Hayward Project
FERC Project No. 2417

Trego Project
FERC Project No. 2711

Exhibit E
Environmental Report

Draft License Application

Prepared for

Northern States Power Company
A Wisconsin Corporation

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LIST OF ABBREVIATIONS AND TERMS

°F	degrees Fahrenheit
§	Section
Applicant	Northern States Power Company
APE	Area of Potential Effect
ATIS	Aquatic and Terrestrial Invasive Species
BITP/A	Broad Incidental Take Permit/Authorization
BMPs	Best Management Practices
CFR	Code of Federal Regulations
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
Default-FAL	Default Fish and Aquatic Life
DLA	Draft License Application
DO	Dissolved Oxygen
E. coli	*Escherichia coli*
EFH	Essential Fish Habitat
EJ	Environmental Justice
ESA	Endangered Species Act
EWA	Eurasian watermilfoil
FAL-Coldwater	Fish and Aquatic Life-Coldwater
FERC	Federal Energy Regulatory Commission
FLA	Final License Application
FPA	Federal Power Act
fps	feet per second
GLEC	Great Lakes Environmental Center
GPS	global positioning system
Hayward APMP	Aquatic Plant Management Plan for Lake Hayward
Hayward Project	Hayward Hydroelectric Project
HPMP	Historic Properties Management Plan
HRMP	Historic Resources Management Plan
IPaC	Information for Planning and Consultation
kW	kilowatt
LHPOA	Lake Hayward Property Owners Association
Licensee	Northern States Power Company
µg/L	micrograms per liter
mg/L	milligrams per liter
MIBI	macroinvertebrate index of biological integrity
mL	milliliter
MDC	maximum depth of colonization
MOE-corrected	margin of error-corrected
MPN	Most Probable Number
MWh	megawatt hour

NHI ..... Natural Heritage Inventory
n.d. ..... no date
NEPA ..... National Environmental Policy Act
NGVD ..... National Geodetic Vertical Datum 1929
NHPA ..... National Historic Preservation Act
NLEB ..... northern long-eared bat
NMFS ..... National Marine Fisheries Service
NOI ..... Notice of Intent
NPS ..... National Park Service
NRCS ..... Natural Resource Conservation Service
NHPA ..... National Historic Preservation Act
NRHP ..... National Register of Historic Places
NR 40 ..... Chapter NR 40 of the Wisconsin Administrative Code
NR 102 ..... Chapter NR 102 of the Wisconsin Administrative Code
NSPW ..... Northern States Power Company
PAD ..... Pre-Application Document
PCU ..... Platinum Color Units
Programmatic Agreement ..... refer to Section 1.3.4
Projects ..... Hayward Project and Trego Project, collectively
REA Notice ..... Notice of Acceptance and Ready for Environmental Analysis
RUSLE 2 ..... Revised Universal Soil Loss Equation Version 2
SCORP ..... Statewide Outdoor Comprehensive Recreation Plan
SHPO ..... State Historic Preservation Officer
TE ..... Threatened and Endangered (Species)
TLD ..... Trego Lake District
TLP ..... Traditional Licensing Process
Trego APMP ..... Trego Lake, Washburn County 2022-26 Aquatic Plant Management Plan
Trego Project ..... Trego Hydroelectric Project
Upper Reservoir ..... Upper portion of the Trego Project reservoir
USC ..... United States Code
USFWS ..... United States Fish and Wildlife Service
USGS ..... United States Geologic Survey
WCMP ..... Wisconsin Coastal Management Program
WDNR ..... Wisconsin Department of Natural Resources
WisCALM ..... Wisconsin Consolidated Assessment and Listing Methodology
WSRA ..... Wild and Scenic River Act

1. Introduction

Northern States Power Company – Wisconsin (Applicant, Licensee, or NSPW), is applying to the Federal Energy Regulatory Commission (FERC or Commission) for subsequent licenses to operate the Hayward Hydroelectric Project (Hayward Project) identified as FERC Project No. 2417 and the Trego Hydroelectric Project (Trego Project) identified as FERC Project No. 2711. Throughout this document, the hydroelectric Projects will be referred to collectively as Projects or individually as Project. The purpose of this Exhibit E is to provide a description of the environmental setting in the vicinity of the Projects. The Licensee's request to use the Traditional Licensing Process (TLP) was approved by the FERC via letter dated January 21, 2021.

1.1 Application

The Applicant prepared the Draft License Application (DLA), which includes this Exhibit E, in accordance with the Commission's regulations under 18 Code of Federal Regulations (CFR) Section (§) 5.18(b), as well as the guidelines listed in the Commission's *Preparing Environmental Assessments: Guidelines of Applicants, Contractors, and Staff*. The purpose of this Exhibit E is to provide a description of the environmental setting in the vicinity of the Projects.

1.2 Purpose and Need for Power

The FERC must determine whether to issue a subsequent license for each Project and, if so, decide what conditions should be included in said licenses. In deciding whether to issue each license, the FERC must determine if the Projects will be best adapted to a comprehensive plan for improving or developing the waterway. In addition, the FERC must give equal consideration to the purposes of energy conservation, fish and wildlife resources, cultural resources, recreational resources, water quality, and other environmental resources.

1.3 Statutory and Regulatory Requirements

The FERC's issuance of a license for both Projects is subject to numerous requirements under the Federal Power Act (FPA) and other applicable statutes. The primary requirements, and the actions NSPW has taken to address them, are described below.

1.3.1 Federal Power Act

1.3.1.1 Section 18 Fishway Prescriptions

Section 18 of the FPA, 16 United States Code (USC) § 811, states the FERC is to require the construction, maintenance, and operation of such fishways as may be prescribed by the Secretary of Commerce or the Interior. Under the Commission's Integrated License Application regulations, 18 CFR § 5.23(a), fishway prescriptions, if any, must be filed within 60 days of the FERC's Notice of Acceptance and Ready for Environmental Analysis (REA Notice) following NSPW's filing of the Final License Application (FLA). During the environmental studies phase of this TLP, neither the United States Fish and Wildlife Service (USFWS) nor the National Marine Fisheries Service (NMFS) raised fish passage as a potential relicensing issue.

1.3.1.2 Section 4(e) Conditions

The first provision in Section 4(e) of the FPA, 16 USC § 797(e), provides any license issued by the Commission for a project within a federal reservation shall be subject to and contain such conditions as the Secretary of the responsible federal land management agency deems necessary for the adequate protection and use of the reservation. As explained in Exhibit A, Section 22 of this DLA, the Projects do not occupy any federal lands.

The Commission's September 1, 1995 Order Issuing Subsequent License for the Hayward Project included the following paragraph regarding the National Park Service's (NPS) 4(e) status:

> *Section 4(e) applies to reservations, and under Section 3(2) of the FPA, reservations are defined in part as land or interests in lands "owned by the United States." Although the Namekagon River is within the National Wild and Scenic Rivers System, administered by the NPS, the Hayward Project does not occupy any federal lands. Nor are there federal easements in the Hayward Project area. Therefore, we don't believe that Interior has 4(e) authority with respect to the Hayward Project."* (Federal Energy Regulatory Commission, 1995).

The Commission's June 2, 1994 Order Issuing License for the Trego Project similarly concluded that the NPS did not have 4(e) authority. The Trego license includes the following:

> *On March 10, 1994, Interior filed a letter in which it acknowledged that there are no federally owned lands within the project boundary, but argued that the project nevertheless is subject to terms and conditions submitted by Interior under Section 4(e) of the FPA because it is located on a component of the National Wild and Scenic Rivers System administered by the Secretary of the Interior.*
>
> *Section 6(a)(1) of the Rivers Act gives the Secretary authority to acquire lands along segments of the National Wild and Scenic Rivers System. However, the Secretary has not exercised that authority in this instance. Thus, Interior appears to be maintaining that administrative authority, by itself, gives it conditioning authority under Section 4(e). We have been unable to find any support, in either the FPA or the Rivers Act, for Interior's position.*
>
> *As defined by Section 3(2) of the FPA 16 U.S.C.§ 796(2), a reservation, for the purposes of the FPA, embraces only "lands and interests in lands owned by the United States."* (Federal Energy Regulatory Commission, 1994).

1.3.1.3 Section 10(j) Recommendations

Under Section 10(j) of the FPA, each hydroelectric license issued by the FERC is required to include conditions based on recommendations of federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by either Project. The Commission is required to include these conditions in the license, unless it determines they are inconsistent with the purpose and requirements of the FPA or other applicable laws. Before rejecting or modifying an agency recommendation, the Commission is required to attempt to resolve any such inconsistency with the agency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency.

During the pre-filing phase of this licensing process, NSPW consulted with those agencies with authority to submit Section 10(j) recommendations, including the NPS, USFWS, and Wisconsin Department of Natural Resources (WDNR). Under the Commission's regulations in 18 CFR § 5.23(a), federal and state fish and wildlife agencies will have 60 days following the FERC's issuance of the REA Notice to submit Section 10(j) recommendations.

1.3.2 Clean Water Act

Under Section 401 of the Clean Water Act (CWA), a license applicant must obtain certification from the appropriate state pollution control agency verifying compliance with the applicable provisions of the CWA, unless the certification is waived. Therefore, a Section 401 water quality certification or waiver is required from the WDNR as a prerequisite to the FERC's issuance of a license for each Project. Pursuant to 18 CFR § 5.23(b), NSPW will request water quality certification from the WDNR within 60 days of the issuance of the FERC's REA Notice.

1.3.3 Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure discretionary actions are not likely to jeopardize the continued existence of any federally listed threatened or endangered (TE) species or result in the destruction or adverse modification of critical habitat of such species.

On November 30, 2020, NSPW requested the Commission grant it designation as the FERC's non-federal representative for ESA consultation. The Commission granted the request on January 21, 2021. NSPW consulted with the USFWS and concluded that four federally listed species and one species proposed for federal listing were potentially located within the vicinity of each Project. The federally listed species include the Canada lynx (*Lynx canadensis*), gray wolf (*Canis lupus*), northern long-eared bat (*Myotis septentrionalis*), and tricolored bat (*Perimyotis subflavus*). The species proposed for federal listing is the monarch butterfly (*Danaus plixippus*) (US Fish and Wildlife Service, 2023a) (US Fish and Wildlife Service, 2023b). The Applicant's analysis of Project impacts on TE species is presented in Section 4.7 and Section 5.7.

1.3.4 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to consider the effects of any proposed undertaking on historic properties and to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the issuance of a FERC or federal license. Historic properties are districts, sites, buildings, structures, traditional cultural properties, and objects that are listed in or eligible for inclusion in the National Register of Historic Places (NRHP). The FERC's issuance of a license for each Project is considered a separate undertaking under Section 106.

On November 30, 2020, NSPW requested the Commission grant it designation as FERC's non-federal representative for Section 106 consultation. The Commission approved the request on January 21, 2021. NSPW developed and conducted cultural resource studies in consultation with the Wisconsin State Historic Preservation Officer (SHPO) and Native American Nations, as described in Section 4.11 and Section 5.11 of this DLA. NSPW anticipates the Commission will meet its obligations under NHPA Section 106 through the execution of the Programmatic Agreement. Section 106 requires, in part, the implementation of an Historic Properties Management Plan (HPMP) that addresses the management and treatment of historic properties identified within each Project's area of potential effect (APE).

1.3.5 Coastal Zone Management Act

Under Section 307(c)(3)(a) of the Coastal Zone Management Act (CZMA), the FERC cannot issue a license for a project within or affecting a state's coastal zone unless the state CZMA agency concurs with the license applicant's certification of consistency with the state CZMA program, or the state CZMA agency's concurrence is conclusively presumed by its failure to act within 180 days of its receipt of the applicant's certification request.

The Wisconsin Coastal Management Program (WCMP) is responsible for implementing Wisconsin's coastal management program, which includes 15 counties with frontage on Lake Superior or Lake Michigan. Neither Project is located within nor affects the designated coastal zones for Wisconsin; therefore, neither Project is subject to coastal zone management review and a consistency certification is not needed for the Commission's relicensing of either Project. The Applicant requested a formal written determination of consistency from the WCMP for both Projects via e-mail on May 24, 2023. No response from the WCMP has been received as of the filing of this application. Communications with the WCMP are included in **Appendix E-1**.

1.3.6 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (Public Law 94-265) requires federal agencies to consult with NMFS on all actions that may adversely affect Essential Fish Habitat (EFH). EFH is only applicable to federally managed commercial fish species which live at least one component of their lifecycle in marine waters. None of the fish species found in the Namekagon River are managed commercially; therefore, no designated EFH is located within the vicinity of either Project.

1.3.7 Wild and Scenic Rivers and Wilderness Act

Section 7(a) of the Wild and Scenic Rivers Act (WSRA) (Public Law 90-542) requires federal agencies to make a determination as to whether the operation of a project under a license would unreasonably diminish the scenic, recreational, and fish and wildlife values present within any designated wild or scenic rivers.

The stretch of the Namekagon River located within the vicinity of both Projects was included as part of the St. Croix National Scenic Riverway when the WSRA was originally approved in 1968. The Wilderness Act (Public Law 88-577) was enacted to establish a National Wilderness Preservation System. The St. Croix National Scenic Riverway is the only wilderness area located within the vicinity of either Project.

1.4 Pre-Filing Consultation Process

The FERC issued a subsequent license for the Hayward Project on September 1, 1995 and a subsequent license for the Trego Project on June 2, 1994. Both licenses expire on November 30, 2025. On November 30, 2020, the Applicant filed with the Commission a Notice of Intent (NOI) to relicense both Projects, a Pre-Application Document (PAD) containing information for both Projects, and a request to use the TLP (NSPW, 2020). After due consideration and the opportunity for public comment, the FERC granted the Applicant's request to use the TLP on January 21, 2021 (Federal Energy Regulatory Commission, 2021a) (Federal Energy Regulatory Commission, 2021b). Each stage of the consultation process is further discussed in the following sections.

1.4.1 First-Stage Consultation

The Licensee distributed the NOI, PAD, and TLP request to the various stakeholders concurrent with the November 30, 2020 FERC filing. The Licensee also published a public notice of said documents on November 25, 2020 in the Sawyer County Record and on November 26, 2020 in the Spooner Advocate, newspapers of general circulation in Sawyer County and Washburn County, respectively, where the Projects are located. Hard copies of the NOI, PAD, and TLP are available for viewing at the Sherman and Ruth Weiss Community Library in Hayward, Wisconsin and at the Spooner Memorial Library in Spooner, Wisconsin. Comments regarding the request to use the TLP were due to the FERC within 30 days of the PAD filing (i.e., on or before December 31, 2020). The NPS filed comments on December 29, 2020 opposing use of the TLP (National Park Service, 2020). The FERC approved the Licensee's request to use the TLP via their January 21, 2021 letter.

In accordance with the schedule set by the FERC, the Licensee held a virtual Joint Agency Meeting (JAM) on March 11, 2021, due to the COVID-19 Centers for Disease Control and corporate guidelines restricting public gatherings and discretionary travel at the time. The FERC was notified of the meeting on February 22, 2021 (NSPW, 2021a). A public notice of the JAM was published in the Sawyer County Record on February 24, 2021 and the Spooner Advocate on February 25, 2021. A total of 21 individuals attended the JAM including representatives from the NPS, Trego Lake District (TLD), WDNR, NSPW, and their licensing consultant. A site visit to both Projects was held on June 17, 2021. The FERC was notified of the site visits on May 28, 2021 (NSPW, 2021b). Public notices of the site visits were published in the Sawyer County Record and Spooner Advocate on June 2 and 3, 2021, respectively.

Comments and study requests submitted by the NPS, TLD, and WDNR following the JAM are discussed within each respective resource section and summarized in **Appendix E-1**.

1.4.2 Second Stage Consultation

1.4.2.1 Study Plans

Based on the study requests submitted during the first stage of consultation, the Applicant developed plans to perform the following studies:

- Aquatic and Terrestrial Invasive Species (ATIS) Study
- Mussel Study
- Recreation Study
- Water Quality Monitoring Study
- Wood and Blanding's Turtle Nesting Habitat Study

On August 2, 2022, NSPW provided a draft study summary for comment to those agencies/entities who requested studies. Draft study plans were subsequently developed and sent to the stakeholders for comment. Stakeholder comments were addressed in the final study plans filed with the Commission on April 21, 2022 (NSPW, 2022a). More detailed information regarding each of the study plans is provided in the following sections.

1.4.2.1.1 Aquatic and Terrestrial Invasive Species Study Plan

The WDNR requested an aquatic plant and terrestrial invasive species survey. On January 13, 2022, NSPW sent the draft ATIS Study to NPS, TLD, and WDNR. The NPS provided comments via letter on February 9, 2022. No comments were received from TLD or WDNR. The NPS comments, and the Applicant's responses, are addressed in the final ATIS Study Plan filed with the Commission on April 21, 2022 and are included in **Appendix E-1**.

1.4.2.1.2 Mussel Study Plan

The WDNR requested a mussel study be completed at each Project. On February 2, 2022, NSPW provided a draft copy of the Mussel Study Plan to the NPS and WDNR for comment. WDNR provided comments via email on February 16, 2022, which were substantially accepted and incorporated into the plan. The NPS provided comments via letter on March 4, 2022. The NPS and WDNR comments, and the Applicant's responses, are addressed in the final Mussel Study Plan filed with the Commission on April 21, 2022 and included in **Appendix E-1**.

1.4.2.1.3 Recreation Study Plan

The NPS and WDNR both requested a recreation study be completed at each Project. On November 5, 2021, NSPW provided a draft copy of the Recreation Study Plan to the NPS and WDNR. Comments were provided by the NPS via letter on December 4, 2021. The WDNR did not respond with any comments. The NPS comments, and the Applicant's responses, are addressed in the final Recreation Study Plan filed with the Commission on April 21, 2022 and are included in **Appendix E-1**.

1.4.2.1.4 Wood and Blanding's Turtle Nesting Habitat Study

Wood and Blanding's turtle studies were requested by the WDNR. On February 3, 2022, NSPW provided a draft copy of the Wood and Blanding's Turtle Nesting Habitat Study to the NPS and WDNR for comment. The WDNR provided comments verbally via a telephone conversation on February 21, 2022. The NPS provided comments via letter dated March 4, 2022. The comments from both parties were addressed in the final Wood and Blanding's Turtle Nesting Habitat Study Plan filed with the Commission on April 21, 2022 and included in **Appendix E-1**.

1.4.2.1.5 Water Quality Study

The WDNR requested a water quality study be completed at each Project. On February 2, 2022, NSPW provided a draft copy of the Water Quality Study to the NPS and WDNR for comment. The NPS provided comments via letter on March 4, 2022. The WNDR did not provide any comments. The NPS comments, and the Applicant's responses, are addressed in the final Water Quality Study Plan filed with the Commission on April 21, 2022 and included in **Appendix E-1**.

1.4.2.2 Study Reports

The studies were completed in 2022 in accordance with the protocol identified in the final study plans. Draft study reports were provided to the stakeholders for comment. Comments were only received from the NPS. The TLD and WDNR did not provide any comments. The study reports and corresponding consultation can be found in **Appendix E-1**.

1.4.2.2.1 Aquatic and Terrestrial Invasive Species Study Report

On March 6, 2023, the draft ATIS Study Report was provided to the NPS, TLD, and WDNR for comment. Only the NPS provided comments on the report. The NPS comments were received via email on April 21, 2023 and are discussed below with the Applicant's responses.

NPS Comment 1

The NPS requested the report be amended to indicate that both Projects in their entirety are located within the St. Croix National Scenic Riverway.

NSPW Response:

The report has been revised as requested.

NPS Comment 2:

The NPS questioned why the methodology of the extended sampling area upstream of the WDNR point-intercept grid was the same as for the rest of the areas studied.

NSPW Response:

Both areas were sampled using the same methodology.

NPS Comment 3:

The NPS questioned whether the course woody habitat included only natural habitat (i.e., trees falling in reservoir) or also included pilings from old bridge crossings.

NSPW Response:

Railroad pilings were mapped as a polyline on Figure 19 at the Hayward Project. The pilings were the only mapped occurrences of manmade woody habitat at Hayward. All woody habitat mapped at Trego was naturally occurring.

NPS Comment 4:

The NPS questioned what mapping techniques were used to map wild rice.

NSPW Response:

Wild rice mapping was conducted via a visual survey. Data were recorded using an iPad and R1 global positioning system (GPS). Wild rice was mapped wherever it was observed while completing the point-intercept survey. The star symbology in Figure 8 of the ATIS Report was for small (i.e., no larger than 10 by 10 feet) isolated occurrences of wild rice. Polygons were used for larger (i.e., larger than 10 by 10 feet) contiguous areas of wild rice. Polygons were created by first getting as close as possible to the wild rice, given obstacles such as shallow water, woody debris, and dense vegetation growth which created navigability issues, and manually illustrating the findings on the field map using the iPad.

NPS Comment 5:

The NPS also questioned whether NSPW would consider other methods such as aerial surveys to map wild rice.

NSPW Response:

The study was conducted according to the final study plan that was submitted to FERC on April 21, 2022. The wild rice information meets the study's objective, which was "to provide baseline data on native and invasive aquatic and terrestrial species." Therefore, there are no plans to conduct additional wild rice mapping or surveys.

NPS Comment 6:

The NPS questioned how the vegetation was characterized in regard to recreation and navigation.

NSPW Response:

As previously noted, the study's objective was to provide baseline data on native and invasive aquatic and terrestrial species, not to evaluate the impact of vegetation on recreation. Impacts of vegetation on recreation have been provided in the DLA.

NPS Comment 7:

The NPS requested the conclusion section of the report be revised to indicate both projects are located within the St. Croix National Scenic Riverway.

NSPW Response:

The conclusion section of the report has been revised to remove reference to the riverway. Section 2 of the report was revised to indicate both Projects, in their entirety, are located within the riverway.

NPS Comment 8:

The NPS requested more detailed bathymetric maps be provided than those included in the ATIS Study Report.

NSPW Response:

More detailed bathymetric mapping of the upper portion of Trego Flowage has been included in the DLA in **Appendix E-2**.

1.4.2.2.2 Mussel Study Report

On March 6, 2023, the draft Mussel Study Report was provided to the NPS and WDNR for comment. Only the NPS provided comments. The NPS comments were received via email on April 21, 2023 and are discussed below along with the Applicant's responses.

