment "shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment" (40 CFR § 1508.14). This means that economic or social effects are not intended by themselves to require preparation of an environmental analysis. When economic, social, and natural or physical environment effects are interrelated, then the environmental analysis will discuss these effects on the human environment (40 CFR § 1508.14).

According to the Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations Executive Order 12898, Federal agencies must take appropriate and necessary steps to identify and address disproportionately high and adverse effects of Federal projects on the health or environment of minority and low-income populations. For the purpose of this analysis, minority is defined as individuals who identify as a race other than white alone (single race) and/or identify their ethnicity as Hispanic or Latino. If the percentage of minority residents of a county population exceeds the state level by more than 10 percent, it is considered to be "meaningfully greater" and an environmental justice community for the purposes of this analysis. Low-income is defined as a household income less than or equal to twice the Federal poverty level. If the poverty rate for the analysis population exceeds the state

poverty rate by more than 10 percent, it is considered "meaningfully greater" and an environmental justice community for the purposes of this analysis.

3.9.1 Affected Environment

This section discusses social and economic characteristics such as population, demographics, employment, and economic trends within Gladwin and Midland Counties, Michigan. Also included, when relevant, are data relating to the State of Michigan and the United States, to provide context when compared to each county. All information in this section was obtained from the U.S. Census Bureau.

As of 2019, Gladwin and Midland Counties are home to 25,386 and 83,494 people, respectively. Towns nearest the proposed Project include Beaverton and Gladwin, Michigan. Gladwin is the largest with a population of approximately 3,069. Beaverton has a population of 1,145. A 0.6 and 0.5 percent growth occurred between 2010 and 2023 in Gladwin and Midland Counties, respectively.

The average household size in Gladwin County is 2.32 people; it is slightly higher in Beaverton and Gladwin city averaging 3.2 and 3.0 people, respectively. There are 11,006 occupied housing units in Gladwin County, of which 87.7 percent are owner-occupied units. The median value of homes in Gladwin County is $140,600. The race and ethnic diversity of Gladwin County is largely homogeneous with over 97 percent of the population white.

The average household size in Midland County is 2.83 people. There are 34,288 occupied housing units in Midland County, of which 78.0 percent are owner-occupied units. The median value of homes in Midland County is $171,600. The race and ethnic diversity of Midland County was largely homogeneous with over 93.8 percent of the population white.

The median household income in Gladwin County was $53,717; the median income of Michigan is $66,986. Approximately 46.6 percent of the population in Gladwin County over the age of 16 are part of the civilian labor force, compared to 58.7 percent in the state of Michigan. The largest industries in the county, in order of significance, include educational and health care services, manufacturing, construction, retail trade, and arts-entertainment-food services.

The median household income in Midland County was $78,487. Approximately 57.1 percent of the population of Midland County over the age of 16 are part of the civilian workforce. The largest industries in the county, in order of significance, include educational and health care services; manufacturing; professional, scientific, management, and administrative services; retail trade; and arts, entertainment, and food services.

3.9.2 Environmental Consequences

3.9.2.1 Impact Criteria

Socioeconomic effects would be considered significant if the following occurred as a result of implementing any of the alternatives:

- Decline in local or regional employment;
- Decrease in local or regional property values;

- Decline in valuable community services; or

- Disproportionate share of adverse environmental effects placed on any minority or low-income community.

3.9.2.2 Direct and Indirect Effects to Socioeconomics and Environmental Justice

Environmental justice issues are identified by first determining whether minority or low-income populations are present. If so, then disproportionate effects on these populations would be considered. EJScreen 2.2 was used as an initial step to gather information regarding minority and/or low-income populations. USEPA recommends that screening tools such as EJScreen 2.2 be used for a "screening-level" look and a useful first step in understanding or highlighting locations that may require further review. As indicated by EJScreen 2.2, about 3 percent of the Plan Area population identifies as a minority population compared to the state average of 26 percent. Additionally, 37 percent of the Plan Area population are considered low-income compared to a state average of 31 percent. Considering this data and the "meaningfully greater" criteria, environmental justice communities are not present in the Project Area.

The Proposed Action, the issuance of an ITP for the take of snuffbox mussel and the implementation of the HCP, would not have an effect on the Plan Area's population, demographics, housing conditions, health, economy, or other socioeconomic conditions. It is important to acknowledge that the activities associated with repairing, maintaining, and operating the Edenville Dam are not part of the Proposed Action and analysis in this EA, but are being assessed and reviewed by other agencies and through other regulatory processes. Costs associated with dam repair and operations, or assessments that may occur within the SAD to fund portions of the repair and operation of the dams, are not actions associated with the issuance of the ITP or the implementation of the HCP. Similarly, refilling Wixom Lake or leaving it in its current condition is not a decision that is part of the Service's Proposed Action, and except for snuffbox mussel impacts that may occur from refilling the lake, any other economic or property value impacts that may be associated with the lake level are not associated with the issuance of the ITP, or the implementation of the HCP, and are not assessed in this EA.

The No Action Alternative and the Removal of the Edenville Dam Alternative do not require the issuance of an ITP and therefore would have no effect on socioeconomic conditions of the Plan Area.

3.9.2.3 Cumulative Impacts to Socioeconomics and Environmental Justice

Current environmental trends and reasonably foreseeable actions would have an impact on the local population and economy. Road improvement projects may result in temporary transportation and commuting delays, but ultimately these projects would improve long-term transportation and commuting in the Plan Area. Commercial and light industrial development will add employment opportunities and boost the local economy. Residential development will support growth that may result from additional jobs and a developing economy. However, we do not anticipate the issuance of an ITP and implementation of the HCP would affect socioeconomic conditions, either singly or when aggregated with and reasonably foreseeable actions; therefore, we do not believe the Proposed Action would cumulatively affect socioeconomic conditions in the Plan Area.

4.0 LIST OF PREPARERS

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