NSP Comment 1:

The NPS indicated the mussel studies were noteworthy and that they look forward to working with NSPW and the other stakeholders on additional analysis and ensuring these resources are considered in future steps of the relicensing process.

NSPW Response:

Comment noted.

NPS Comment 2:

The NPS indicated the Chinese mystery snail may be a new finding within this reach of the river and questioned whether the finding was reported to the WDNR.

NSPW Response:

Chinese mystery snails were previously identified at both Projects (WI Department of Natural Resources, n.d.a) (WI Department of Natural Resources, n.d.b). They were also identified in the ATIS Study Report which was provided to the WDNR.

NPS Comment 3:

The NPS indicated that the study did not identify any obvious drawdown zones in any of the river reaches as result of either consistent drawdowns or seasonal drawdowns where no mussels would be present due to being dewatered. They also questioned whether any such zones were identified or if searching for them was not part of the study protocol.

NSPW Response:

The Projects are both operated in a run-of-river mode where outflow measured at the tailrace approximates inflow into reservoir. Additionally, both Projects are operated within relatively narrow operating ranges of 0.5 feet and 0.6 feet for Hayward and Trego, respectively. There are no consistent or seasonal drawdowns conducted at either Project. Therefore, no such drawdown zones were identified in the Mussel Study Report.

1.4.2.2.3 Recreation Study Report

On March 6, 2023, the draft Recreation Study Report was provided to the NPS and WDNR for comment. Only the NPS provided comments. Their comments, submitted via email on April 21, 2023, are included below along with the Applicant's responses.

NPS Comment 1:

Due to survey methodology, land-based users were better represented within the survey than water-based users. As a result, the study did not adequately capture the perspectives of paddlers and those recreating on the river. As a result, the recreation study failed to address important issues such as the quality of paddlers or tubers' experience navigating emergent vegetation while taking out or putting in at Trego Park Landing, how much use Trego Park Landing experiences from paddlers or tubers in privately-owned craft, etc.

NSPW Response:

The Recreation Study Plan was developed per the NPS's April 21, 2021 study request letter. In addition, the NPS was provided a draft study plan for comment. The NPS's comments on the draft study plan were addressed as noted in Appendix 6 Documentation of Consultation of the Final Recreation Study Plan. The study was conducted according to protocol identified in the final study plan. Prior to receipt of the study report, the NPS provided no comments regarding this issue. NSPW notes that water users also use land-based facilities when traversing the Project, and there was no bias when conducting surveys.

The recreation surveys, which included questions provided by the NPS in their initial study request, were collected from recreationists observed using each of the recreation sites studied and included boaters.[1] The information collected is sufficient for the FERC to conduct its environmental review. Evaluation of aquatic vegetation impacts on recreation are discussed in the DLA.

NPS Comment 2:

The summary of the TLD response does not adequately reflect material shown in Appendix 7, including Xcel partnership regarding vegetation management under the current license and concerns about access, aquatic invasive species vegetation management, and sedimentation.

NSPW Response:

Section 5.3.2 of the Recreation Report provides an overall summary of the TLD's responses. Discussion of TLD's concern regarding aquatic invasive species and sediment are included in this summary. TLD's full response is also included in Appendix 7 of the Recreation Study Report. Additional information regarding aquatic invasive species, including NSPW's partnership with TLD regarding the annual harvesting aquatic vegetation, is included in Section 5.4.

NPS Comment 3:

The assessment of the condition of signage at the Hayward Canoe Portage may not be consistent with the documentation of the signage contained in Appendix 7.

NSPW Response:

NSPW has proposed to review all signage at the Canoe Portage Take-Out, Canoe Portage Put-In, and Informal Bank Fishing Area and update or replace the signage as necessary in Section 4.8.3.

NPS Comment 4:

An index should be added to Appendix 3 Recreation Inventory Photo-Log identifying photo number, topic, and location.

NSPW Response:

The photolog in Appendix 3 of the Recreation Study Report is labeled by site, and each photograph is numbered. The text in Section 4 of the Recreation Study Report identifies which photos are associated with each site. The report currently provides adequate information regarding the photolog and has not been revised to include an index.

1.4.2.2.4 Water Quality Study Report

On March 6, 2023, the draft Water Quality Study report was provided to the NPS and WDNR for comment. Only the NPS provided comments. Their comments were submitted via email on April 21, 2023, and are summarized below along and the Applicant's responses.

[1] The survey questions used for the study were originally provided by the NPS in their recreation study request.

NPS Comment:

The NPS requested clarification on why the water quality study excluded the WDNR-requested parameters of cyanobacteria, methyl mercury, and sediment accumulation at the Trego Project.

NSPW Response:

Cyanobacteria

In their March 4, 2022, comments on the draft study plans, the NPS previously provided comments indicating they concurred with the rationale for not monitoring cyanobacteria.

Methyl Mercury

In their March 4, 2022, comments on the draft study plans, the NPS did not provide any comments on the need for methyl mercury sampling. In their study request, the WDNR indicated dam operations can influence the sulfur and ultimately the mercury cycle where sulfate runoff can acidify the water and enhance methyl mercury concentrations in water and methyl mercury in fish tissue. The proposed water sampling protocol did include total mercury sampling, which provides sufficient information to determine whether there is mercury contamination at either Project. Therefore, no fish tissue sampling for methyl mercury was included in the final study plan.

Sediment Accumulation

In their March 4, 2022, comments on the draft study plans, the NPS requested NSPW monitor sediment accumulation at the Trego Project. As noted in Appendix 3 of the Final Water Quality Study Plan, and based upon existing information provided by the USACE, the source for the accumulation of sediment in the upper reaches of Trego Flowage is from upstream of the reservoir. Therefore, the existing run-of-river mode of operation does not contribute to sedimentation. This was acknowledged in FERC's Order Modifying and Approving Drawdown Needs Analysis, FERC Accession No. 19951107-0144, issued October 31, 1995. Since the Trego Project is not contributing to the sedimentation, if a study were conducted, it would not provide information to assist the FERC in its environmental analysis. Therefore, sedimentation was not included as a study parameter in the final study plan.

1.4.2.2.5 Wood and Blanding's Turtle Nesting Habitat Study Report

On March 6, 2023, the draft Wood and Blanding's Turtle Nesting Habitat Study report was provided to the NPS and WDNR for comment. Only the NPS provided comments. Their comments, submitted via email on April 21, 2023, are summarized below along with the Applicant's responses.

NPS Comment:

The NPS indicated they did not have any questions or comments regarding the study report.

NSPW Response:

Comment noted.

1.4.2.2.6 Other NPS Comments

In addition to the comments the NPS provided on each of the study reports, they also requested NSPW reconsider additional study requests made in their April 27, 2021 letter, specifically the Hydraulics, Sedimentation, and Channel Change Study. As noted in NSPW's response to the NPS comments on the

Water Quality Study in Section 1.4.2.2.4, sedimentation within the upper reaches of Trego Flowage originates upstream of the Project and is not exacerbated by the Project's run-of-river operations. While NSPW did not conduct a specific sediment study, it did conduct a shoreline survey of Trego Flowage to identify any areas of erosion that could influence the amount of sediment within the Project boundary. The findings of this survey are included in Section 4.3.1.4.

NSPW also collected information on aquatic and terrestrial vegetation, lakebed substrates, and water depths in conjunction with the ATIS Study. This information was used to develop updated vegetation and bathymetric maps for each Project which are included in the ATIS Study Report found in **Appendix E-3**. This information is sufficient to evaluate the potential recreational impacts caused by excessive vegetation and/or low water depths and develop any needed mitigation measures.

Both Projects are operated in a run-of-river mode with an allowable reservoir fluctuation of 0.5 feet at the Hayward Project and 0.6 feet at the Trego Project. The existing run-of-river operations do not have a demonstrable effect on river hydraulics at elevations above the licensed operations range. Hydraulic effects are driven primarily by the volume of inflow to the reservoir, rather than the operation of either Project. Therefore, no hydraulic study was conducted.

1.4.2.3 Draft License Application

This DLA was submitted for review and comment to the consulting parties on the distribution list included with the cover letter submitting said application. Written comments received regarding the DLA, and the Applicant's responses, will be included in Appendix E-1 of the FLA.

1.4.3 Third-Stage Consultation

The Licensee will address comments received on the DLA in the FLA. A letter with a link to the electronic version of the FLA will be sent via certified mail to the aforementioned distribution list. The distribution list used for delivery of the FLA will be included in Appendix E-1 of the FLA.

The FLA will also be posted on each Project's relicensing website:

- Hayward Project is located at http://hydrorelicensing.com/hayward/
- Trego Project is located at http://hydrorelicensing.com/trego/

2. Hayward Project Proposed Action and Alternatives

In accordance with the National Environmental Policy Act (NEPA) review process, the environmental analysis must consider, at a minimum, the three alternatives described in the sections below: (1) the no-action alternative, (2) NSPW's proposed action, and (3) alternatives to the proposed action.

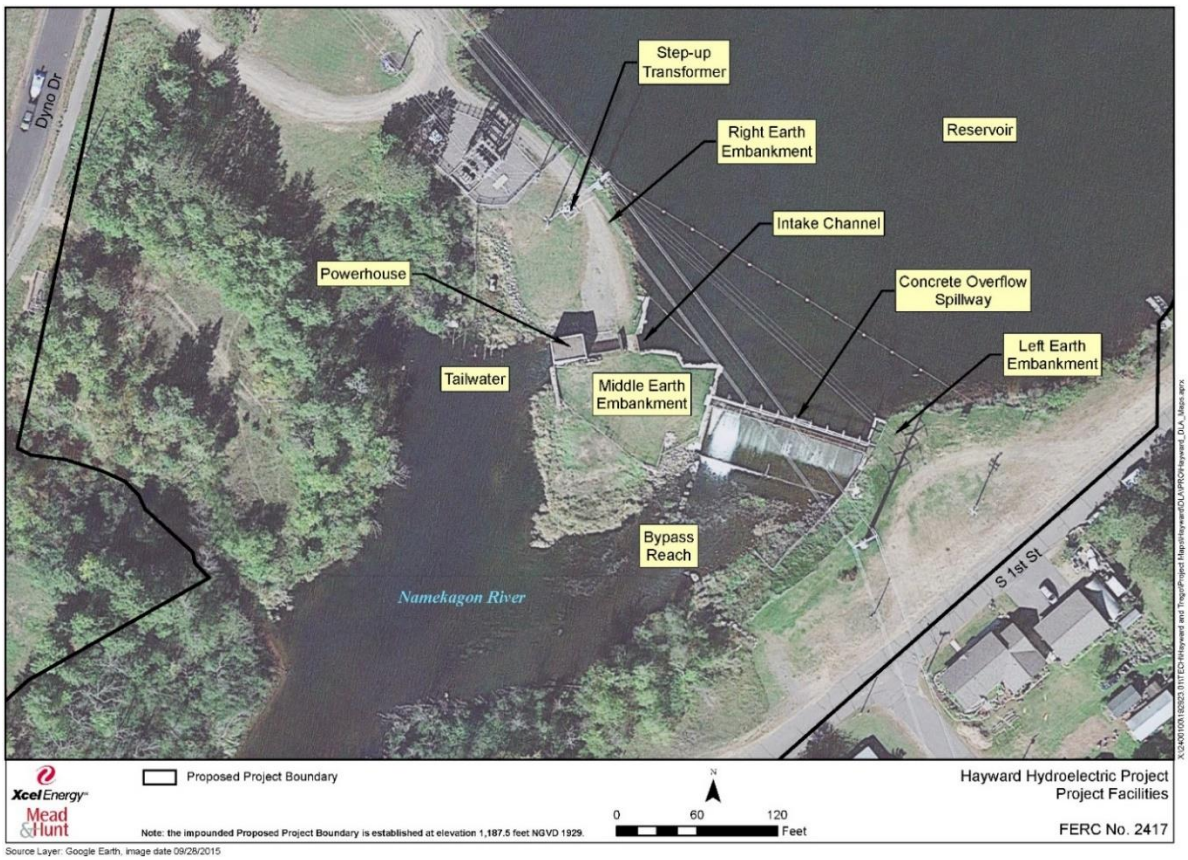
2.1 Hayward Project No-Action Alternative

Under the no-action alternative (denial of the application), the Hayward Project would continue to operate under the exiting license and no new environmental protection, mitigation, or enhancement measures would be implemented. This alternative is also defined as the current operation relative to the other alternatives.

2.1.1 Hayward Project Existing Project Facilities

The Hayward Project is located on the Namekagon River in the City of Hayward in Sawyer County, Wisconsin, with an authorized capacity of 168 kilowatts (kW). Project facilities include a dam, powerhouse with intake channel, tailrace or tailwater, transmission equipment, appurtenant equipment, reservoir (246.9 acres), surrounding land extending landward to an elevation of 1,187.5 feet National Geodetic Vertical Datum (NGVD) and NSPW-owned lands near the dam necessary for Project operations.[2] Existing Project facilities are shown in **Figure 2.1.1-1**.

Figure 2.1.1-1 Hayward Project Facilities



[2] Reservoir acreage calculated acreage using GIS at the maximum operating elevation of 1,187.5 feet NGVD.

2.1.1.1 Project Dam

The dam is approximately 442 feet long and 15 feet high. From left to right looking downstream, the main structures of the dam consist of a left earth embankment, concrete overflow spillway, middle earth embankment, powerhouse with intake channel, and right earth embankment.

2.1.1.1.1 Earth Embankments

The dam contains three earth embankments. From a perspective of looking downstream, there is the left earth embankment, middle earth embankment, and right earth embankment. The concrete overflow spillway separates the left and middle embankments and the powerhouse with the intake channel separates the middle and right embankments.

Left Earth Embankment

The left earth embankment extends 24 feet from the left bank to the left abutment of the concrete overflow spillway. It is 85 feet wide at its base and 15 feet high. It has a top elevation of approximately 1,190.0 feet NGVD (NSPW, 2010).

Middle Earth Embankment

The middle earth embankment extends approximately 80 feet from the right abutment of the concrete overflow spillway to the powerhouse. It is approximately 147 feet wide at its base and 15 feet high (NSPW, 2010).

Right Earth Embankment

The right earth embankment extends approximately 200 feet from the right abutment of the powerhouse to the right bank. It is approximately 65 feet wide at its base and 15.5 feet high. Distance and height measurements are from the Exhibit F drawings.

2.1.1.1.2 Concrete Overflow Spillway

The concrete overflow spillway is approximately 120 feet long and extends from the left earth embankment to the middle earth embankment. It is approximately 50 feet wide and 13.7 feet high. Distance and height measurements are extracted from the Exhibit F drawings. The spillway consists of rock-filled timber cribbing with a concrete overlay that contains 10 bays separated by concrete piers. Reservoir levels are controlled by two slide gates in Bays 1 and 2 and steel bulkheads in Bays 3 to 10.

2.1.1.1.3 Powerhouse with Intake Channel

The powerhouse structure is approximately 18 feet wide (left to right) and extends 24 feet downstream. It has a concrete substructure and a brick masonry wall superstructure which extends approximately 27.5 feet from the generator floor to the roof. The top of the concrete substructure is at an approximate elevation of 1,191.5 feet NGVD. The approximate elevation of the draft tube invert is 1,164.7 feet NGVD, giving it an overall height of 26.8 feet (NSPW, 2010).

The intake channel is located between the right and middle earth embankments. It is 42 feet long and consists of the concrete intake structure, trashrack, steel bulkhead, access bridge, and channel. The channel width varies linearly from approximately 13 feet on the upstream side of the access bridge to

approximately 8 feet on the downstream side of the bridge and remains 8 feet wide to the powerhouse (NSPW, 2010). Stoplog slots are located at the upstream end of the intake channel and are built into the concrete channel side walls. A steel trashrack is located downstream of the stoplog slots and is mounted near-vertical across the intake. Downstream of the trashrack, an 8-foot-wide concrete access bridge spans the intake channel. A headgate slot and vertical steel bulkhead are located downstream of the bridge. The headgate does not have a hoist and is operated using some type of mobile equipment. Metal grating covers the top of the intake channel from the access bridge to the powerhouse.

The trashracks are 12.8 feet wide and 10.9 feet high with a clear spacing of 1.5 inches. The trashracks are at a minimum reservoir elevation of 1,187.0 feet NGVD (NSPW, 1991b).

The Project contains one S. Morgan Smith vertical Francis-Type turbine with a minimum hydraulic capacity of 120 cubic feet per second (cfs) and a maximum hydraulic capacity of 178 cfs at a net head of 17 feet. The Project contains one generator manufactured by the Northwestern Electric Equipment Company with a nameplate rating of 168 kW at 80% power factor (NSPW, 1991b).

2.1.1.2 Tailwater

The Project tailwater, or tailrace, extends approximately 200 feet downstream of the powerhouse before merging with the Namekagon River. The depth is 8 feet at the downstream side of the powerhouse. The Project boundary extends an additional 400 feet downstream of the powerhouse on the Namekagon River.

2.1.1.3 Transmission Equipment

A 150-foot-long, 480-volt, three phase underground transmission line extends from the powerhouse to a 300 kilovolt-amps, 277 volt to 12.5 kilovolt step-up pad mounted transformer. The high voltage side of the transformer is the point of interconnect with NSPW's non-project distribution system (NSPW, 2010).

2.1.1.4 Appurtenant Facilities

Appurtenant equipment includes, but is not limited to, bearing lubrication systems, powerhouse ventilation systems, trashrack cleaning equipment, protective devices, and metering devices.

2.1.1.5 Reservoir

The Project reservoir (Lake Hayward, also known as Hayward Lake) encompasses approximately 246.9 acres with a gross storage capacity of approximately 1,234.5 acre-feet at the maximum reservoir elevation of 1,187.5 feet NGVD. Under the current operation, the reservoir elevation is maintained between an elevation of 1,187.0 and 1,187.5 feet NGVD, while targeting 1,187.4 feet NGVD. The reservoir has a maximum depth of 17 feet at the dam and an estimated average depth of 5 feet (NSPW, 1991b).

2.1.2 Hayward Project Dam Safety

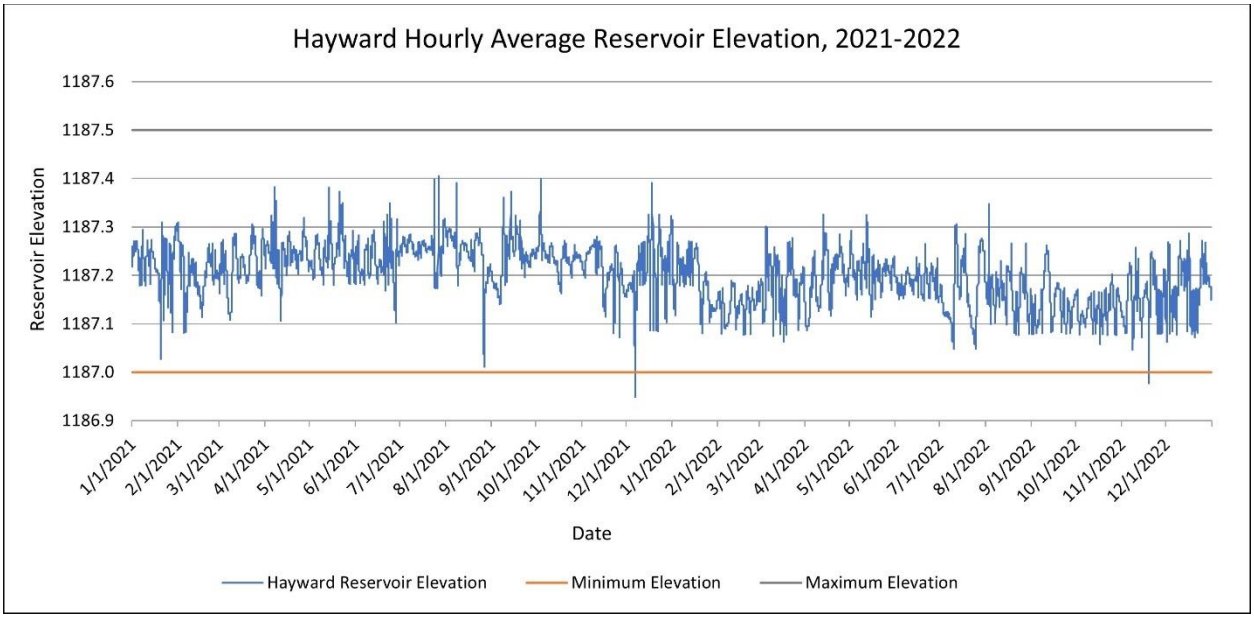
Dam safety has been considered during the development of the proposed and alternative actions described in this application to ensure the Project continues to meet the Commission's dam safety guidelines. There are no proposed modifications to the dam structures that could impact their integrity as part of this application.

2.1.3 Hayward Project Current Project Operation

The Project currently operates in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resource values. At all times NSPW acts to minimize the fluctuation of the reservoir and maintain the elevation between 1,187.0 and 1,187.5 feet NGVD, while targeting 1,187.4 feet NGVD. NSPW does not operate the Project between the low and high elevation on a daily basis for peaking purposes. In addition, a minimum flow of 8 cfs or inflow, whichever is less, is released into the bypass reach year-round for the protection of fish and wildlife resources and water quality.

In order to demonstrate compliance with the run-of-river requirement, NSPW analyzed hourly average reservoir elevation information from 2021 and 2022, the most recent two-year period of data available. The analysis showed that the reservoir elevation typically fluctuates gradually and averaged less than 0.01 feet per 24-hour period. During the two-year timeframe, the maximum 24-hour change was just 0.26 feet. This analysis clearly shows that the reservoir was not fluctuated on a daily basis for the purposes of peaking. **Figure 2.1.3-1** shows hourly average reservoir elevation changes during this two-year timeframe.

Figure 2.1.3-1 Hayward Reservoir Hourly Average Reservoir Elevation Data (2021-2022)



2.1.4 Hayward Project Existing Environmental Measures

Existing environmental measures implemented by NSPW are described in the following sections.

2.1.4.1 Geologic and Soils Resources

NSPW currently implements best management practices (BMPs) for erosion control during ground disturbing activities associated with in-kind maintenance activities at the Project. BMPs include temporary measures such as silt fencing, installation of straw wattles, seeding and mulching. Permanent BMPs include establishment of vegetation and shoreline stabilization with rock riprap.

2.1.4.2 Aquatic Resources

NSPW currently follows these operating parameters for protection and enhancement of aquatic resources:

- Operates in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir.
- Maintains a year-round minimum flow of 8 cfs or inflow, whichever is less, into the bypass reach of the Namekagon River.
- Acts to minimize the fluctuation of the reservoir and maintain the elevation between 1,187.0 and 1,187.5 feet NGVD, while targeting 1,187.4 feet NGVD.

2.1.4.3 Terrestrial Resources

NSPW does not currently implement any specific measures for terrestrial resources.

2.1.4.4 Threatened and Endangered Species

NSPW currently implements the USFWS northern long-eared bat (NLEB) guidance. The Wisconsin's Broad Incidental Take Permit/Authorization (BITP/A) for Cave Bats will be followed for all tree removal activities greater than 3 inches in diameter.

2.1.4.5 Recreation and Land Use

NSPW currently maintains three recreation sites at the Hayward Project. Those facilities include the Canoe Portage Take-Out/Carry-In Access, Informal Tailwater Access, and Canoe Portage Trail and Put-In.

2.1.4.6 Cultural Resources

NSPW complies with the current Historic Resources Management Plan (HRMP) for the Hayward Project.

2.2 Hayward Project Applicant's Proposal

2.2.1 Hayward Project Proposed Project Facilities

NSPW is not proposing any changes to the existing Project facilities.

2.2.2 Hayward Project Proposed Project Operation

Under the proposed alternative, the Project would operate under the operational conditions and environmental protection, mitigation, and enhancement measures described in the following sections. This alternative is defined as the proposed operation for comparison with other alternatives.

2.2.2.1 Proposed Operations

Under the Proposed Operation Alternative, NSPW will:

- Continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resource values.
- At all times, NSPW will act to minimize the fluctuation of the Project reservoir and maintain the elevation between 1,187.0 and 1,187.5 feet NGVD, while targeting 1,187.4 feet.
- NSPW will not operate the Project between the low elevation and high elevation on a daily basis for peaking purposes.
- A minimum flow of 8 cfs or inflow, whichever is less, will be released into the bypass reach for the protection of fish and wildlife resources and water quality.
- Just prior to spring runoff, or for emergency purposes, NSPW may deviate from the maximum reservoir elevation by no more than 0.5 feet to remove ice from the spillway for dam safety purposes. The duration of the deviation will be no longer than necessary, typically less than a few days, to remove the ice and will be considered a planned deviation under the requirements outlined in Section 4.5.3.[3]

2.2.2.2 Proposed Environmental Measures

In addition to the operational parameters proposed in Section 2.2.2.1 above, the following environmental measures are being proposed to mitigate for potential adverse impacts that could occur due to the Project's proposed operation:

- NSPW will develop an Aquatic and Terrestrial Invasive Species Plan and conduct biennial invasive species surveys.
- NSPW will conduct shoreline erosion surveys every 10 years.
- NSPW will develop an HPMP in consultation with the Wisconsin SHPO and interested Native American Nations to follow the requirements outlined in the Programmatic Agreement.
- NSPW will develop an Operations Management Plan to include deviation reporting and agency consultation requirements.

[3] Due to the short duration of the deviation and its occurrence during high inflow periods, which coincides with the natural hydrologic cycle of the river, it is not expected to have an adverse impact upon geology and soil resources, water resources, fish and aquatic resources, terrestrial resources, threatened and endangered resources, recreation resources, aesthetic resources, cultural resources, socioeconomic resources, tribal resources, land use, or environmental justice.

NSPW is also proposing the following environmental measures regarding recreation resources:

- Maintain or improve signage, including Part 8 signage, at the Canoe Portage Take-Out and Carry-In Access site to meet current FERC standards.
- Coordinate with WDNR to obtain a current invasive species sign for installation at the Canoe Portage Put-In.
- Maintain or improve signage, including Part 8 signage, at the Canoe Portage Trail and Put-In site.
- Conduct routine maintenance of NSPW's FERC-Approved recreation sites, including signage, over the term of the subsequent license.
- Implement the Cave Bat BITP/A for any routine vegetation maintenance activities at NSPW's FERC-Approved recreation sites.
- Implement the Wood Turtle BITP/A for maintenance work at NSPW's FERC-Approved recreation sites, as long as the turtle remains a state-listed species.

2.2.2.3 Proposed Environmental Measures for Yet to be Fully Defined In-Kind Maintenance Work that may Occur During the Term of the Subsequent License

In addition to the operational parameters proposed in Section 2.2.2.1 and Section 2.2.2.2, the following environmental measures are being proposed to avoid any potential adverse impacts during any yet to be fully defined in-kind maintenance activities that could occur during the subsequent license:

- Implement the Cave Bat BITP/A.
- Implement the Wood Turtle BITP/A, as long as wood turtles remain a state threatened or endangered species.
- Implement the Mussel Relocation BITP/A for any activities conducted in areas of suitable habitat below the ordinary high-water mark.
- Annually review the Wisconsin Natural Heritage Inventory (NHI) to determine the location of bald eagle nests and provide a 660-foot buffer between any vegetation management or construction activities and identified nests during the nesting season.

These activities are further described in Section 9.0.

2.2.3 Hayward Project Proposed Project Boundary

The proposed Project boundary for the Hayward Project, included in Exhibit G of this application, encompasses all lands and waters necessary for Project purposes consistent with FERC regulations and governing precedent.

2.3 Hayward Project Alternatives to the Proposed Action

As part of their NEPA analysis, the Commission will consider reasonable alternatives for operational or facility modifications, as well as protection, mitigation, and enhancement measures identified by the Commission, resource agencies, Native American Nations, non-governmental organizations, and the public.

3. Trego Project Proposed Action and Alternatives

In accordance with the NEPA review process, the environmental analysis must consider, at a minimum, the three alternatives described in the sections below: (1) the no-action alternative, (2) NSPW's proposed action, and (3) alternatives to the proposed action.

3.1 Trego Project No-Action Alternative

Under the no-action alternative (denial of the application), the Trego Project would continue to operate under the exiting license and no new environmental protection, mitigation, or enhancement measures would be implemented. This alternative is also defined as the current operation relative to the other alternatives.

3.1.1 Trego Project Existing Project Facilities

The Trego Hydroelectric Project is located on the Namekagon River in the Town of Trego in Washburn County, Wisconsin, with an authorized capacity of 1,200 kW. Project facilities include a dam, powerhouse, tailrace or tailwater, transmission equipment, appurtenant equipment, reservoir (435.2 acres), surrounding land extending landward to an elevation of 1,035.2 feet NGVD, and NSPW-owned land near the dam necessary for Project operations.[4] Existing Project facilities are depicted in **Figure 3.1.1-1**.

3.1.1.1 Trego Dam

The Trego Dam is approximately 638 feet long and 43 feet high. From left to right looking downstream, the main structures of the dam consist of a left earth embankment, powerhouse, sluice gate spillway, radial gate spillway, and right earth embankment (NSPW, 2017).

3.1.1.1.1 Earth Embankments

The dam contains two earth embankments. From a perspective of looking downstream, there is the left earth embankment and right earth embankment. The powerhouse, sluice gate spillway, and radial gate spillway separates the two embankments.

Left Earth Embankment

The left earth embankment extends 110 feet from the left bank to the left abutment of the powerhouse. The embankment is 150 feet wide at its base and 25 feet high. Height and width measurements are extracted from the Exhibit F drawings.

Right Earth Embankment

The right earth embankment extends approximately 200 feet from the right abutment of the powerhouse to the right bank. The embankment is approximately 162 feet wide at its base and 30 feet high. Height and width measurements are extracted from the Exhibit F drawings.

[4] Reservoir acreage calculated acreage using GIS at the maximum operating elevation of 1,035.2 feet NGVD.

Figure 3.1.1-1 Trego Project Facilities

3.1.1.2 Powerhouse

The powerhouse is approximately 59.5 feet long from left to right and extends 99 feet downstream from its upstream foundation wall to the downstream end of the tailrace apron. The 99 feet includes the 58 foot substructure and 41 foot tailrace apron. The powerhouse has a concrete substructure and a brick masonry superstructure with an overall height of 74 feet above the foundation (NSPW, 1991a). The powerhouse also contains an integral intake structure, turbines, and generators and forms a tailwater or tailrace downstream.

3.1.1.2.1 Intake Structure

The integral intake structure is vertically separated into two intake and discharge flumes. The left passage is 13.5 feet wide and the other is 21 feet wide (NSPW, 1991a). The structure has a total width of 36 feet. The trashracks in both bays are vertically angled slightly downstream to facilitate cleaning, with a height measured along the angled axis at 17.75 feet and a flow height of 17.5 feet The trashracks have a clear spacing of 1.5 inches. Trashrack measurements are extracted from the Exhibit F drawings. The trashracks are submerged at all times during normal reservoir operating levels.

3.1.1.2.2 Turbines

The Project contains two J. Leffel Company vertical Francis-Type turbines with a minimum hydraulic capacity of 100 cfs and a maximum hydraulic capacity of 663 cfs. The Project has an average head of 31 feet and an effective head of 29 feet (NSPW, 1991a).

3.1.1.2.3 Generators

The Project contains two generators manufactured by Electric Machinery Manufacturing Company with a total nameplate capacity of 1,200 kW, with Unit 1 rated at 700 kW and Unit 2 at 500 kW (NSPW, 1991a).

3.1.1.3 Sluice Gate Spillway

The sluice gate spillway section is an Ambursen dam spillway that separates the concrete spillway section from the powerhouse. It is six feet long and 40 feet high from the bottom of the spillway foundation to the top of the gate. In cross-section width, the section extends about 99 feet from its upstream foundation wall to the end of its downstream apron, which includes 73 feet for the sluice gate spillway and 26 feet for the apron. The sluice gate is a 6-foot wide by 8-foot high vertical bottom hinge Obermeyer-type gate with a capacity of 320 cfs at elevation 1,137.5 feet NGVD (NSPW, 1991a).

3.1.1.4 Radial Gate Spillway

The radial gate spillway section is an Ambursen dam spillway that is 86 feet long, 112 feet wide from the upstream foundation wall to downstream end of stilling basin, and 45 feet high from the bottom of the section foundation to the top of the operating platform. The section contains three steel radial gates that are each 25.5-feet wide by 10-feet high separated by concrete piers. The gate sill elevation is 1,026 feet NGVD and top of gate elevation is 1,035.2 feet NGVD when closed (NSPW, 1991a).

3.1.1.5 Trego Tailrace

The tailrace, or tailwater, is approximately 125 feet wide and extends downstream from the dam for approximately 160 feet. Both the powerhouse and spillway discharge directly to the Namekagon River, which has a depth of approximately 9 feet at the downstream edge of the powerhouse.

3.1.1.6 Trego Transmission Equipment

There is a 40-foot-long, 2.4 kilovolt three phase transmission line extending from the powerhouse to a 2,000 kilovolt-amps, 480-volt to 12.5 kilovolt step up transformer housed in the 16-foot by 32-foot substation attached to the east side of the powerhouse. The high voltage side of the transformer is the point of interconnect with NSPW's non-project distribution system.

3.1.1.7 Trego Reservoir

The Project reservoir (Trego Lake) encompasses approximately 435.2 acres with a gross storage capacity of approximately 43,520 acre-feet at the maximum reservoir elevation of 1,035.2 feet NGVD. The reservoir has a maximum depth of 35 feet at the dam and an estimated average depth of 10 feet (NSPW, 1991a).

3.1.1.8 Trego Appurtenant Equipment

Appurtenant equipment includes, but is not limited to, bearing lubrication systems, powerhouse ventilation systems, trashrack cleaning equipment, gate lifting equipment, protective devices, and metering devices.

3.1.2 Trego Project Dam Safety

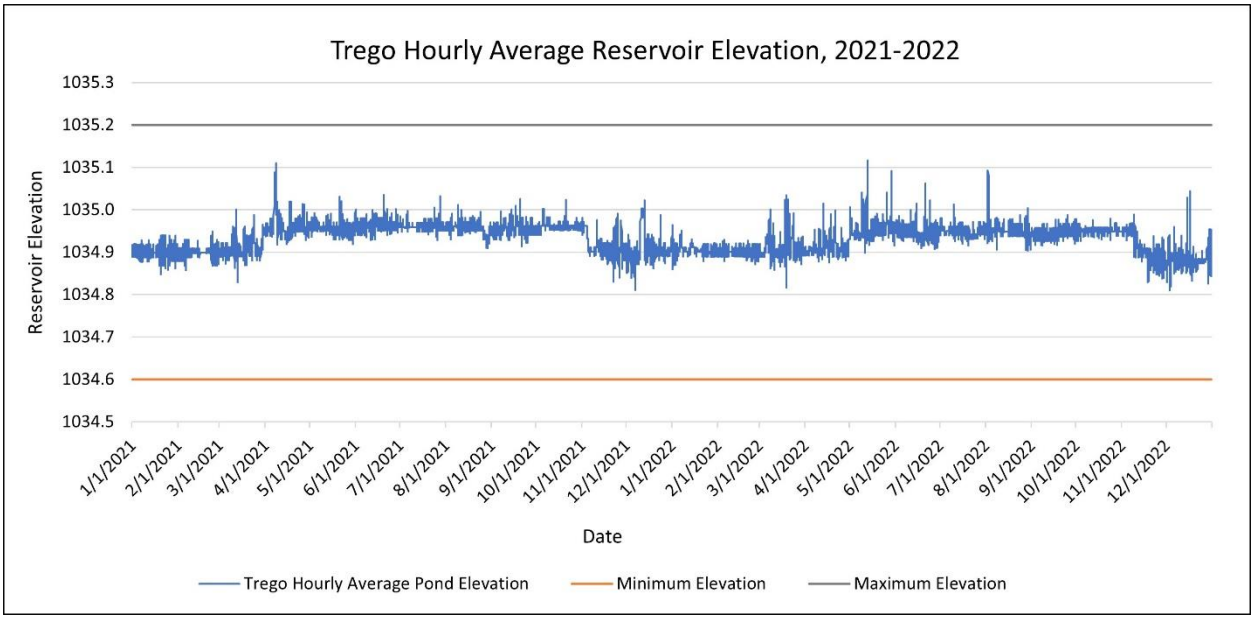
Dam safety has been considered during the development of the proposed and alternative actions described in this application to ensure the Project continues to meet the Commission's dam safety guidelines. There are no proposed modifications to the dam structures that could impact their integrity as part of this application.

3.1.3 Trego Project Current Project Operation

The Project currently operates in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. NSPW maintains a target elevation of 1,034.9 feet NGVD, with fluctuations limited to 0.3 feet around the target elevation (i.e., 1,034.6 and 1,035.2 feet NGVD). This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and aquatic resources.

In order to demonstrate compliance with the run-of-river requirement, NSPW reviewed hourly average reservoir elevation information for 2021 and 2022, the most recent two-year period of data available. The analysis showed the reservoir elevation generally changes gradually and averaged less than 0.01 feet per 24-hour period, with a maximum 24-hour change of 0.1 feet during this two-year timeframe. This review clearly shows the Project reservoir was not fluctuated on a daily basis for peaking purposes. **Figure 3.1.3-1** illustrates hourly average reservoir elevation data for the two-year period.

Figure 3.1.3-1 Trego Reservoir Hourly Average Reservoir Elevation Data (2021-2022)



3.1.4 Trego Project Existing Environmental Measures

Existing environmental measures implemented by NSPW are described in the following sections.

3.1.4.1 Geologic and Soils Resources

NSPW currently implements BMPs for erosion control during ground disturbing activities associated with any in-kind maintenance activities at the Project. BMPs include temporary measures such as silt fencing, installation of straw wattles, seeding and mulching. Permanent BMPs include establishment of vegetation and shoreline stabilization with rock riprap.

3.1.4.2 Aquatic Resources

NSPW currently follows these operating parameters for protection and enhancement of aquatic resources:

- Maintain a target reservoir elevation of 1,034.9 feet NGVD, with fluctuations limited to 0.3 feet around the target elevation (i.e., between 1,034.6 and 1,035.2 feet NGVD).
- Reimburse TLD for the cost of annually harvesting aquatic vegetation to improve navigation in the upper portion of the reservoir.

3.1.4.3 Terrestrial Resources

NSPW does not currently implement any specific measures for terrestrial resources.

3.1.4.4 Threatened and Endangered Species

NSPW currently implements the USFWS NLEB guidance. The Wisconsin's BITP/A for Cave Bats will be followed during the pending license for all tree removal activities greater than 3 inches in diameter.

3.1.4.5 Recreation and Land Use

NSPW currently maintains two recreation sites at the Trego Project and they include the South Tailwater Access and the North Tailwater Access and Canoe Portage.

3.1.4.6 Cultural Resources

NSPW complies with the requirements of the current Cultural Resources Management Plan (CRMP) for the Trego Project.

3.2 Trego Project Applicant's Proposal

3.2.1 Trego Project Proposed Project Facilities

NSPW is not proposing any changes to the existing Project facilities.

3.2.2 Trego Project Proposed Project Operation

Under the proposed alternative, the Project would operate under the operational conditions and environmental protection, mitigation, and enhancement measures described in the following sections. This alternative is also defined as the proposed operation relative to the other alternatives.

3.2.2.1 Proposed Operations

NSPW is proposing the following operational parameters for the Project during the license term:

- Continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation minimizes adverse impacts on water quality, aquatic habitat, and aquatic resources.
- Maintain a target reservoir elevation of 1,034.9 feet NGVD, with fluctuations limited to 0.3 feet around the target elevation (i.e., between 1,034.6 and 1,035.2 feet NGVD).
- Just prior to spring runoff, or for emergency purposes, NSPW may need to deviate from the maximum reservoir elevation by no more than 0.5 feet to remove ice from the spillway for dam safety purposes. The duration of the deviation will be no longer than necessary, typically less than a few days, to remove the ice and will be considered a planned deviation under the requirements outlined in Section 5.5.3.[5]

3.2.2.2 Proposed Environmental Measures

In addition to the operational parameters proposed in Section 3.2.2.1 above, the following environmental measures are being proposed to mitigate for potential adverse impacts that could occur due to the proposed Project operation:

- NSPW will develop an Aquatic and Terrestrial Invasive Species Plan and conduct biennial invasive species surveys.

[5] Due to the short duration of the ice removal event and its timing during high inflow periods, which coincides with the natural hydrologic cycle, the proposed planned deviations for ice removal purposes are not expected to have an adverse impact upon geology and soil resources, water resources, fish and aquatic resources, terrestrial resources, threatened and endangered resources, recreation resources, aesthetic resources, cultural resources, socioeconomic resources, tribal resources, land use, or environmental justice.

- NSPW will conduct shoreline erosion surveys every 10 years.
- NSPW will develop an HPMP in consultation with the Wisconsin SHPO and interested Native American Nations to follow the requirements outlined in the Programmatic Agreement. The HPMP will supersede the existing CRMP.
- NSPW will develop an Operations Management Plan to include deviation reporting and agency consultation requirements.
- NSPW will provide a one-time payment not to exceed $75,000 to the TLD to cost-share up to 75% of the total cost towards the purchase of a weed harvester. This one-time commitment would be in lieu of the annual reimbursement NSPW currently provides TLD for aquatic vegetation harvesting.
- NSPW will develop an Operation Monitoring Plan to include deviation reporting and agency consultation requirements.

NSPW is also proposing the following environmental measures regarding recreation resources:

- Review and maintain or improve signage, including Part 8 signage, at the South Tailwater Access site to meet current standards.
- Maintain or improve signage, including Part 8 signage, at the North Tailwater Access/Canoe Portage site during the open water recreation season during the term of the subsequent license.
- Continue to maintain the existing portable restroom facilities during the open water recreation season at the North Tailwater Access and Canoe Portage site during the subsequent license term.
- Conduct routine maintenance of NSPW's FERC-Approved recreation sites, including signage, over the term of the subsequent license.
- Implement the Cave Bat BITP/A for any routine vegetation maintenance activities at NSPW's FERC-Approved recreation sites.
- Implement the Wood Turtle BITP/A for maintenance work at NSPW's FERC-Approved recreation sites as long as the turtle remains a state threatened or endangered species.

3.2.2.3 Proposed Environmental Measures for Yet to be Fully Defined In-Kind Maintenance Work that may Occur During the Term of the Subsequent License

In addition to the operational parameters proposed in Section 3.2.2.1 and Section 3.2.2.2, the following environmental measures are being proposed to limit potential adverse impacts during any yet to be fully defined in-kind maintenance activities that could occur during the subsequent license:

- Implement the Cave Bat BITP/A.
- Implement the Wood Turtle BITP/A, as long as wood turtles remain a state threatened or endangered species.
- Implement the Mussel Relocation BITP/A for activities conducted in areas of suitable habitat below the ordinary high-water mark.
- Annually review the Wisconsin NHI to determine the location of bald eagle nests and provide a 660-foot buffer between any vegetation management or construction activities and identified nests during the nesting season.

These activities are further described in Section 9.0.

3.2.3 Trego Project Proposed Project Boundary

The proposed Trego Project boundary, included in Exhibit G of this application, encompasses all lands and waters necessary for Project purposes consistent with FERC regulations and governing precedent.

3.3 Trego Project Alternatives To the Proposed Action

As part of their NEPA analysis, the Commission will consider reasonable alternatives for operational or facility modifications as well as protection, mitigation, and enhancement measures identified by the Commission, resource agencies, Native American Nations, non-governmental organizations, and the public.

4. Hayward Project Environmental Analysis

4.1 Hayward Project General Description of the River Basin

4.1.1 Namekagon River Basin

The Hayward Project is located on the Namekagon River, a small river that originates from Namekagon Lake in southern Bayfield County, Wisconsin. The river flows approximately 100 miles through Bayfield, Sawyer, Washburn, and Burnett Counties before its confluence with the St. Croix River. The Namekagon River is the largest tributary to the St. Croix River and has a rather uniform gradient of 6 to 8 feet per mile (NSPW, 1991a) (NSPW, 1991b). From Lake Namekagon, the Namekagon River flows approximately 33 miles southwest to the Hayward Project and continues flowing southwesterly for another 37 miles to the Trego Project. At the Trego Project, the river begins flowing northwesterly for its final 30 miles before entering the St. Croix River (US Geological Survey, n.d.a).

The entire mainstem of the Namekagon River is included in the Wild and Scenic Rivers System as part of the St. Croix National Scenic Riverway, which was established as a result of the enactment by Congress of the Wild and Scenic Rivers Act in 1968 (National Park Service, n.d.a).

The Namekagon River basin has a drainage area of approximately 1,030 square miles at the mouth of the river. The drainage area extends 206 square miles upstream of the Hayward dam and 488 square miles upstream of the Trego dam (Heinrich, E.W. and D.N. Daniel, 1983). The Upper Namekagon River Watershed, which includes the Hayward Project, is dominated by forests and wetlands (WI Department of Natural Resources, 2010a).

There are two FERC-licensed hydroelectric dams and three non-power dams located on the Namekagon River. Those facilities are listed in **Table 4.1.1-1** in order from upstream to downstream. A map depicting the location of the dams on the Namekagon River is included in **Appendix E-4**. The FERC-regulated dams include the Hayward and Trego Hydroelectric Projects. The remaining dams do not generate power and are regulated by the State of Wisconsin.

Table 4.1.1-1 Dams on the Namekagon River

Dam Name	Owner	County	National Dam Inventory No.	FERC or State Regulated	FERC No.	Authorized Capacity
Namekagon	Town of Namekagon	Bayfield	WI-00623	State	N/A	N/A
Pac-Wa-Wong	US Dept. of Interior	Sawyer	WI-10489	State	N/A	N/A
Phipps	US Dept. of Interior	Sawyer	WI 10488	State	N/A	N/A
Hayward	NSPW	Sawyer	WI-00795	FERC	P-2417	168 kW
Trego	NSPW	Washburn	WI-00812	FERC	P-2711	1,200 kW

4.1.2 Hayward Project Major Land Uses

While the Hayward area was historically used for timber production, current land use within the Namekagon River basin is primarily devoted to forest management, wildlife habitat, outdoor recreation, and rural residential properties. A more detailed description of current land use in the Project vicinity is found in Section 4.9.

4.1.3 Hayward Project Major Water Uses

Water from the Hayward Project serves multiple purposes including hydropower generation, public recreation, and fish and wildlife habitat. A more detailed description of water use in the Project vicinity is found in Section 4.4.

4.1.4 Hayward Project Flow Management

The Project is operated in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resource values The Project is operated at all times to minimize the fluctuation of Lake Hayward and maintain reservoir elevation between 1,187.0 and 1,187.5 feet NGVD, while targeting 1,187.4 feet NGVD. A minimum flow of 8 cfs or inflow, whichever is less, is released into the bypass reach at all times (NSPW, 1991b).

4.1.5 Hayward Project Tributary Streams

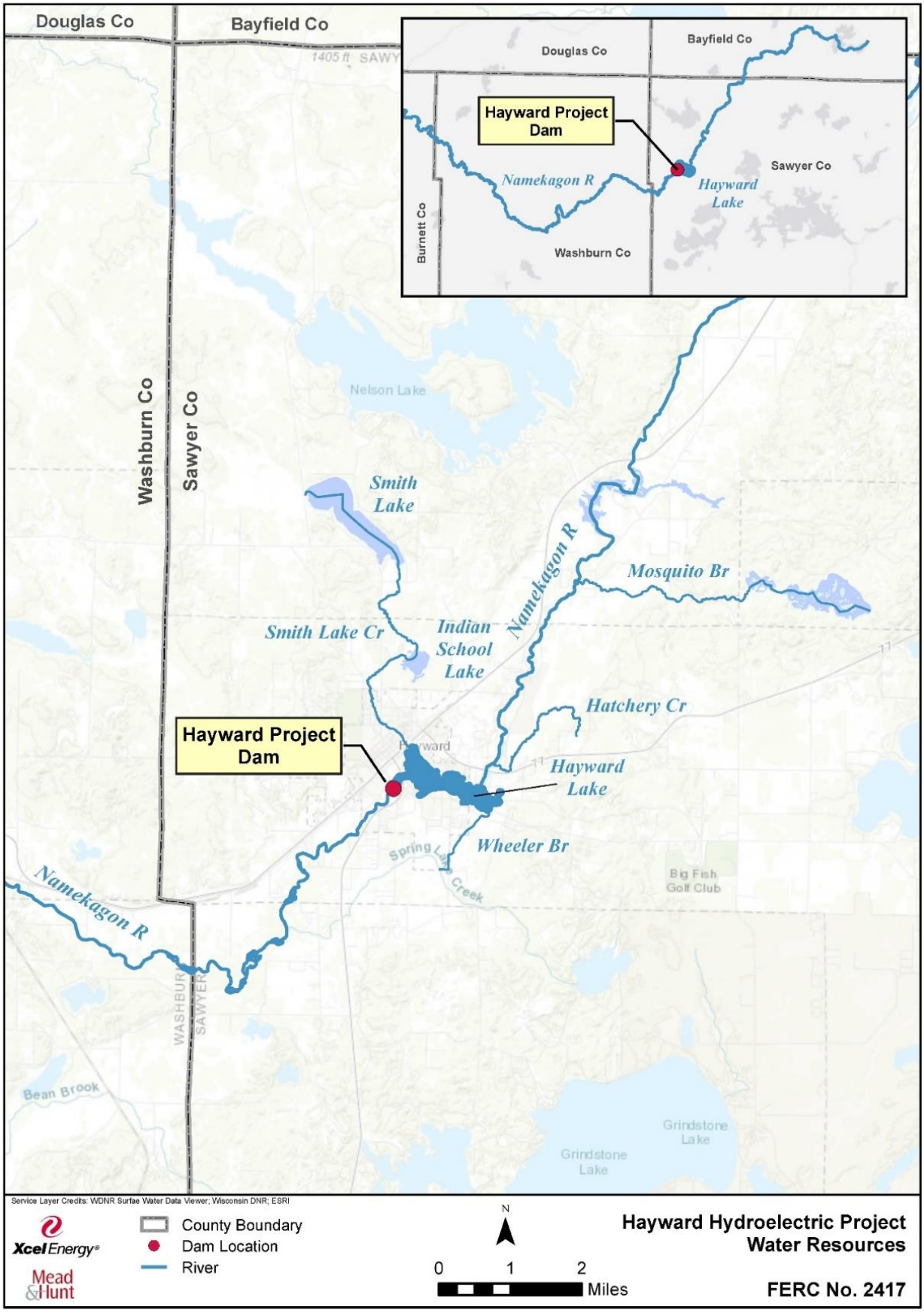
Tributaries in the vicinity of the Hayward Project reservoir include Hatchery Creek, Mosquito Brook, Smith Lake Creek, and Wheeler Brook, as shown in **Figure 4.1.5-1** on the following page.

4.1.6 Hayward Project Climate

The Hayward Project is located in the Northwest Sands Ecological Landscape in Sawyer County. This ecological landscape has a continental climate with cold winters and warm summers, similar to other northern ecological landscapes. The northern ecological landscapes in Wisconsin tend to have shorter growing seasons, cooler summers, colder winters, and less precipitation than the ecological landscapes located father south in the state (WI Department of Natural Resources, 2015a).

Climate information for the Hayward Project is based on data collected in the City of Hayward. The average monthly minimum temperatures range from -1 degrees Fahrenheit (°F) in January to 55°F in July. The average monthly maximum temperatures range from 23°F in January to 82°F in July. The overall monthly average temperatures range from 11°F in January to 68.5°F in July. The average annual precipitation is 31.67 inches, with approximately 62% of the precipitation falling during the growing season from May through September. The area receives an average of 59 inches of snow each year (US Climate Data, n.d.a).

Figure 4.1.5-1 Hayward Project Water Resources



4.2 Hayward Project Cumulative Effects

The Council on Environmental Quality's regulations for implementing the NEPA (40 CFR § 1508.7) define a cumulative effect as an impact on the environment resulting from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over time, including hydropower and other land and water development activities. NSPW has not identified any cumulatively affected resources. Therefore, no further discussion regarding cumulative effects is included in this DLA.

4.3 Hayward Project Geology and Soils

4.3.1 Hayward Project Affected Environment

4.3.1.1 Topography

The topography surrounding the Hayward Project varies in elevation by approximately 100 feet. The highest land surface elevation of about 1,270 feet NGVD descends to the Namekagon River surface elevation of approximately 1,171 feet NGVD downstream of the powerhouse (US Geological Survey, n.d.a). A topographic map of the Hayward Project vicinity is included in **Appendix E-5**.

4.3.1.2 Geology

The Hayward Project lies within the Northwest Sands Ecological Landscape, which is the most extensive and continuous glacial outwash system in northern Wisconsin. It has two major geomorphic components which include a large outwash plain pitted with depressions, called kettle lakes, and a former spillway of Glacial Lake Duluth and its associated terraces. The spillway is now a river valley occupied by the St. Croix River and Bois Brule River and their tributaries, including the Namekagon River (WI Department of Natural Resources, 2015a).

Surficial geology near the Hayward Project is primarily composed of glacial sediment. Geologic maps of the area indicate the underlying bedrock is Cambrian sandstone. Available soil boring records from the Wisconsin Geological and Natural History Survey indicate a 60 to130-foot thick layer of sand and gravel, underlain by sandstone bedrock. All Project structures are founded on soil. (NSPW, 2010).

4.3.1.3 Soils

There are five soil types throughout the vicinity of the Hayward Project which are grouped into four major soil associations with distinct soil patterns, relief, and drainage factors (Natural Resources Conservation Service, n.d.a). A custom soils report and map for the general Project vicinity is included in **Appendix E-6**.

The most prevalent soil series identified include Lenroot loamy sands (35.6%), Mahtomedi loamy sands (16.6%), Seelyeville and Markey soils (1.7%), and Newson mucks (0.2%). Soil characteristics for each soil series are shown in **Table 4.3.1.3-1**.

Table 4.3.1.3-1 Prevalent Soil Characteristics in the Hayward Project Vicinity

Soil Series	Drainage Classification	Formation	Water Transmittal Capacity	Runoff Class
Lenroot	Moderately Well-drained	Outwash plains and stream terraces	High to Very High	Low
Mahtomedi	Excessively drained	Outwash plains and stream terraces	High to Very High	Very Low
Seelyeville and Markey	Very poorly drained	Drainageways and depressions	High to Very High	Negligible
Newson muck	Very poorly drained	Drainageways and depressions	High to Very High	Negligible

Source: (Natural Resources Conservation Service, n.d.a)

The Natural Resource Conservation Service (NRCS) uses a computer software model called the Revised Universal Soil Loss Equation Version 2 (RUSLE 2) to estimate soil loss from erosion caused by rainfall on cropland. Several factors are viewed in RUSLE 2 to estimate soil erosion based on the soil type's inherent erodibility. Those factors include hydrologic group, T factor, Kf factor, and soil texture.

The hydrologic group for each soil type is based upon runoff potential for saturated and bare soils and ranges from Group A to Group D, with Group A having the lowest runoff potential and Group D having the highest. The T factor is an estimate of the maximum average rate of soil erosion in tons per acre that can occur without affecting crop productivity over a sustained period. T factor values range from 1 to 5 tons per acre, with higher values being less subject to damage from erosion. The T factor also relates to the ability of the soil to revegetate once it is disturbed. The Kf factor gives an indication of how susceptible a soil type is to sheet and rill erosion. Kf factor values range from 0.02 to 0.69, with 0.69 having the highest susceptibility to erosion (Natural Resources Conservation Service, 2001).

NRCS also provides representative values of the amounts of sand, silt, and clay to describe the representative soil texture of each soil type. The amounts of sand, silt, and clay are not listed for the Seelyeville and Markey soils because they consist primarily of organic material.

A summary of the RUSLE 2 related attributes for the four most prevalent soil series in the Hayward Project vicinity are shown in **Table 4.3.1.3-2**.

Table 4.3.1.3-2 RUSLE 2 Related Attributes for the Four Most Prevalent Soil Series Hayward Project Vicinity

Soil name	Percent of Project Vicinity	Hydrologic Group	Kf Factor	T Factor	Soil Texture Representative Values (%)		
					Sand	Silt	Clay
Lenroot loamy sand							
0 to 3% slopes	35.6%	A	0.1	5	82.5	9.0	8.5
Mahtomedi loamy sand							
0 to 6 % slopes	16.1%	A	0.1	5	82.5	9.0	8.5
12 to 30% slopes	0.5%	A	0.1	5	82.5	9.0	8.5

Soil name	Percent of Project Vicinity	Hydrologic Group	Kf Factor	T Factor	Soil Texture Representative Values (%)		
					Sand	Silt	Clay
Seelyeville and Markey Soils							
0 to 1% slopes	1.7%	B/D	N/A	1	N/A	N/A	N/A
Newson muck							
0 to 2 % slopes	0.2%	A/D	0.17	5	80.5	17.0	2.5

Source: (Natural Resources Conservation Service, n.d.a)

4.3.1.4 Reservoir Shoreline

Lake Hayward is a shallow, narrow body of water with a maximum width of approximately 0.3 miles. The run-of-river operating regime minimizes the likelihood of active bank erosion from wind or wave action. Most of the shoreline around Lake Hayward is heavily developed with permanent or seasonal residential properties. The shoreline is gently sloping and typically only 2-3 feet above the water surface (NSPW, 1991b). The shoreline was surveyed for erosion in 1998 and 2003 in conjunction with archaeological monitoring. These surveys concluded the reservoir shoreline was very stable and well vegetated with little or no erosion (AVD Archaeological Services, Inc., 1998) (AVD Archaeological Services, Inc., 2003).

NSPW conducted another shoreline erosion survey in 2022 as part of the federal relicensing process. All previously identified archaeological sites were inspected during the survey in addition to inspecting for actively eroding sites. The survey, conducted on August 17, 2022, involved an inspection of the entire shoreline by boat for erosion. No overall erosion was identified during the survey. Characteristic photographs of Lake Hayward's shoreline are included in the monitoring report (**Appendix E-7**). The archaeologist who conducted the study recommended to continue the current schedule for monitoring the Project's shoreline every 10 years, with the next survey occurring in 2033 (TRC, 2023a).

4.3.2 Hayward Project Environmental Effects

Under the proposed operation, NSPW will operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resources. NSPW will act at all times to minimize Lake Hayward's elevation fluctuations between 1,187.0 and 1,187.5 feet NGVD, while targeting 1,187.4 feet NGVD. NSPW does not operate the Project between the low and high elevations on a daily basis for peaking purposes. A minimum flow of 8 cfs or inflow, whichever is less, is also released in the bypass reach of the Namekagon River at all times (Section 2.2.2.1).

This run-of-river operation, when combined with local shoreland zoning regulations and existing vegetated buffers (emergent aquatic vegetation and terrestrial shoreline vegetation), helps protect Lake Hayward's shoreline from widespread erosion. No active erosion sites were noted during the 2022 survey. As discussed below, continuing to periodically monitor the reservoir shoreline for erosion as a proposed mitigation measure will help NSPW identify and address any new erosion sites before they have an opportunity to cause adverse environmental impacts.

4.3.3 Hayward Project Proposed Environmental Measures

NSPW is proposing to conduct an erosion survey of the Project's shoreline, including the tailwater area, every 10 years over the term of the new license. The survey will include an erosion inspection of all shorelines within the Project boundary, a review of the status of previously identified erosion sites, and development of a report to be submitted to the FERC, NPS, and WDNR. The report will provide a recommendation on whether mitigation of any erosion site located on NSPW-owned lands is warranted.

The proposed mitigation measures will benefit the environmental resources at the Project when compared to the alternative of no-action or denial of the application. Without issuance of a subsequent license for the Project, the resource enhancements discussed would not occur.

4.3.4 Hayward Project Unavoidable Adverse Impacts

With the implementation of the proposed environmental measures discussed above, the proposed operation of the Project is not expected to adversely affect geology and soil resources.

4.4 Hayward Project Water Resources

4.4.1 Hayward Project Affected Environment

4.4.1.1 Water Quantity

4.4.1.1.1 Existing Uses of Project Waters

A review of the WDNR Water Quantity Data viewer did not identify any state-permitted surface water withdrawals within the Project vicinity (WI Department of Natural Resources, n.d.c).

The Project reservoir is currently operated in a run-of-river mode where discharge downstream of the Project tailrace approximate the sum of inflows into the Project reservoir. This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resource values The reservoir is also currently operated to minimize the fluctuation of the Project reservoir and maintain the elevation between 1,187.0 and 1,187.5 feet NGVD, while targeting elevation 1,187.4 feet NGVD. The current license prohibits the operation of the Project between the low and high elevation range on a daily basis for peaking purposes (Federal Energy Regulatory Commission, 1995).

Based on the bathymetric map of Lake Hayward, developed as part of the ATIS study, the reservoir encompasses 246.9 acres with a gross storage capacity of 1,234.5 acre-feet at the maximum reservoir elevation of 1,187.5 feet NGVD (Mead & Hunt, 2023e). The bathymetric map is included in Figure 17 of the ATIS Study Report (**Appendix E-3**).

4.4.1.1.2 Proposed Uses of Project Waters

NSPW is not proposing any material changes to Project operations.[6]

[6] Due to the short duration of the ice removal event, and its timing during high inflow periods, which matches the natural hydrologic cycle, the proposed planned deviations for ice removal purposes are not considered a material change in operations.

4.4.1.1.3 Hydrology and Streamflow

Inflow to Lake Hayward comes primarily from the Namekagon River. Other tributaries include Hatchery Creek, Mosquito Brook, Smith Lake Creek, and Wheeler Brook. The drainage basin for the Project is 206 square miles (US Geological Survey, n.d.b). Mean monthly flows at the Hayward dam based on streamflow data from 1996 to 2021 are shown in **Table 4.4.1.1.3-1**.

Table 4.4.1.1.3-1 Mean Monthly Flows at the Hayward Project, 1996 to 2021

Month	Mean Monthly Flow (cfs)
January	168
February	161
March	209
April	346
May	335
June	262
July	219
August	184
September	184
October	221
November	211
December	185

Source: (Mead & Hunt, 2022)

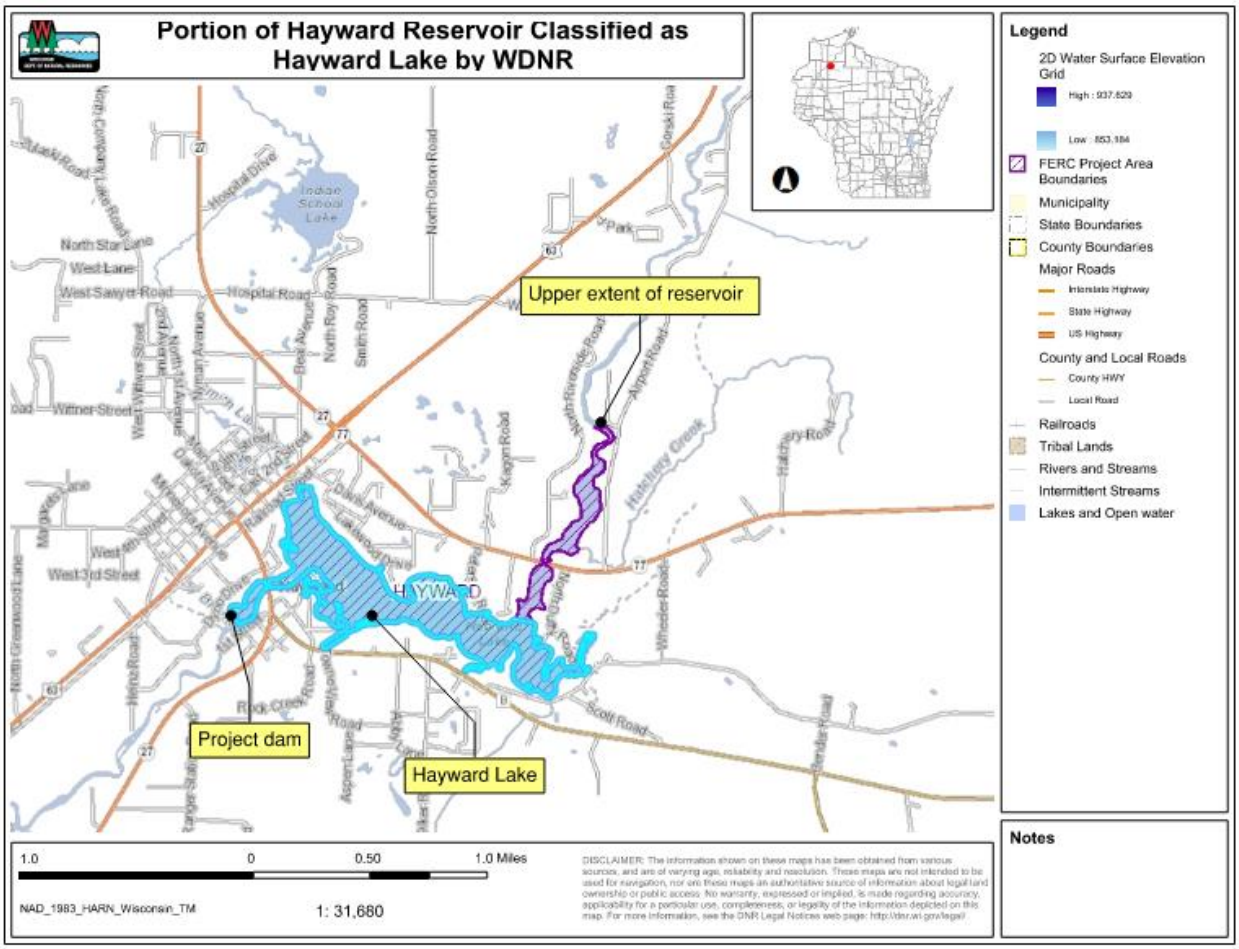
4.4.1.2 Water Quality

4.4.1.2.1 Water Quality Standards

The State of Wisconsin established water quality standards under Chapter NR 102 of the Wisconsin Administrative Code (NR 102) to protect, maintain, and enhance surface waters for a variety of designated uses. The standards set limits for each designated use described below for which water quality cannot be artificially lowered unless a variance has been provided. NR 102 standards are consistent with CWA § 301. A copy of NR 102 was provided in Appendix 4.3.7.1-1 of the PAD.

The water within the Project reservoir has two different classifications. WDNR considers only the main portion of the Project reservoir as Lake Hayward, as shown in **Figure 4.4.1.2.1-1**. The Namekagon River upstream of Lake Hayward is classified as a Class II trout stream and has a designated use for Fish and Aquatic Life-Coldwater (FAL-Coldwater). The portion of the Project reservoir classified as Lake Hayward and the Namekagon River downstream of the Hayward dam have designated uses for Default Fish and Aquatic Life (Default-FAL).

Figure 4.4.1.2.1-1 Portion of Project Reservoir Classified as Hayward Lake by WDNR



Fish and Aquatic Life Standards

Fish and aquatic life standards in Wisconsin are as follows:

- pH shall be between 6.0 and 9.0, with no change greater than 0.5 units outside the estimated natural seasonal maximum and minimum.
- Surface water dissolved oxygen (DO) shall never be lowered below 5 milligrams per liter (mg/L).
- Total phosphorus shall be less than 75 micrograms per liter (µg/L) or 0.075 mg/L.
- Water bodies classified as trout waters by the WDNR or as Great Lakes or cold-water communities may not be altered from natural background DO levels to such an extent that trout populations are adversely affected. Additionally, all the following conditions shall be met:
    - DO in classified trout streams shall not be artificially lowered to less than 6.0 mg/L at any time, nor shall DO be lowered to less than 7.0 mg/L during the spawning season.
    - DO in Great Lakes tributaries used by stocked salmonids for spawning runs shall not be lowered below natural background during the period of habitation.

Temperature Standards

Per the WDNR's May 7, 2021 comments on the PAD, the Namekagon River upstream of the Hayward Dam is subject to the "Cold" temperature standard as shown in Table 2 of NR 102. Although

Hayward Lake is an impoundment, it is not subject to the temperature standards for inland lakes and impoundments under Table 4 of NR 102 since it has an estimated water residence time of six days. Residence times must exceed 14 days for an impoundment to be subject to the inland lake and impoundment temperature standards. The Namekagon River downstream of the Hayward Dam is subject to the "Warm-Large" temperature standards shown in Table 2 of NR102. A summary of monthly acute temperature standards applicable to Hayward Project waters is shown in **Table 4.4.1.2.1-1**.

Table 4.4.1.2.1-1 Water Temperature Standards for Waters within the Hayward Project

Month	Namekagon River Upstream of Hayward Dam	Namekagon River Downstream of the Hayward Dam
	Maximum Acute Temperatures (°F)	
	NR 102 Table 2 (Cold)	NR 102 Table 2 (Warm-Large)
January	68	76
February	68	76
March	69	76
April	70	79
May	72	82
June	72	85
July	73	86
August	73	86
September	72	84
October	70	80
November	69	77
December	69	76

Recreational Use Standards

NR 102.04(6) states that a recreation use classification requires the geometric mean of bacterial counts of *Escherichia coli* (*E. coli*) to not exceed a most probable number of 200 counts per 100 milliliters (mL), based on five or more water samples per month. Under the WDNR Beach Advisory Program, a beach advisory is issued when bacterial counts reach an action value of 235 counts per 100 mL and a beach closure is issued at 1,000 counts per 100 mL.

Public Health Standards

NR 102.14 establishes taste and odor criteria standards for public health and welfare, which are outlined by specific substance, and will not be summarized here.

Fish Consumption Standards

NR 105.07 establishes wildlife use standards, which are outlined based upon specific substance concentrations, and will not be discussed here.

Total Phosphorus Standards[7]

Phosphorus criteria in Wisconsin are as follows:

- River criterion (NR102 specified rivers): 100 µg/L
- Stream criterion: 75 µg/L
- Stratified "reservoir" criterion: 30 µg/L
- Non-stratified "reservoir" criterion: 40 µg/L

4.4.1.2.2 Historic Water Quality Conditions

None of the waters associated with the Hayward Project are designated as impaired waters (WI Department of Natural Resources, 2021a). A review of water quality information identified current data for three water quality monitoring stations within and one outside the Project boundary. Station 100005697 is located in the Project reservoir and has invasive species monitoring data from 2005 to 2017. Station 10019085 is located at the City Boat Landing and has invasive species monitoring data from 2006 to 2015. Station 583131 is located in a deep hole near the Hayward City Beach and has monitoring data from 1999 to 2014. Station 10022184 is located on the Namekagon River approximately 0.6 miles upstream of the Project boundary and has monitoring data from 2007 and 2008.

A review of the data from these stations shows the pH ranging from 7.0 to 8.5 (7.6 average), total phosphorous ranging from 0.011 to 0.039 mg/L (0.023 mg/L average),and DO ranging from 5.0 to 13.5 mg/L (10.1 mg/L average). Water quality monitoring data for the Hayward Project was provided in Appendix 4.3.8.2-1 of the PAD.

4.4.1.2.3 Current Water Monitoring Data

In 2022, NSPW conducted a water quality study to characterize current water quality conditions and determine compliance with Wisconsin NR 102. Study results are described below in the following sections and the Water Quality Study Report is included in **Appendix E-8**.

Surface water quality monitoring was conducted at three locations within the Project boundary, two following the WDNR's river monitoring protocols (Site 1 and Site 3), and one following the WDNR's lake monitoring protocols (Site 2). Site 1 was located approximately 3,600 feet upstream of the Highway 77 bridge in a riverine area, Site 2 was located at the WDNR's existing deep hole monitoring station 83131, and Site 3 was located at the WDNR's existing monitoring station 583001. Monitoring locations are shown in **Figure 4.4.1.2.3-1**. **Table 4.4.1.2.3-1** shows the parameters monitored, type of sampling, and sampling frequency for Sites 1 and 3. **Table 4.4.1.2.3-2** shows the monitored parameters, type of sampling, and sampling frequency for Site 2.

Data was collected and analyzed using the standard operating procedures of the Wisconsin Consolidated Assessment and Listing Methodology (WisCALM). The WDNR Nutrient Grab Sample Protocols were used to monitor ammonia, dissolved phosphorus, nitrate (plus nitrite), sulfate, total mercury, total nitrogen, total phosphorus, and total suspended solids. The chemistry procedures listed in the Wisconsin Citizen Lake Monitoring Training Manual were used to monitor bacteria (*E. coli*), chlorophyll A, chloride, and Secchi depth.

[7] All waters within the Hayward Project are subject to the stream criterion of 75 µg/L.

Discrete multi-parameter water quality measurements of DO, pH, specific conductance, and temperature were collected at each monitoring location during each field visit using a calibrated Yss ProDSS multi-parameter meter.

Depth profile monitoring for DO, pH, specific conductance, and temperature was also conducted in the deepest part of the reservoir at Site 2 using a calibrated YSI ProDSS multi-parameter meter. Sampling began at the water surface and continued at 1-meter intervals until the reservoir bed was reached.

Continuous hourly monitoring was conducted for DO, pH, specific conductance, and temperature at Sites 1 and 3. These four parameters were measured using calibrated YSI-EX03 Multi-parameter sondes. Continuous hourly temperature monitoring was also conducted using Onset HOBO tidbit Temperature Data Loggers.

Figure 4.4.1.2.3-1 Hayward Project 2022 Water Quality Study Monitoring Locations

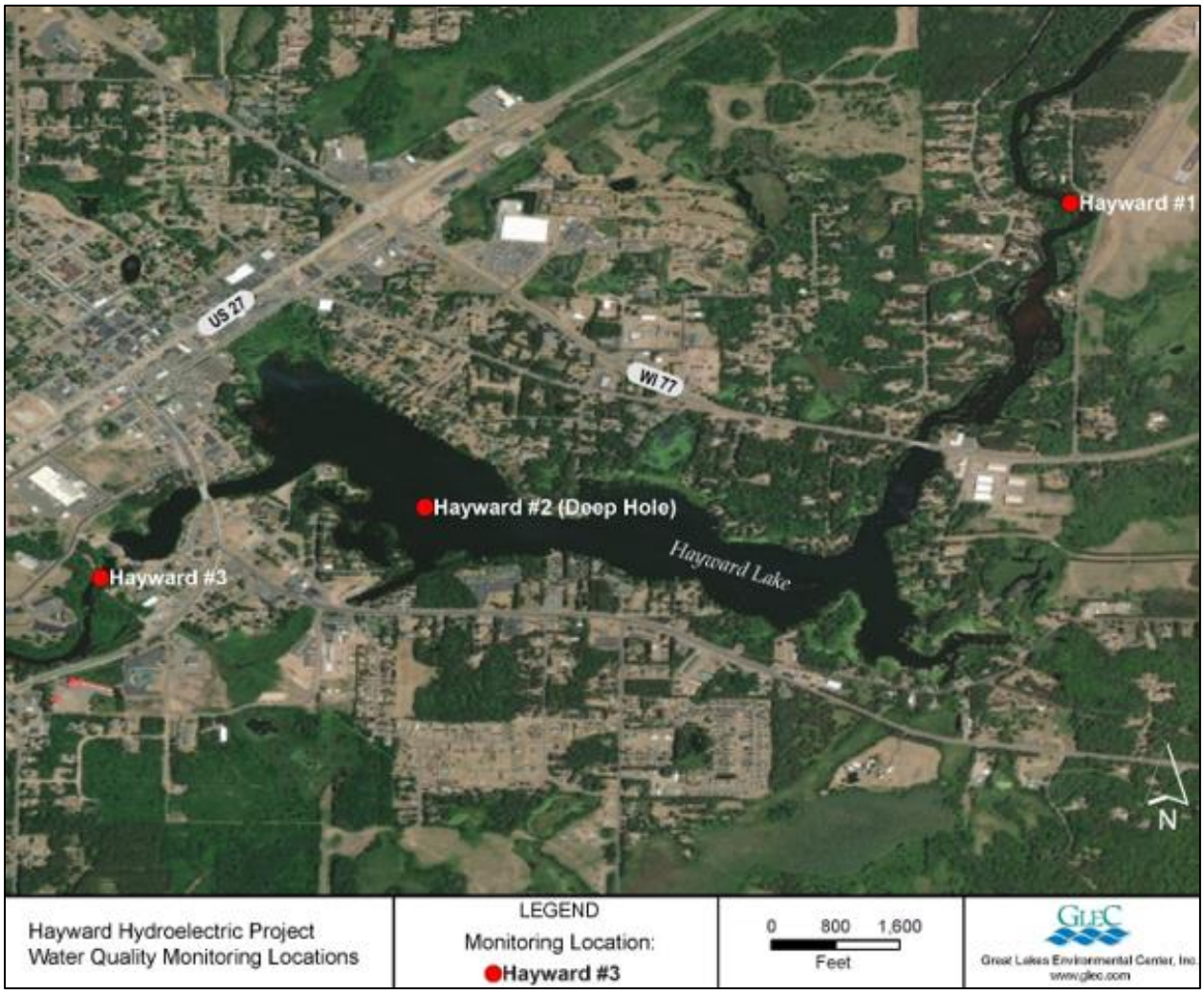


Table 4.4.1.2.3-1 Water Quality Monitoring at Hayward Sites 1 (Upstream) and 3 (Downstream)

Monitored Parameter	Number of Samples	Type of Sampling	Sampling Frequency					
			May	June	July	Aug.	Sept.	Oct.
Ammonia	6 total	Lab	X	X	X	X	X	X
Bacteria	6 total	Lab	X	X	X	X	X	X
Chloride	6 total	Lab	X	X	X	X	X	X
Chlorophyll a	6 total	Lab	X	X	X	X	X	X
Conductivity	Continuous July – Sept.	Field Measurement			X	X	X	
Dissolved Oxygen	Continuous July – Sept.	Field Measurement			X	X	X	
Dissolved Phosphorus	6 total	Lab	X	X	X	X	X	X
Nitrate/Nitrite	6 total	Lab	X	X	X	X	X	X
pH	Continuous July – Sept.	Field Measurements			X	X	X	X
Sulfate	1 total	Lab	X					
Total Mercury	1 total	Lab	X					
Temperature	Continuous July – Sept.	Field Measurement			X	X	X	
Total Nitrogen	6 total	Lab	X	X	X	X	X	X
Total phosphorus	6 total	Lab	X	X	X	X	X	X
Total Suspended Solids	6 total	Lab	X	X	X	X	X	X

Table 4.4.1.2.3-2 Water Quality Monitoring at Hayward Site 2 (Deep Hole)

Monitored Parameter	Number of Samples	Type of Sampling	Sampling Frequency			
			May	July	Aug.	Sept.
Ammonia	1 total	Lab	X	X	X	X
Bacteria	4 total	Lab	X	X	X	X
Chloride	4 total	Lab	X	X	X	X
Chlorophyll a	3 total	Lab		X	X	X
Conductivity	4 total	Field Profile	X	X	X	X
Color	1 total	Lab		X		
Dissolved Oxygen	4 total	Field Profile	X	X	X	X
Dissolved Phosphorus	4 total	Lab	X	X	X	X
Iron	4 total	Lab	X	X	X	X
Manganese	4 total	Lab	X	X	X	X
Nitrate/Nitrite	1 total	Lab		X		
pH	4 total	Field Profile		X	X	X
Secchi depth	4 total	Field	X	X	X	X
Sulfate	1 total	Lab	X			

Monitored Parameter	Number of Samples	Type of Sampling	Sampling Frequency			
			May	July	Aug.	Sept.
Sulfide	4 total	Lab	X	X	X	X
Total Mercury	1 total	Lab	X			
Temperature	4 total	Field Profile	X	X	X	X
Total Nitrogen	1 total	Field Fixed	X			
Total Phosphorus	4 total	Field Fixed	X	X	X	X
Total Suspended Solids	4 total	Lab	X	X	X	X

Water Monitoring Results for Lab Analyzed Water Quality Parameters

Lab analyzed water quality parameters are summarized below and in **Table 4.4.1.2.3-3**.

Ammonia

Ammonia concentrations ranged between <0.013 and 0.081 mg/L. These concentrations are far below the toxicity threshold of freshwater aquatic organisms of 33.52 mg/L.

Bacteria *(E. coli)*

E. coli colony counts ranged between 2.0 and 24.3 Most Probable Number (MPN), which is below the State's "Beach Action Value" of 235 counts per 100 mL.

Chloride

Concentration of chloride ranged between 0.7 and 11.1 mg/L, which is typical for waterbodies in the area.

Chlorophyll a

Concentration of chlorophyll-a ranged between 1.12 and 2.71 µg/L, which is considered very low and typical of waterbodies in the area.

Color

Color is measured in Platinum Color Units (PCU) with values ranging from 0 to 500 PCU. One color measurement was taken in mid-July with a 41 PCU, which is typical for lakes in the area.

Dissolved and Total Phosphorus

Dissolved phosphorus ranged from <1.5 to 6.5 µg/L and total phosphorus ranged from 4.0 to 17.1 µg/L. While there is no specific state standard for dissolved phosphorus, the concentration was far lower than that required to support algal growth. The total phosphorus concentration was well below the 75 µg/L state standard for streams.

Iron

Concentration of total iron ranged from 215 to 330 µg/L, which is typical for waterbodies in the area.

Manganese

Concentration of total manganese ranged from 31.1 to 45.0 µg/L, which is typical for waterbodies in the area.

Nitrate/Nitrite and Total Nitrate

Nitrate/Nitrite concentrations ranged from 41.1 to 139.2 µg/L and total nitrate concentrations ranged from <0.021 to 0.55 mg/L. These concentrations are not a water quality concern.

Sulfide and Sulfates

Concentrations of sulfide and sulfate were either below or just above detectable levels and are not a water quality concern.

Total Mercury

Total mercury levels were sampled during the May 2022 sampling event. The concentrations were below detectable levels and are not a water quality concern.

Total Suspended Solids

Total suspended solids (TSS) can affect water clarity. Water typically appears clear when TSS concentrations are 20 mg/L or less. TSS concentrations ranged from 3.1 to 6.3 mg/L and therefore do not cause any water clarity concerns.

Water Monitoring Results for Field Analyzed Water Quality Parameters (Grab samples)

Field analyzed monthly water quality parameters are summarized in **Table 4.4.1.2.3-4**.

Table 4.4.1.2.3-3 Summary of Lab Analyzed Water Quality Monitoring Results for the Hayward Project (2022)

Parameter	Site 1 (upstream)						Site 2 (deep hole)						Site 3 (downstream)					
	May	Jun	Jul	Aug	Sept	Oct	May	Jun	Jul	Aug	Sept	Oct	May	Jun	Jul	Aug	Sept	Oct
Ammonia (µg/L)	73.9	<30.0	52.1	31.5	30.0	36.0	x	x	<30.0	x	x	x	39.0	80.6	37.2	<13.0	53.0	47.0
E. coli (MPN)	5.2	15.5	3.1	13.1	13.4	18.7	3.1	x	TE[8]	12.1	9.7	x	17.1	15.6	24.3	16.0	8.6	2.0
Chloride (mg/L)	3.8	4.1	3.7	3.7	5.9	4.0	4.5	x	4.9	4.6	0.7	x	6.1	6.0	11.1	6.4	6.0	5.2
Chlorophyll a (µg/L)	x	x	2.18	1.45	1.12	x	x	x	2.71	1.20	1.68	x	x	x	2.53	1.31	1.82	x
Color (PCU)	x	x	x	x	x	x	x	x	41	x	x	x	x	x	x	x	x	x
Dissolved P (µg/L)	2.0	2.8	1.8	<1.5	2.0	2.6	<1.5	x	3.0	3.1	3.1	x	1.6	6.5	3.2	2.6	2.5	<1.5
Iron (µg/L)	x	x	x	x	x	x	330	x	296	215	276	x	x	x	x	x	x	x
Manganese (µg/L)	x	x	x	x	x	x	45.0	x	35.2	31.1	33.4	x	x	x	x	x	x	x
Nitrate (plus nitrite) (µg/L)	66.4	11.0	37.6	21.7	49.5	77.9	x	x	6.4	x	x	x	61.1	16.2	21.8	17.6	22.6	25.0
Sulfide (mg/L)	x	x	x	x	x	x	1.2	x	<1.2	<1.2	<2.4	x	x	x	x	x	x	x
Sulfate (mg/L)	2.1	x	x	x	x	x	0.75	x	x	x	x	x	<0.71	x	x	x	x	x
Total Mercury (µg/L)	<0.16	x	x	x	x	x	<0.16	x	x	x	x	x	<0.16	x	x	x	x	x
Total N Nitrogen (mg/L)	0.49	0.55	0.39	0.33	0.35	0.37	x	x	0.43	x	x	x	0.55	0.53	0.38	0.34	<0.02	0.38
Total Phosphorus (µg/L)	4.2	6.4	8.3	10.3	14.5	9.5	4.6	x	9.1	6.8	15.0	x	4.0	7.1	7.3	10.8	17.1	11.4
Total suspended solids (mg/L)	5.0	4.3	3.4	4.1	5.0	4.6	4.6	x	3.3	4.4	4.9	x	3.6	3.1	5.8	3.9	5.1	6.3

[8] Technical error - *E. coli* processing time exceeded; value not used.

Table 4.4.1.2.3-4 Summary of Field Analyzed Water Quality Monitoring Results for the Hayward Project (2022)

Parameter	Site 1 (upstream)						Site 2 (deep hole)						Site 3 (downstream)					
	May	Jun	Jul	Aug	Sept	Oct	May	Jun	Jul	Aug	Sep	Oct	May	Jun	Jul	Aug	Sep	Oct
Specific Conductance (µs/cm)	133	X	168	179	183	186	274	X	173	178	192	X	133	X	173	179	196	190
DO (mg/L)	9.78	X	9.01	10.85	6.73	10.93	9.74	X	8.93	9.71	8.71	X	9.39	X	8.39	9.16	8.83	10.88
pH (SU)	7.86	X	7.83	8.44	8.17	7.73	7.75	X	8.09	8.24	7.88	X	7.60	X	7.97	8.04	7.83	7.91
Secchi Depth (inches)	X	X	X	X	X	X	80	X	87	115	102	X	X	X	X	X	X	x
Temperature (°C)	17.3	22.4	17.4	19.5	15.6	9.3	16.9	X	21.5	21.0	18.4	X	16.6	20.7	21.6	19.7	18.5	10.3
Temperature (°F)	63.1	72.3	63.3	67.1	60.1	48.7	62.4	X	70.7	69.8	65.1	X	61.9	69.3	70.9	67.5	65.3	50.5

Depth Profile Monitoring

Depth profile monitoring for temperature, DO, pH, and specific conductance were completed at Site 2 in May, July, August, and September 2022. The profile data showed no stratification in terms of water temperature or DO throughout the study. In July, August, and September, the results showed a slight thermocline around 2 meters below the surface with DO levels remaining above 8 mg/L at the bottom of the reservoir for each sampling event. Specific conductance was fairly consistent across the water column and was not profiled. The depth profiles are shown in **Figures 4.4.1.2.3-2** to **4.4.1.2.3-5**.

Figure 4.4.1.2.3-2 Hayward Project Site 2 May Profiles

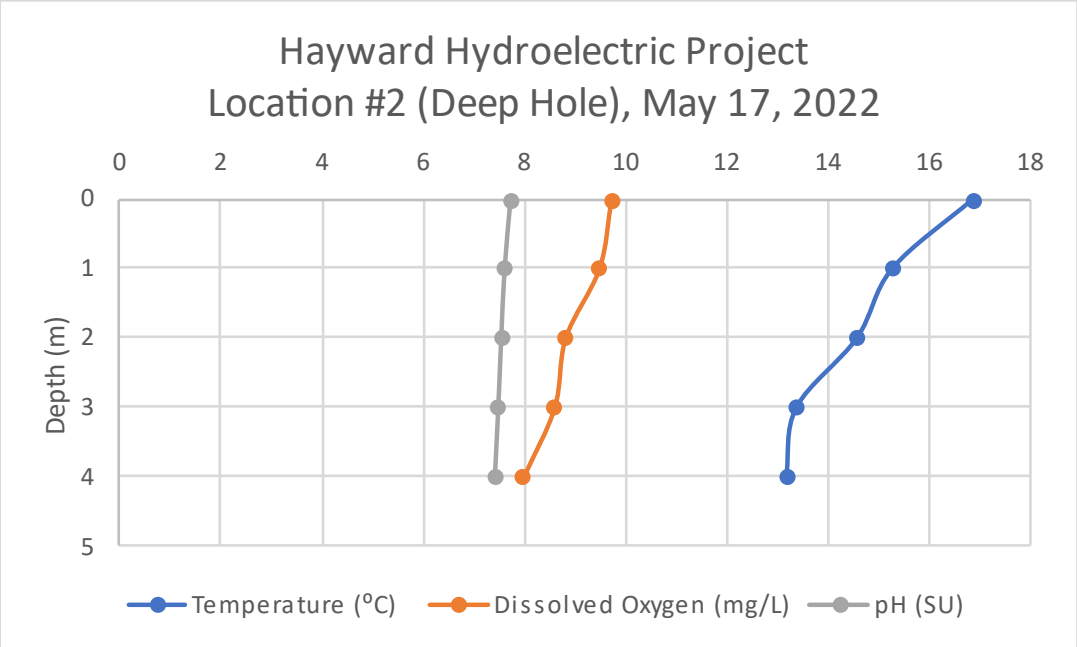


Figure 4.4.1.2.3-3 Hayward Project Site 2 July Profiles

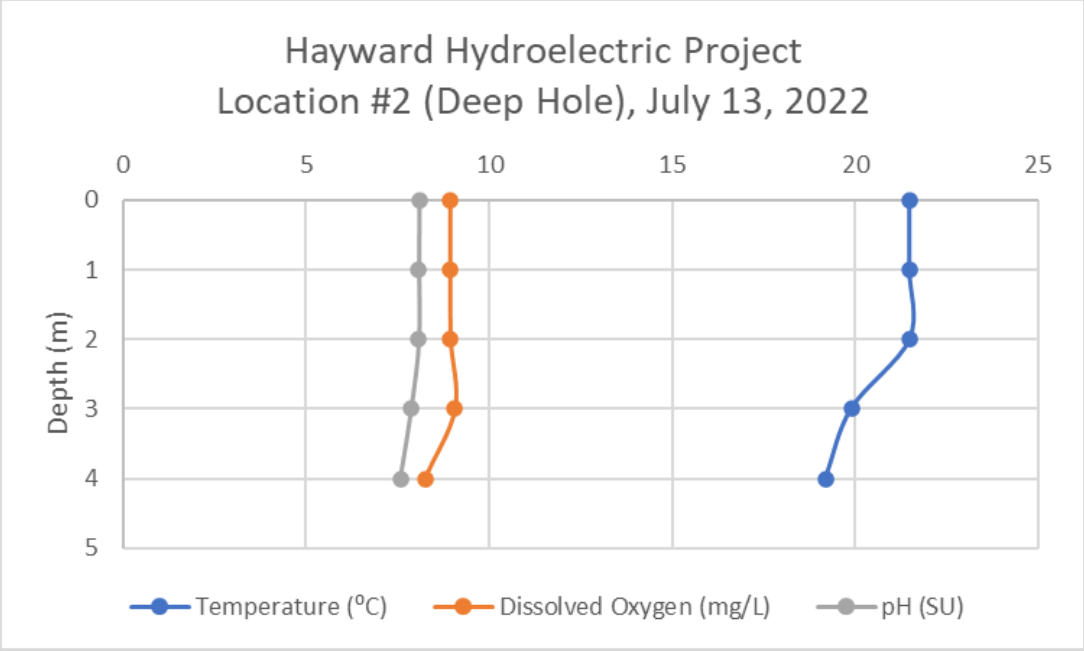


Figure 4.4.1.2.3-4 Hayward Project Site 2 August Profiles

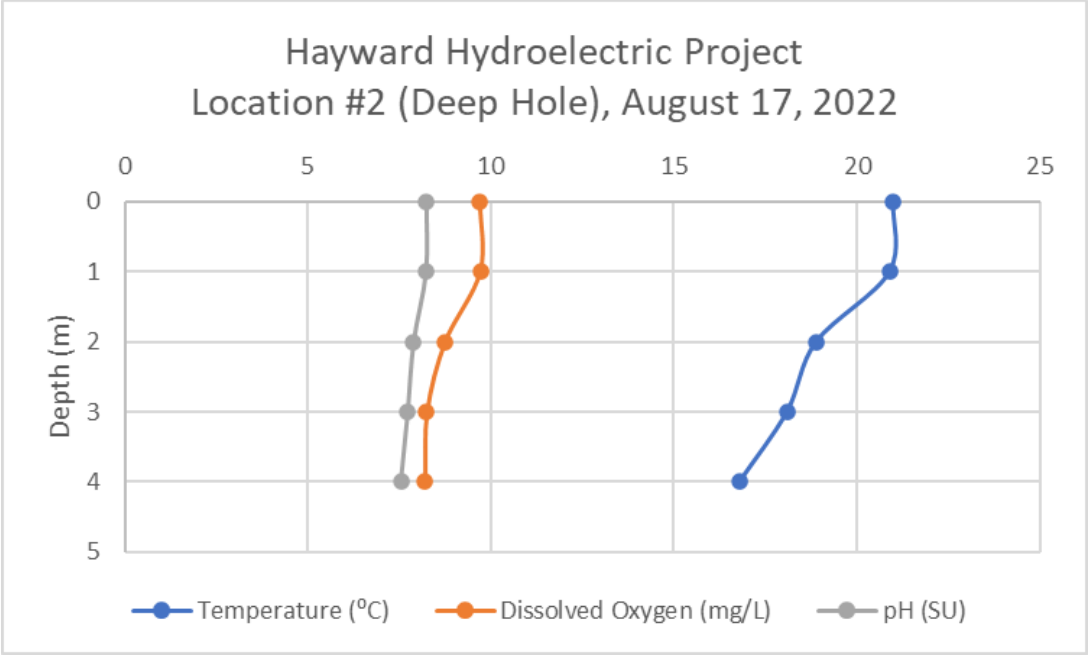
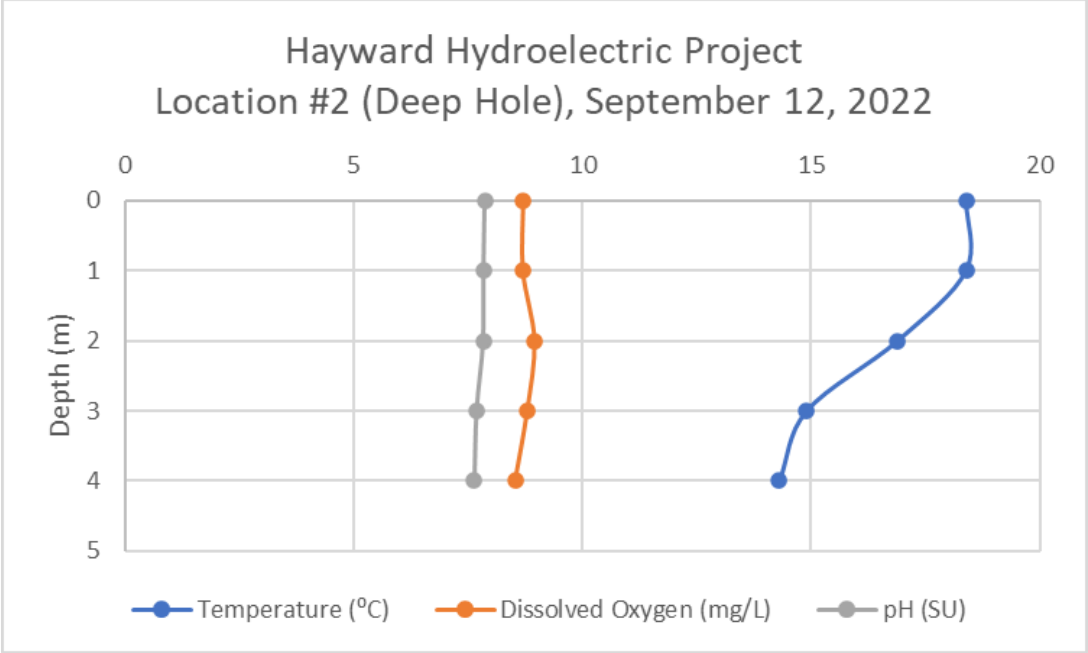


Figure 4.4.1.2.3-5 Hayward Project Site 2 September Profiles



Continuous Monitoring Results

The results of continuous monitoring for temperature, DO, specific conductance, and pH are shown in **Table 4.4.1.2.3-5** and **Table 4.4.1.2.3-6** and are summarized in the sections below.

Table 4.4.1.2.3-5 Continuous Monitoring Results at Hayward Site 1 (May 17, 2022 to October 11, 2022)

Monitoring Site 1 (Upstream)	Hobo Tidbit		YSI EXO3 Multi-parameter Sonde		
	Temperature		DO (mg/L)	Specific Conductance (µS/cm)	pH
	(°C)	(°F)			
Min	6.24	43.23	6.15	148.7	7.38
Max	26.21	79.20	11.85	199.7	8.69
Mean	17.43	63.37	8.92	184.9	7.84
Median	18.05	64.49	8.81	191.8	7.78

Table 4.4.1.2.3-6 Continuous Monitoring Results at Hayward Site 3 (May 17, 2022 to October 11, 2022)

Monitoring Site 3 (Downstream)	Hobo Tidbit		YSI EXO3 Multi-parameter Sonde		
	Temperature		DO (mg/L)	Specific Conductance (µS/cm)	pH
	(°C)	(°F)			
Min	10.0	50.00	6.46	163.6	7.43
Max	25.50	77.90	10.32	221.4	8.4
Mean	19.24	66.63	8.39	192.4	7.82
Median	20.15	68.27	8.45	201.5	7.8

Continuous Monitoring Results-Temperature

Hobo Tidbit temperature readings ranged from 43.23°F to 79.20°F at Site 1, with an average of 63.37°F, and from 50°F to 77.90°F at Site 3, with an average of 66.63°F.

In accordance with Section 6.2 of the 2022 WisCALM guidelines, NSPW completed a review of the Hobo Tidbit water temperature data and calculated the number of days in each month when the measured values exceeded the acute temperature criteria for a cold-water stream at Site 1 and a warm-large river at Site 3. If temperature readings exceeded the applicable standard in a particular month, NSPW then calculated the margin of error-corrected (MOE-corrected) temperatures. If more than 10% of the MOE-corrected temperature readings within a month are above temperature criteria, it is considered in exceedance of the standard (WI Department of Natural Resources, 2021b).

While water temperatures did not meet the state standard for cold-water streams at Site 1, this site is at the upstream end of the Project and is measuring water temperatures in the Namekagon River as it enters the Project. Project operations, therefore, did not contribute to the increased water temperatures.

A summary of the continuous temperature monitoring by month is included below:

May Results

There were no instances of water temperature readings exceeding the 72°F standard for Site 1 or the 82°F standard for Site 3.

June Results

For Site 1, the acute temperature standard listed in WisCALM for June is 72°F. Eight of the daily maximum water temperature measurements (26.7%) and six of the MOE-corrected readings (20%) exceeded 72°F. Since more than 10% of the June MOE-corrected results were above 72°F, June water temperatures were considered to be in exceedance of the standard.

For Site 3, the acute value listed in WisCALM for June is 82°F. None of the daily maximum temperature measurements exceeded this value.

July Results

For Site 1, the acute temperature standard for July is 73°F. Eight of the daily maximum temperature measurements (25.8%) and four of the MOE-corrected readings (12.9%) exceeded 73°F. Since more than 10% of the MOE-corrected readings were above 73°F, July water temperatures were considered to be in exceedance of the standard.

For Site 3, the acute temperature standard for July is 86°F. None of the daily maximum temperature measurements exceeded this value.

August Results

For Site 1, the acute temperature standard for August is 73°F. Two of the daily maximum temperature measurements (6.5%) and two of the MOE-corrected readings (6.5%) exceeded 73°F. Since less than 10% of the MOE-corrected readings were above 73°F, August water temperatures were not considered in exceedance of the standard.

For Site 3, the acute temperature standard for August is 86°F. None of the daily maximum temperature measurements exceeded this value.

September Results

For Site 1, the acute temperature standard for September is 72°F. One of the maximum daily temperature measurements (3.3%) and none of the MOE-corrected readings exceeded 72°F. Since none of the MOE-corrected readings were above 72°F, September water temperatures were not considered in exceedance of the standard.

For Site 3, the acute temperature standard for September is 84°F. None of the daily maximum temperature measurements exceeded this value.

October Results

For the month of October, there were no instances of water temperature readings exceeding the 70°F standard for Site 1 or the 80°F standard for Site 3.

Continuous Monitoring Results-DO

The DO at Site 1 ranged from 6.15 to 11.85 mg/L and averaged 8.92 mg/L. DO at Site 3 ranged from 6.46 to 10.32 mg/L and averaged 8.39 mg/L. All DO readings recorded met the state standard of 7.0 mg/L during the spawning season and 6.0 mg/L during the remainder of the year.

Continuous Monitoring Results-Specific Conductance

The specific conductance at Site 1 ranged from 148.7 to 199.7 µS/cm with an average of 184.9 µS/cm. Specific conductance at Site 3 ranged from 163.6 to 221.4 µS/cm, with an average of 192.4 µS/cm.

While there is no state standard regarding specific conductance, it is used as a general measure of water quality. Conductivity is generally relatively constant within a waterbody. Therefore, significant changes in conductivity may be an indicator of a source of pollution. The values collected during the study provide baseline information for future analysis.

Continuous Monitoring Results-pH

The pH at Site 1 ranged from 7.38 to 8.69 and averaged 7.84. The pH at Site 3 ranged from 7.43 to 8.40 and averaged 7.82. All pH readings recorded met the state standards.

4.4.2 Hayward Project Environmental Effects

Hayward Lake is listed as a "Healthy Waterbody" in WDNR's 2022 *Water Quality Report to Congress., Appendix E-Healthy Waters List* (WI Department of Natural Resources, 2022a). Water quality monitoring conducted in 2022 indicated that all analyzed water quality parameters, except upstream temperature, met Wisconsin's water quality standards. Temperature measurements at Site 1 did not meet Wisconsin cold-water temperature standards for the months of June and July. This monitoring site is located at the upstream end of the Project and is representative of the temperature of the water before entering Hayward Lake. Since the water temperature at Site 1 exceeded the temperature standard before entering the Project, Project operations were not the cause for the temperature exceedances. Therefore, the proposed operation of the Project is not expected to cause adverse impacts to water quality.

4.4.3 Hayward Project Proposed Environmental Measures

Under Section 6 of Exhibit A, NSPW proposes to operate the Project in the following manner:

- Continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resources.
- Maintain a minimum flow of 8 cfs or inflow, whichever is less, year-round into the bypass reach of the Namekagon River for the protection of fish and wildlife resources and water quality.
- Maintain the elevation of the Project reservoir between 1,187.0 and 1,187.5 feet NGVD, while targeting 1,187.4 feet NGVD.
- Just prior to spring runoff, or for emergency purposes, NSPW may deviate from the maximum reservoir elevation by no more than 0.5 feet to remove ice from the spillway for dam safety purposes. The duration of the deviation will be no longer than necessary, typically less than a few days, to remove the ice and will be considered a planned deviation under the requirements outlined in Section 4.5.3.

- NSPW will not operate the Project between the low elevation and high elevation on a daily basis for peaking purposes.

4.4.4 Hayward Project Unavoidable Adverse Impacts

With the implementation of the proposed environmental measures, the continued operator of the Project is not expected to result in unavoidable adverse impacts to fish and aquatic resources.

4.5 Hayward Project Fish and Aquatic Resources

4.5.1 Hayward Project Affected Environment

4.5.1.1 Aquatic Vegetation

The Hayward Project consists of a reservoir, dam, powerhouse with intake channel, tailrace or tailwater, transmission equipment, and appurtenant facilities. From left to right looking downstream, the main structures of the dam consist of a left earthen embankment, concrete overflow spillway, middle earth embankment, powerhouse with intake channel, and a right earth embankment.

The reservoir encompasses 246.9 acres with a gross storage capacity of 1234.5 acre-feet at the maximum reservoir elevation of 1,187.5 feet NGVD. A bathymetric map developed as part of the 2022 ATIS study is included in **Appendix E-3**.

NSPW proposes to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resource values. At all times, operations will act to minimize the fluctuation of the Project reservoir while maintaining the elevation between 1,187.0 and 1,187.5 feet NGVD, while targeting 1,187.4 feet NGVD. NSPW will not operate the Project between the low and high elevations on a daily basis for peaking purposes.

In addition, a minimum flow of 8 cfs or inflow, whichever is less, is currently released into the bypass reach for the protection of fish and wildlife resources and water quality at all times (Section 2.2.1).

4.5.1.1.1 ATIS Study

As part of the ATIS study, NSPW conducted a point-intercept aquatic vegetation survey of Lake Hayward. Two surveys were completed, one in June and one in early August, to account for both early and late season species. The WDNR provided a point intercept plan with 482 sampling grid points distributed evenly throughout the reservoir. Per WDNR guidelines, grid points to be sampled included those located in water depths of less than 15 feet or to the maximum depth of colonization (MDC) if less than 15 feet (WI Department of Natural Resources, 2010b). The ATIS Study Report, including all maps and datasheets, is included in **Appendix E-3**.

The survey was conducted from a boat using a GPS with submeter accuracy to navigate to the grid point locations. Points were sampled using a double-sided rake mounted on a pole. The rake was lowered until it rested gently on the river bottom, twisted twice, and then raised straight up out of the water. The density for each rake sample was recorded based on rake fullness. Plants not collected on the rake sample, but visible within six feet of the sample point, were recorded as visual sightings.

A meander survey of the littoral zone, which includes areas with a water depth of less than 5 feet, was also conducted for aquatic invasive species. A summary of aquatic and terrestrial invasive species identified during the ATIS survey is included in Section 4.5.1.6 and Section 4.6.1.1.2, respectively.

Additional information on bed substrates and water depths was collected during the August survey at points with water depths less than 15 feet. Substrate was categorized using nine types including: clay, silt, sand, gravel, cobble, boulder, bedrock, wood, or organic. During rake sampling, the presence or absence of woody debris on the lake bottom was also noted. Locations with coarse woody habitat greater than four inches in diameter and five feet in length that were observed in the water at or below the ordinary high-water mark were mapped. Maps depicting the substrate types and coarse woody habitat are included in the ATIS Study Report as Figures 18 and 19, respectively (**Appendix E-3**).

During the June survey, a total of 352 of the 482 grid points were sampled. The remaining grid points were not sampled for the following reasons:

- Grid point was terrestrial (5)
- Grid point was in an unnavigable area or in an area deeper than 15 feet (119)
- Grid point was too shallow (4)
- Grid point was inside the boat restraining buoys (1)
- Grid point was inaccessible due to temporary obstacle (1)

Of the 352 points sampled, 344 were shallower than the MDC (10.5 feet) of which 283 had vegetation. A total of 34 native species were found during the survey. Two of the identified species were observed visually but not present on the rake. The predominant species from the June survey included flatstem pondweed (*Potamogeton zosteriformis*), coontail (*Ceratophullum demersum*), common waterweed (*Elodea canadensis*), forked duckweed (*Lemna trisulca*), and fern pondweed (*Potamogeton robbinsii*). The average rake fullness during the study was 1.55 (GAI Consultants, Inc., 2023a).

During the August survey, all navigable sample points of 15 feet or less (394 total) were sampled to assess sediment types. Of those points, 335 were found to be within the littoral zone of which 295 contained vegetation. A total of 32 native species were found on the rake during the August survey. In addition to the native species, the invasive curly-leaf pondweed and Eurasian watermilfoil (EWM) were also present. The predominant species, in order from greatest to least abundant, included common waterweed, coontail, flat-stem pondweed, forked duckweed, and wild celery (*Vallisneria americana*). The average rake fullness during the August survey was 1.96 (GAI Consultants, Inc., 2023a).

Table 4.5.1.1.1-1 lists all submerged aquatic plant species identified during the early season and late season ATIS Surveys. **Table 4.5.1.1.1-2** provides an overall summary of the ATIS survey.

Table 4.5.1.1.1-1 Species of Aquatic Vegetation Observed During 2022 ATIS Surveys at the Hayward Project.

Common Name	Scientific Name
Arrowhead spp.	*Sagitaria spp.*
Clasping-leaf pondweed	*Potamogeton richardsonii*
Common arrowhead	*Sagittaria latifolia*
Common bladderwort	*Utricularia minor*
Common bur-reed	*Sparganium eurycarpum*
Common waterweed	*Elodea canadensis*
Coontail	*Ceratophyllum demersum*
Curly-leaf pondweed	*Potamogeton crispus*
Eurasian watermilfoil	*Myriophyllum spicatum*
Fern pondweed	*Potamogeton robbinsii*
Flat-stem pondweed	*Potamogeton zosteriformis*
Floating-leaf bur-reed	*Sparganium fluctuans*
Floating-leaf pondweed	*Potamogeton natans*
Forked duckweed	*Lemna trisulca*
Fries' pondweed	*Potamogeton gramineus*
Horsetails	*Equisetum spp.*
Illinois pondweed	*Potamogeton illinoensis*
Large duckweed	*Spirodela polyrhiza*
Large-leaf pondweed	*Potamogeton amplifolius*
Muskgrass	*Chara spp.*
Northern watermilfoil	*Myriophyllum sibiricum*
Needle spikerush	*Eleocharis acicularis*
Ribbon-leaf pondweed	*Potamogeton epihydrus*
Sago pondweed	*Stuckenia pectinata*
Slender naiad	*Najas flexilis*
Small bladderwort	*Utricularia minor*
Small duckweed	*Lemna minor*
Small pondweed	*Potamogeton pusillus*
Spatterdock	*Nuphar variegata*
Stiff pondweed	*Potamogeton robbinsii*
Stoneworts	*Nitella spp.*
Variable-leaf pondweed	*Potamogeton gramineus*
Water marigold	*Bidens beckii*
Watermeals	*Wolffia spp.*
Watershield	*Brasenia schreberi*
Water stargrass	*Heterantherra dubia*
White-stem pondweed	*Potamogeton praelongus*
White water crowfoot	*Ranunculus aquatilis*
White water lily	*Nymphaea odorata*
Wild celery	*Ballisneria americana*

Source: (GAI Consultants, Inc., 2023a)

Table 4.5.1.1.1-2 Overall Summary of 2022 Point Intercept Vegetation Survey at the Hayward Project

Statistic	June 2022	August 2022
Littoral Frequency of Occurrence	82.3	88.0
Maximum Plant Depth (feet)	10.5	12.2
Native Species Richness[9]	30	31
Floristic Quality Index	34.7	33.4

Source: (GAI Consultants, Inc., 2023a)

4.5.1.1.2 Lake Hayward Aquatic Plant Management Plan

The Lake Hayward Property Owners Association (LHPOA) obtained a planning grant from the WDNR to update their aquatic plant management plan for Lake Hayward. A large component of the plan addresses impairment associated with native plant species. The plan provides background information on Lake Hayward, identifies issues and the need for management, reviews the results of past management, and presents future management options (Aquatic Plant and Habitat Services, LLC, 2023). A draft version of the plan provided to NSPW by LHPOA Is included in **Appendix E-9**.

2021 Aquatic Vegetation Survey

In 2021, on behalf of LHPOA, Aquatic Plant and Habitat Services, LLC completed a whole-lake point-intercept aquatic plant survey. A previous survey was completed in 2013. The 2021 survey was conducted in late July. The maximum rooting depth observed was noted at 15.0 feet. A total of 45 species were observed on the rake at sample points. An additional five species were observed within 6 feet of survey points and three species were observed when boating between sites at a distance greater than 6 feet from any designated survey points. The most common species observed were waterweed (37%), coontail (36%), and flat-stem pondweed (28%). The frequency of occurrence at sites shallower than the maximum rooting depth was 79.6 % (Aquatic Plant and Habitat Services, LLC, 2023). Detailed information on all of the species observed during the survey is included in the draft plan (**Appendix E-9**). A general summary of the 2013 and 2021 aquatic vegetation surveys is shown in **Table 4.5.1.1.2-1**.

For comparison with the ATIS Study conducted in 2022, a total of 38 native and 2 invasive aquatic species were observed. The plants observed had a maximum rooting depth of 12.2 feet and the frequency of occurrence at sites shallower than the maximum rooting depth was 88.0 (GAI Consultants, Inc., 2023a).

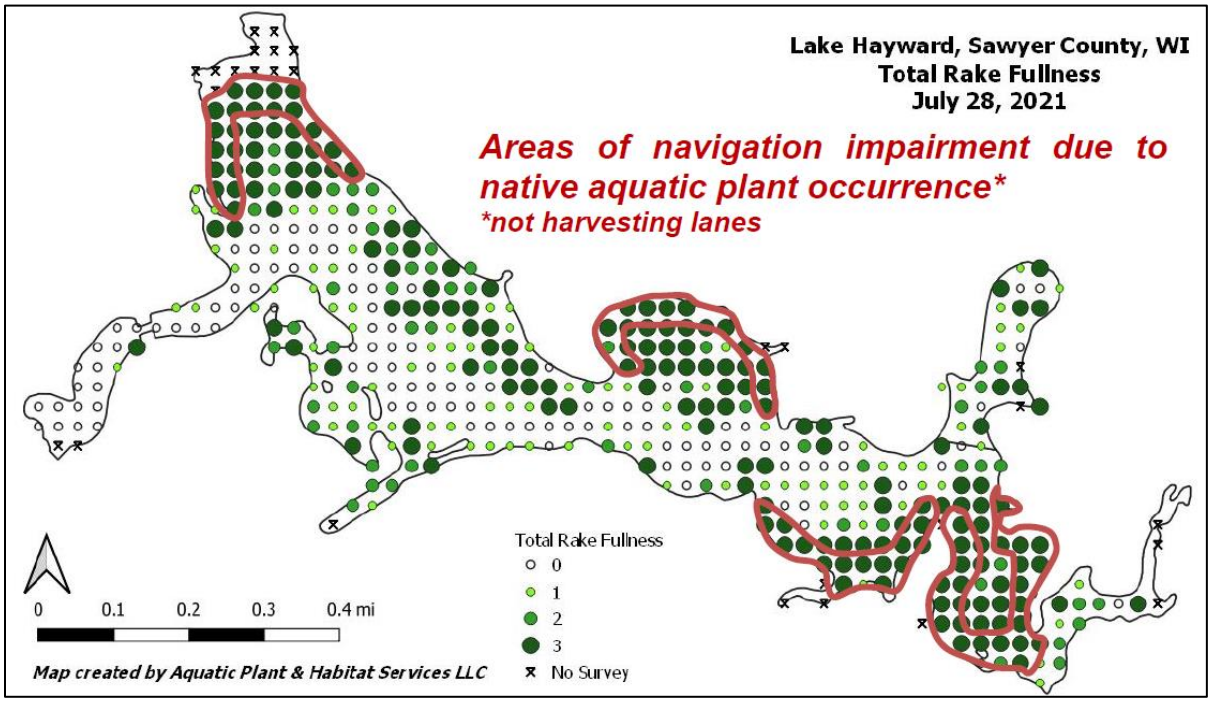
Table 4.5.1.1.2-1 Overall Summary of LHPOA 2013 and 2020 Point Intercept Vegetation Surveys

Statistic	June 2013 Pre-Treatment	July 2013 Post-Treatment	July 2021
Littoral Frequency of Occurrence	79.5	80.6	79.6
Maximum Plant Depth (feet)	13.5	12.5	15.0
Species Richness[10]	46	50	45
Floristic Quality Index	39.5	42.5	38.4

[9] Native species richness in this instance includes all native species observed on the rake at designated survey points. Visual sightings were not included.
[10] Species richness in this instance includes all species observed on the rake at designated survey points. Visual sightings are not included.

Results from the 2020 aquatic plant survey indicated Lake Hayward has a high abundance of native aquatic plants, particularly in water depths less than 10 feet. This results in some areas where navigation is difficult due to the abundance of native plants, including bur-reed, water lily, spatterdock, coontail, and elodea (Aquatic Plant and Habitat Services, LLC, 2023). **Figure 4.5.1.1.2-1** shows areas of navigation impairment due to native aquatic plants.

Figure 4.5.1.1.2-1 Areas of Navigation Impairment Due to Native Vegetation



Source: (Aquatic Plant and Habitat Services, LLC, 2023)

Lake Hayward Management Strategy 2023-2027

The Aquatic Plant Management Plan for Lake Hayward (Hayward APMP) identified the following five primary management goals between 2023 and 2027:

- Goal 1: Provide educational information via the organization's website and organizing educational sessions focusing on aquatic invasive species identification, manual removal, and aquatic plant management on Lake Hayward.
- Goal 2: Reduce beneficial use impairment caused by aquatic plants by promoting manual removal of aquatic plants near docks, while protecting the overall native plant community, using mechanical harvesting to open channels in bays with navigation impairment, and consider the use of herbicide treatment if aquatic invasive plant occurrence is high and causing navigation impairment.
- Goal 3: Protect native aquatic plants, organisms, and native mammal and fish populations by avoiding impacts to native plants when controlling aquatic invasive species by minimizing the manual removal of native plants for navigation and recreation.
- Goal 4: Protect water quality by launching citizen-based water quality monitoring and promoting riparian practices that protect water quality.
- Goal 5: Prevent the introduction of new aquatic invasive species by conducting watercraft inspections, and to apply for grant funding to install and maintain a decontamination station at the City of Hayward Boat Landing.

4.5.1.2 Wetlands

Wetlands are transition habitat between land and water that feature unique hydrologic, soil, and vegetative characteristics that allow them to be differentiated (delineated) from other habitat types. Wetlands function to improve water quality, wildlife habitat, nutrient cycling and storage, aesthetics, and recreation. Large wetlands absent from human influence are generally higher quality wetlands. In riverine systems, wetlands provide for flood water storage and filtration for water contaminants and sediment, as well as an environmental corridor for enhanced aesthetics and recreation. The USFWS National Wetland Inventory data layers were used to determine the types of wetlands located within both the current and proposed Project boundaries.

Wetland types and their corresponding acreages within the current and proposed Hayward Project boundary are shown in **Table 4.5.1.2-1**. Maps illustrating wetlands within the current and proposed Hayward Project boundary are included in **Appendix E-10**.

Table 4.5.1.2-1 Wetlands Identified within the Current and Proposed Hayward Project Boundary

Wetland Type	Current Boundary	Proposed Boundary
	Acres	Acres
Lacustrine	184.1	184.8
Freshwater Forested/Shrub	6.5	6.5
Freshwater Emergent	0.2	0.3
Freshwater Pond	7.7	8.4
Riverine	36.4	36.4
Total Wetlands	234.9	236.4

Source: (Mead & Hunt, 2023a)

4.5.1.3 Fisheries

4.5.1.3.1 Fish Assemblage–- Historic Information

Hayward Project Reservoir Fish Surveys

Historic fish assemblage data within the Hayward Project, as discussed in the PAD, came from survey information from 1965 to 2014 provided by the WDNR. A list of fish species collected during the surveys is shown in **Table 4.5.1.3.1-1** and is included in **Appendix E-11**. Of the 8,461 fish collected, the five most predominant fish collected included (WI Department of Natural Resources, 2020a):

- Bluegill (*Lepomis macrochirus*) at 3,499 or 40.5%
- Pumpkinseed (*Lepomis gibbosus*) at 1,493 or 17.3%
- Black crappie (*Pomoxis nigromaculatus*) at 1263 or 14.6%
- Northern pike (*Esox lucius*) at 953 or 11.0 %
- Yellow perch (*Perca flavescens*) at 508 or 5.9%

Table 4.5.1.3.1-1 Fish Species Collected at the Hayward Project Reservoir (1965-2014)

Fish Species	Scientific Name
Black bullhead	*Ameiurus melas*
Black crappie	*Pomoxis nigromaculatus*
Blackside darter	*Percina maculata*

Fish Species	Scientific Name
Bluegill	*Lepomis macrochirus*
Bluntnose minnow	*Pimephales notatus*
Bowfin	*Amia cava*
Brown bullhead	*Ameiurus nebulosus*
Brown trout	*Salmo trutta*
Burbot	*Lota lota*
Central mudminnow	*Umbra limi*
Channel catfish	*Ictalurus punctatus*
Chestnut lamprey	*Icthyomyzon castaneus*
Common logperch	*Percina caprodes*
Common shiner	*Luxilus cornutus*
Creek chub	*Semotilus atromaculatus*
Flathead minnow	*Pimephales promelas*
Gilt darter	*Percina evides*
Golden redhorse	*Mosostoma erythrurum*
Golden shiner	*Notemigonus crysoleucas*
Greater redhorse	*Moxostoma valenciennesi*
Hornyhead chub	*Nocomis biguttatus*
Johnny darter	*Etheostoma nigrum*
Lake sturgeon	*Acipenser fulvescens*
Largemouth bass	*Micropterus salmoides*
Largescale stoneroller	*Campostoma oligolennis*
Longnose dace	*Rhinichthys cataratae*
Madtom	*Noturus spp.*
Mimic shiner	*Notropus volucellus*
Muskellunge	*Esox masquinongy*
Northern hogsucker	*Hypentelium nigricans*
Northern pike	*Esox lucius*
Pumpkinseed	*Lepomis gibbosus*
River redhorse	*Mosostoma carinatum*
Rock bass	*Ambloplites rupestris*
Shorthead redhorse	*Onchohynchus mykiss*
Silver redhorse	*Mosostoma anisurum*
Smallmouth bass	*Micropterus dolomieu*
Spottail shiner	*Notropus hudsonius*
Walleye	*Sander vitreus*
White sucker	*Catostomus commersonii*
Yellow bullhead	*Ameiurus natalis*
Yellow perch	*Perca flavescens*

Source: (WI Department of Natural Resources, 2020a)

Namekagon River Fish Surveys Downstream of Dam

During development of the study plans, the WDNR provided additional fisheries information for all fish surveys conducted within the Namekagon River. A review of the data showed two surveys were conducted immediately downstream of the Hayward Dam and included an all-species electrofishing survey in 2003 and a hook and line survey in 2020 (WI Department of Natural Resources, 2021c). The survey information is included in **Appendix E-12**. Fish species collected downstream of the Hayward Dam during these two surveys are shown in **Table 4.5.1.3.1-2**.

Table 4.5.1.3.1-2 Fish Species Collected in the Namekagon River Downstream of the Hayward Dam

Fish Species	Scientific Name
Blacknose shiner	*Notropis heterolepis*
Bluegill	*Lepomis macrochirus*
Central stoneroller	*Campostoma anomalum*
Common shiner	*Luxilus cornutus*
Creek chub	*Semotilus atromaculatus*
Fantail darter	*Etheostoma flabellare*
Golden redhorse	*Mosostoma erythrurum*
Greater redhorse	*Moxostoma valenciennesi*
Hornyhead chub	*Nocomis biguttatus*
Johnny darter	*Etheostoma nigrum*
Largemouth bass	*Micropterus salmoides*
Longnose dace	*Rhinichthys cataratae*
Northern hogsucker	*Hypentelium nigricans*
Northern pike	*Esox lucius*
Pumpkinseed	*Lepomis gibbosus*
Shorthead redhorse	*Onchohynchus mykiss*
Smallmouth bass	*Micropterus dolomieu*
Western blacknose dace	*Rhinichthys obtusus*
White sucker	*Catostomus commersonii*

Source: (WI Department of Natural Resources, 2021c)

4.5.1.3.2 Fish Assemblage–- Current Fish Survey Information

The WDNR provided NSPW with a fish survey report in March 2023 for fieldwork conducted at the Hayward Project during 2022 (**Appendix E-13**). As part of the fieldwork, fyke netting surveys were conducted on Lake Hayward from April 17-22, 2022. The primary species targeted were northern pike and walleye (*Sander vitreus*). Information was also gathered on black crappies and yellow perch. An electrofishing survey targeting largemouth bass and bluegill was conducted on June 1, 2022 along approximately 2.5 miles of shoreline.

The northern pike catch rate of 15 per net night was exceptionally high (99th percentile) compared to other lakes in the same class. Only two walleye were captured for a catch rate of 0.2 fish per net night, indicating a low abundance of the species. The low catch rate for walleye is consistent with previous

surveys of Lake Hayward and the population is supported almost exclusively by stocking. The WDNR opined in the report that stocked walleye may not stay in the lake since they have opportunities to leave both upstream into the Namekagon River and downstream over the dam (WI Department of Natural Resources, 2022b).

The report also indicated that muskellunge (*Esox masquinongy*) are present in the lake, with trophy size fish captured during previous surveys. However, no muskies were captured during the 2022 surveys. The species is periodically stocked in the lake, but also may move out of the lake similar to walleye.

The black crappie catch rate of 4.1 per net night was below average compared to lakes in the same class. The yellow perch with a catch rate of 2.5 fish per net night and largemouth bass (*Micropterus salmoides*) with a catch rate of 12 fish per mile ≥8 inches, were about average compared to other lakes in the same class. The bluegill catch rate of 228 per mile ≥ 3 inches, was above average compared to other lakes in the same class. Lake Hayward has a strong reputation as a bluegill fishery during both the open water and ice fishing seasons (WI Department of Natural Resources, 2022b).

4.5.1.3.3 Fish Stocking

A review of the WDNR Fish Stocking Database showed that a total of 141,029 fish were stocked in Lake Hayward between 1979 and 2022, as shown in **Table 4.5.1.3.3-1**. Information regarding the year of release, number, source, and size of the released fish is included in **Appendix E-14**. (WI Department of Natural Resources, n.d.d)

Table 4.5.1.3.3-1 Fish Stocked in Lake Hayward between 1972 and 2022

Species	Age	Number stocked	Stocking Timeframe
Muskellunge	Fingerling	5,362	1979-2019
Panfish	Adult	250	2003
Walleye	Fingerlings and fry	136,029	1982-2022

Source: (WI Department of Natural Resources, n.d.d)

4.5.1.3.4 Entrainment and Impingement

The Hayward Project contains a 10.9 foot high by 12.8-foot wide main trashrack with 1.5 inch clear spacing. The powerhouse has a maximum hydraulic capacity of 178 cfs resulting in a calculated approach velocity of approximately 1.1 feet per second (fps) at the trashracks.[11] Since fish larger than three inches in length feature sustained or burst swim speeds greater than 1.6 fps, the risk of fish impingement at the Project is very low. The combination of low intake velocities and existing narrow trashrack spacing precludes the entrainment of larger fish while allowing primarily young-of-year fish to pass through the turbine. While young-of-year fish are more susceptible to entrainment, they are less prone to mortality due to their small size. Natural mortality in the first year for most resident fish species is very high, therefore the small increment in mortality due to turbine passage at the early life stage should not significantly affect the overall fishery.

[11] Approach velocity calculated based upon a width of 12.8 feet, a vertical length of 12.75 feet at a maximum headwater elevation of 1,187.5 feet NGVD, and a maximum hydraulic capacity of 178 cubic fps.

4.5.1.4 Mussel Species

4.5.1.4.1 Historic Mussel Information

According to the mussel information provided by the WDNR via email on August 17, 2020, there are no federal or state threatened, endangered, or special concern mussel species known to occur in Lake Hayward. However, listed species may occur within the Namekagon River upstream or downstream of the Project (WI Department of Natural Resources, 2020b). **Table 4.5.1.4.1-1** provides a list of native mussel species that have been identified in the Namekagon River in Sawyer County.

Table 4.5.1.4.1-1 Mussel Species in the Namekagon River (Sawyer County, WI)

Common Name	Scientific Name	State Status	Last Observed
Black sandshell	*Ligumia recta*		1987
Creek heelsplitter	*Lasmigona compressa*		1995
Cylindrical papershell	*Anodontoides ferussacianus*		1987
Elktoe	*Alasmidonta marginata*	Special Concern	1987
Fatmucket	*Lampsilis siliquodea*		1995
Fluted-shell	*Lasmigona costata*		1995
Giant floater	*Pyganodon grandis*		1987
Mucket	*Actinonaias ligamentina*		1987
Plain pocketbook	*Lampsilis cardium*		1987
Round pigtoe	*Pleurobema sintoxia*		1995
Spike	*Elliptio dilatata*		1987
Wabash pigtoe	*Fusconaia flava*		1995

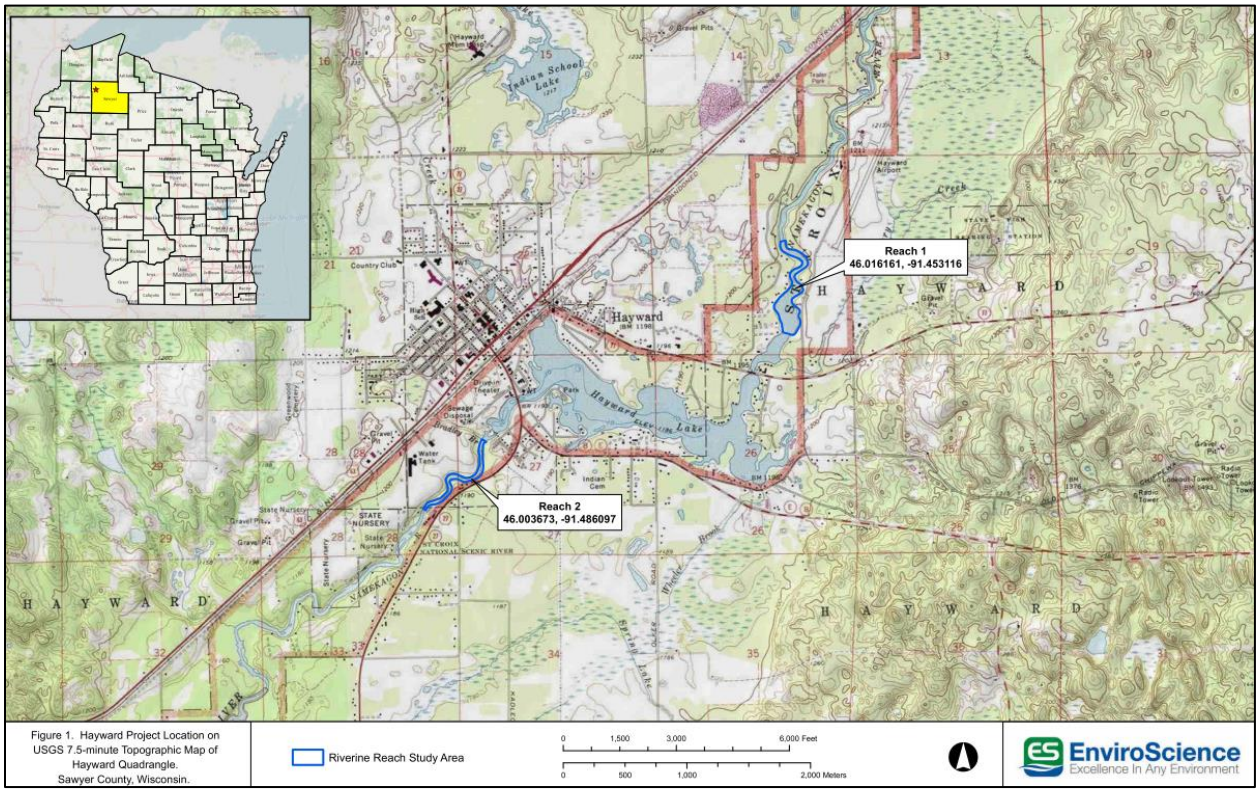
Source: (WI Department of Natural Resources, 2020b)

4.5.1.4.2 Current Mussel Information

In order to provide additional information regarding the mussel community in the Project vicinity, mussel surveys were conducted within two riverine reaches in 2022, one upstream and one downstream of the Hayward Dam. The objective of the survey was to provide baseline data on the general density and diversity of freshwater mussels, including characterizing mussel habitat within the Project area. The Hayward Mussel Study Report is found in **Appendix E-15**.

The mussel surveys were performed according to the 2015 WDNR Guidelines for Sampling Freshwater Mussels in Wadable Streams and other standard protocols. Two river reaches, Reach 1 and Reach 2, were sampled. Reach 1 was the upstream reach which began approximately 430 m upstream of the State Highway 77 bridge and extended 1,000 meters upstream. Reach 2 was the downstream reach which began at the Hayward Canoe Portage Put-In and extended 1,000 meters downstream. The locations of the survey reaches are shown in **Figure 4.5.1.4.2-1**.

Figure 4.5.1.4.2-1 Hayward Mussel Study Locations



Source: (Enviroscience, 2023a)

A series of transects extending from bank to bank were established every 100 meters creating a series of 10 possible transects for each reach. Transects were numbered sequentially from downstream to upstream and a random number function was used to select five transects to survey within each reach. Searches along each transect were conducted in 10-meter segments and extended 0.5 meters on each side of the transect. A rapid visual search for signs of freshwater mussels was performed within each segment. The rapid visual search entailed an initial search of 0.2 minute/meter^2 along each 10-meter segment to determine if mussels were present. If mussels were present in a particular segment, a semi-quantitative search was triggered and the time was extended for one minute/meter^2. During the semi-quantitative search, divers visually searched, probed the substrate, and turned over rocks to detect small, burrowed mussels (Enviroscience, 2023a).

General stream conditions and morphology were recorded within the study area. Water depth and river bottom substrate composition using the Wentworth Scale were recorded for each 10-transect segment. In addition, a general description of mussel habitat characteristics within the Project boundary was recorded.

The mussel survey was conducted on June 19, 2022. River flow at the time was 117 cfs as measured at the Leonards, Wisconsin United States Geologic Survey (USGS) Gage No. 05331833 upstream of the Project. Maximum visibility was approximately 1.0 meter and the water temperature was approximately 66°F (Enviroscience, 2023a).

Reach 1 Study Results

The upstream portion of Reach 1 was characterized as riverine and consisted of a shallow run with moderate current velocity. The lower portion of Reach 1 was located at the confluence with Lake Hayward where the river channel was wider and the current velocity slower. Transects 1, 2, 6, 7, and 8 were randomly selected for sampling. Transects 6, 7, and 8 were within shallow run habitat. Substrate along all three of the transects most closely aligned with the Wan et al., 2007 substrate code 7 (abundant fine substrate, gravel, pebbles, and cobble).[12] Woody debris and submerged aquatic vegetation were also present in some transect segments. Water depth did not exceed three feet along these transects. The habitat in Transects 1 and 2 differed from the upstream transects. A maximum depth of four feet was recorded, however; the depths of most segments but did not exceed three feet. Substrate along Transects 1 and 2 most closely aligned with composition code 1 (abundant fine substrate).

No live mussels were collected in Reach 1. Weathered dead or subfossil shells of threeridge (*Amblema plicata*), Wabash pigtoe (*Fusconaia flava*), and fatmucket (*Lampsilis siliquoidea*) were collected from Transect 6 and shells of the same species were observed on top of the substrate while walking between transects. The invasive Chinese mystery snail (*Cipangopaludina chinensis*) was abundant in the substrates of all five transects (Enviroscience, 2023a). The study report concluded Transects 1 and 2 do not provide high quality mussel habitat. Transects 6, 7, and 8 may provide more suitable habitat and relic shells observed in this portion of the reach suggest mussels may occur in low abundance in the upstream portion of Reach 1.

Reach 2 Study Results

Reach 2 consisted primarily of glide/run with heterogeneous substrate and moderate current velocity. The streambanks were low and gradually sloping. Transects 2, 3, 4, 8, and 9 were randomly selected for sampling. Although there was some substrate variation, conditions were generally similar across all five transects sampled. Substrate across the sampled transects most closely aligned with substrate composition code 7 (abundant fine substrate gravel pebbles and cobbles) in Wan et. al., 2007. Sand was generally more abundant near the banks while some transect segments featured small areas of boulder, woody debris, and submerged vegetation. The maximum depth observed was 3 feet.

A total of 373 live mussels representing 10 different species were collected in Reach 2 as shown in **Table 4.5.1.4.2-1**. Muckets (*Actinonaias ligamentina*) and fluted shells (*Lasmigona costata*) were the most prevalent species collected. Plain pocketbook (*Lampsilis cardium*), spike (*Eurynia ubercula*), creeper (*Strophitus undulatus*), and Wabash pigtoe were also commonly encountered. One mussel of state special concern, the elktoe, was also identified (Enviroscience, 2023a).

Although species relative abundance varied somewhat among the transects sampled, seven of the ten species observed were present in all transects. Mussel density ranged from 1.23 mussels per meter^2 in transect 2, to 3.4 mussels per meter^2 in transect 3, and averaged 2.66 mussels per meter^2 over all of the sampled transects. The study report concluded that Reach 2 provides suitable habitat

[12] Wan, H Perry, et. al, 2007, Aquatic habitat classification of the St. Croix National Scenic Riverway. In Research report to the US National Park Service. University of Minnesota.

for mussels due to the heterogeneous substrates and moderate current velocity (Enviroscience, 2023a). The complete Mussel Study Report is included in **Appendix E-15**.

Table 4.5.1.4.2-1 Mussels Observed in Reach 2 During 2022 Mussel Study (Hayward Project)

Common Name	Scientific Name	Total Live Mussels	Percentage of Mussels Collected
Black sandshell	*Ligumia recta*	18	4.8
Creeper	*Strophitus undulatus*	37	9.9
Elktoe	*Alasmidonta marginata*	10	2.7
Fatmucket	*Lampsilis siliquodea*	21	5.6
Fluted-shell	*Lasmigona costata*	63	16.9
Giant floater	*Pyganodon grandis*	2	0.5
Mucket	*Actinonaias ligamentina*	110	29.5
Plain pocketbook	*Lampsilis cardium*	40	10.7
Spike	*Eurynia dilatata*	37	9.9
Wabash pigtoe	*Fusconaia flava*	35	9.4
Totals		**373**	**100**

Source: (Enviroscience, 2023a)

4.5.1.5 Aquatic Invasive Species

Chapter NR 40 of the Wisconsin Administrative Code (NR 40) makes it illegal to possess, transport, transfer, or introduce certain invasive species into the state without a permit. NR 40 requirements are often used as a guide at hydroelectric projects to determine which species should be considered invasive. NR 40.03 classifies invasive species into two categories, which are prohibited and restricted. Prohibited species are defined as invasive species not currently found in Wisconsin, but if introduced are likely to survive, spread, and potentially cause negative environmental and economic impacts. Restricted species are invasive species already established in Wisconsin and have caused or are believed to cause negative environmental and economic impacts. NR 40 further categorizes invasive species by group, which include plants, algae and cyanobacteria, aquatic invertebrates (except crayfish), fish and crayfish, terrestrial and aquatic vertebrates (except fish), terrestrial invertebrates and plant disease-causing microorganisms, and fungus (WI Department of Natural Resources, n.d.e).

4.5.1.5.1 Historic Aquatic Invasive Species Information

WDNR Lakes and Aquatic Invasive Species Mapping Tool

A review of the WDNR Lakes and Aquatic Invasive Species Mapping Tool identified four invasive species listed in NR 40 in the vicinity of the Hayward Project. Those species include curly leaf pondweed (*Potamogeton crispus*), Eurasian watermilfoil (*myriophyllum spicatum*), hydrid watermilfoil, and Chinese mystery snail (*bellamya chenensis*).[13] The mapper also identified reed canary grass (*Phalaris arundinacea*) (WI Department of Natural Resources, n.d.g). Currently, only the ribbon grass cultivar of reed canary grass is proposed to be listed as a restricted species under the rule (WI

[13] Hybrid milfoil is a cross between the native northern watermilfoil (*Myriophyllum sibiricum*) and the invasive EWM.

Department of Natural Resources, n.d.e). The remaining cultivars of reed canary grass are not currently, or proposed to be, classified as restricted or prohibited species. The ribbon grass cultivar has not been identified at the Hayward Project. The remaining species identified by the mapper are classified as restricted species under NR 40.

NSPW Purple Loosestrife Monitoring

NSPW monitors Lake Hayward annually for the presence of the restricted purple loosestrife (*Lythrum salicaria*). The plant was identified as being present or common on 0.09 miles of shoreline in 2021 and 0.12 miles of shoreline in 2022. No shoreline areas were classified as abundant (NSPW, 2022b).

2021 Lake Hayward Aquatic Plant Management Plan

The Lake Hayward APMP, developed for the LHPOA, identified three aquatic invasive plant species within the lake. They included curly-leaf pondweed, Eurasian watermilfoil, and purple loosestrife. Curly-leaf pondweed was found at only 1% of littoral sites in the July 2021 survey. In 2013, the species was found at 33% of littoral sites. EWM had low to moderate littoral frequency from a lake-wide perspective (9.5%) and had a slightly higher occurrence in 2013 (12.3%). EWM occurrence was lower than six native plant species and its occurrence did not form any beds of dominant or highly dominant EWM. Purple loosestrife was found at three locations near sample sites but was not causing impairment (Aquatic Plant and Habitat Services, LLC, 2023). Maps showing the locations of each species are included in the Hayward APMP included in **Appendix E-9**.

4.5.1.5.2 Current Aquatic Invasive Species Information

The Licensee conducted an ATIS Study at the Hayward Project in 2022. The study area encompassed the Project reservoir, bypass reach, tailwater area and the upland shoreline areas adjacent to the reservoir along with upland areas owned by NSPW within the current and proposed project boundaries. Aquatic invasive species monitoring was conducted concurrently with the submerged aquatic vegetation survey (Section 4.5.2.1.1). Each sampling point was inspected for the presence of invasive species as listed in NR 40.

Two submergent aquatic invasive species, curly-leaf pondweed and EWM, were identified during the point intercept surveys. Overall, the frequency of curly-leaf pondweed was low and no areas were observed that contained monotypic stands or impeded navigability any more than native plants. The overall frequency of EWM was also relatively low, with no surface-matted areas of EWM observed during the study (GAI Consultants, Inc., 2023a). Semiaquatic and terrestrial species identified during surveys of the Project's shorelines are detailed in Section 4.6.1.1.2.

In addition to aquatic vegetation sampling, two water samples, including one in the reservoir and one in the tailwater, were collected during the July survey using WDNR protocol to sample for the presence of zebra mussels (*Dreissena polymorpha*). Likewise, two water samples were collected to sample for the presence of spiny and fishhook water fleas (*Bythotrephes longimanus* and *Cercopagis pengoi*, respectively). The samples were delivered to the Wisconsin State Lab of Hygiene in Madison on August 11, 2022 for analysis. All water samples tested negative for the presence of zebra mussel veligers and water fleas (GAI Consultants, Inc., 2023a).

Sediment samples were collected at the City of Hayward's Boat Landing off of South Second Street using WDNR protocol. The samples were examined for the presence of invasive macroinvertebrates, including Asian clam (*Corbicula fluminea*), faucet snail (*Bithynia tentaculate*), New Zealand mud snail (*Potamopyrgus antipodarum*), Malaysian trumpet snail (*Melanoides uberculatea*), rusty crayfish (*Orconectes rusticus*), and others. The area around the sampling site was also visually examined for live snails, crayfish, or shells. The sediment sampling identified the presence of Japanese mystery snails (*Cipangopaludina japonica*) within Lake Hayward, which was expected as they are present within the upstream Smith Lake. Even though Chinese mystery snails had previously been identified within Lake Hayward, none were found within the sediment samples. No other invasive macroinvertebrates were identified during the study (GAI Consultants, Inc., 2023a). The complete ATIS Study Report is included in **Appendix E-3** and includes maps depicting the locations of the aquatic invasive species.

4.5.1.6 Macroinvertebrate Community

In 2008, the WDNR conducted macroinvertebrate sampling at the monitoring station 10029431upstream of Hospital Road. The station is located approximately 0.7 miles upstream of the Project boundary and the sampling results are included in **Appendix E-16**.

The WDNR uses biological indices, including the Macroinvertebrate Index of Biological Integrity (MIBI), as one of the measures evaluated to determine the aquatic life portion of the FAL-Fish and Aquatic Life designated use. According to the 2022 WisCALM guidelines, condition category thresholds for wadable river MIBI scores are as follows (WI Department of Natural Resources, 2021b):

- >7.5 Excellent
- 5.0–- 7.4 Good
- 2.5 – 4.9 Fair
- <2.5 Poor

The ten-year mean MIBI value at monitoring station 10029431 was listed at 6.7, indicating the site falls within the upper end of the "good" condition category.

4.5.2 Hayward Project Environmental Effects

4.5.2.1 Effects of Proposed Project Operation on Fish and Other Aquatic Resources

4.5.2.1.1 Aquatic Vegetation

The ATIS Study Report showed that Lake Hayward contains a diverse aquatic plant community, a community which developed under the current operating regime under the existing license. NSPW is proposing to operate the Project in the same manner it currently operates. More specifically, the Project will continue to operate in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. At all times, NSPW acts to minimize the fluctuation of the Project reservoir by maintaining the elevation between 1,187.0 and 1,187.5 feet NGVD, while targeting 1,187.4 feet NGVD. NSPW does not operate the Project between the low and high elevation on a daily basis for peaking purposes.

Since the existing diverse aquatic plant community has developed under the current operating regime, and no material changes to operations are proposed, the proposed operation of the Project is not expected to cause any adverse impacts to aquatic vegetation.[14]

4.5.2.1.2 Wetlands

NSPW is proposing to operate the Project in the same manner it currently operates. More specifically, the Project will continue to operate in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resource values. At all times, NSPW acts to minimize the fluctuation of the Project reservoir by maintaining the elevation between 1,187.0 and 1,187.5 feet NGVD, while targeting 1,187.4 feet NGVD. NSPW does not operate the Project between the low and high elevation on a daily basis for peaking purposes.

Since the existing wetland community has developed under the current operating regime, and no material changes to operations are proposed, continued operation of the Project in not expected to adversely impact wetlands.[15]

4.5.2.1.3 Fisheries

Under the proposed operation, NSPW will operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resource values At all times, NSPW will act to minimize the fluctuation of the Project reservoir by maintaining the elevation between 1,187.0 and 1,187.5 feet NGVD, while targeting 1,187.4 feet NGVD. NSPW does not operate the Project between the low and high elevation on a daily basis for peaking purposes.

Reservoir Fishery

The existing fisheries data for Lake Hayward indicates that it contains a diverse and healthy fishery. No adverse effects to the existing fish populations or their habitat are anticipated due to the proposed Project operations.[16]

Fish Entrainment/Impingement

As noted in Section 4.5.1.3.3, the risk of entrainment and impingement at the Project is very low. The combination of low intake velocities (1.1 fps) and narrow trashracks (1.5-inch spacing) preclude larger fish from becoming entrained. Smaller fish, if entrained, are less susceptible to mortality.[17] Therefore, the proposed operation of the Project is not expected to adversely affect the overall fish community due to entrainment or impingement.

[14] Planned deviations for ice removal are expected to have no effect on aquatic vegetation due to their short duration and timing outside of the growing season.
[15] Planned deviations for ice removal are expected to have no effect on wetlands due their short duration and their timing outside of the growing season.
[16] Planned deviations for ice removal purposes are not expected to cause adverse effects to the fishery due to their short duration and timing during high flow periods, which coincides with the natural hydrologic cycle.
[17] Approach velocity calculated based upon a width of 12.8 feet, a vertical length of 12.75 feet at a maximum headwater elevation of 1,187.5 feet NGVD, and a maximum hydraulic capacity of 178 cubic fps.

4.5.2.1.4 Mussel Species

NSPW proposes to continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resource values. At all times, NSPW will act to minimize the fluctuation of the Project reservoir by maintaining the elevation between 1,187.0 and 1,187.5 feet NGVD, while targeting 1,187.4 feet NGVD. NSPW does not operate the Project between the low and high elevation on a daily basis for peaking purposes.

Relict mussel shells and limited suitable mussel habitat were identified in the upstream sampling reach (Reach No. 1). While no live mussels were encountered in this stretch of river, the study concluded that mussels may occur in low abundance in this reach. In contrast, the downstream reach featured quality mussel habitat and a diverse mussel population.

Since no material changes to current Project operations are proposed, no adverse effects to existing mussel habitat are anticipated. [18]

4.5.2.1.5 Aquatic Invasive Species

Recreational activities at the Project have the potential to increase the risk of spread or transfer of aquatic invasive species. NSPW has proposed mitigation measures in Section 4.5.3 to address these risks.

4.5.2.1.6 Macroinvertebrate Community

NSPW proposes to continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resource values. At all times, NSPW will act to minimize the fluctuation of the Project reservoir by maintaining the elevation between 1,187.0 and 1,187.5 feet NGVD, while targeting 1,187.4 feet NGVD. NSPW does not operate the Project between the low and high elevation on a daily basis for peaking purposes.

Since no material changes to current operations are proposed, no new effects to the benthic community are anticipated.[19]

4.5.3 Hayward Project Proposed Environmental Measures

Under Section 6 of Exhibit A, NSPW is proposing the following:

- Operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resource values.

[18] The planned deviations for ice removal purposes are not expected to cause adverse effects to mussels due to their short duration and timing during high flow periods, which matches the natural hydrologic cycle. Therefore, the planned deviation is not considered a material change regarding impacts to the mussel community.
[19] Planned deviations for ice removal purposes are not expected to cause adverse effects to macroinvertebrate populations due to their short duration and timing during high flow periods, which matches the natural hydrologic cycle.

- Maintain the reservoir elevation between 1,187.0 and 1,187.5 feet NGVD, while targeting 1,187.4 feet NGVD.
- Avoid operating the Project between the low and high elevations on a daily basis for peaking purposes.
- Release a minimum flow of 8 cfs or inflow, whichever is less, into the byapss reach for the protection of fish and wildlife resources and water quality.

To mitigate the spread of invasive species, NSPW will develop a rapid response invasive species monitoring plan to monitor for the introduction of new invasive species and limit the dispersal of established species. Within one year of license issuance, NSPW proposes to develop said plan in consultation with the WDNR and NPS prior to filing the plan with FERC. The plan will incorporate monitoring for both aquatic and terrestrial invasive species via biennial surveys.

In an effort to maintain the current quality of aquatic habitat in the upstream and downstream portions of the Project, NSPW will notify the FERC, NPS, USFWS, and WDNR of any planned deviations that have an expected duration of up to three weeks. This advanced notification will allow NSPW to implement any agency-recommended measures so as to minimize adverse environmental impacts.

An after-the-fact notification process for unplanned deviations will allow the FERC, NPS, USFWS, and WDNR to respond to any stakeholder concerns regarding the deviations in an informed manner. This process will also allow NSPW to track deviations. Should a deviation result in unanticipated adverse environmental impacts, as identified by NSPW's responding operator(s), NSPW will address the cause of the deviation to prevent similar occurrences from happening in the future.

NSPW recommends the following language regarding deviations be incorporated into any issued license:

Planned Deviations

Project operation may be temporarily modified for short periods, of up to 3 weeks, upon mutual agreement among the NPS, USFWS, and WDNR (collectively, agencies) and the Licensee. After concurrence from the agencies, the Licensee must file a report with the Secretary of the Commission as soon as possible, but no later than 14 calendar days after the onset of the planned deviation. Each report must include: (1) reasons for the deviation and how project operations were modified, (2) duration and magnitude of the deviation, (3) any observed or reported environmental effects and how the observations were made, and (4) documentation of consultation with the agencies. For planned deviations exceeding 3 weeks, the Licensee shall file for Commission approval an application for a temporary amendment of license in consultation with the agencies.

Unplanned Deviations

Operations may be temporarily modified if required by operating emergencies beyond the control of the Licensee (i.e., unplanned deviations). For any unplanned deviation that lasts longer than 3 hours or results in visible adverse environmental effects such as a fish kill, turbidity plume, bank erosion, or downstream flooding, the Licensee shall file a report with the Secretary of the Commission as soon as possible, but no later than 14 days after each such incident. The report must include: (1) cause of the deviation, (2) duration and magnitude of the deviation, (3) any pertinent operational and/or

monitoring data, (4) a timeline of the incident and the Licensee's response, (5) any comments or correspondence received from the agencies, or confirmation that no comments were received from the agencies, (6) documentation of any observed or reported environmental effects, and (7) a description of measures implemented to prevent similar deviations in the future.

For unplanned deviations lasting 3 hours or less that do not result in visible adverse environmental effects, the Licensee must file an annual report, by March 1, describing each incident that occurred during the prior calendar year. The report must include: (1) cause of the deviation, (2) duration and magnitude of the deviation, (3) any pertinent operational and/or monitoring data, (4) a timeline of the incident and the Licensee's response to each deviation, (5) any comments or correspondence received from the resource agencies, or confirmation that no comments were received from the agencies, and (6) a description of measures implemented to prevent similar deviations from occurring in the future.

NSPW will develop a compliance monitoring plan in consultation with the WDNR to document how it will comply with the operating requirements of the license, including reservoir elevation and minimum flow requirements. The plan will also include the following:

- Locations of headwater monitoring gages;
- frequency of monitoring;
- procedures for maintaining and calibrating monitoring equipment;
- standard operating procedures to be implemented outside of normal operating conditions, such as scheduled or emergency facility shutdowns or maintenance activities;
- schedule for installing and operating monitoring equipment; and
- a procedure to remove ice from the spillway prior to spring runoff as a planned deviation.

The proposed environmental measures are beneficial for fish and aquatic resources when compared to the alternative of no-action or denial of the license application. Without the issuance of a subsequent license for the Project, the proposed aquatic resource improvements will not occur.

4.5.4 Hayward Project Unavoidable Adverse Impacts

With the implementation of the proposed environmental measures, the continued operation of the Project is not expected to result in unavoidable adverse impacts.

4.6 Hayward Project Terrestrial Resources

4.6.1 Hayward Project Affected Environment

4.6.1.1 Botanical Resources

Wisconsin is divided into 16 ecological landscapes primarily defined by the physical environment, which includes climate, geology and landforms, and hydrology. A map depicting the 16 ecological landscapes within Wisconsin is included in **Appendix E-17**. The Project is located within the Northwest Sands Ecological Landscape (WI Department of Natural Resources, 2015a). Historic vegetation maps developed from General Land Office surveyor's notes and inferences from physical and ecological characteristics and cultural uses show this ecological landscape contained an extensive area of jack pine,

scrub oak forest, and barrens (Finley, R., 1976). A map showing Wisconsin's land cover in the 1800s is included in **Appendix E-18**.

Today, the lands within the Northwest Sands Ecological Landscape are mostly covered with barrens and dry forests of jack pine (*Pinus banksiana*) and oak (*Quercus spp*.). Other common tree species included aspen (Populus spp.), paper birch (*Betula papyrifera*), red pine (*Pinus resinosa*), tamarack (*Larix laricina*), and white pine (*Pinus strobus*) (WI Department of Natural Resources, 2015a).

WDNR maintains a detailed land cover dataset called WISCLAND 2.0 that describes the land cover across the state (WI Department of Natural Resources, n.d.f). The dataset was used to generate detailed land cover maps for lands within the current and proposed Project boundaries. The maps are included in **Appendix E-19**. Species level cover types identified within the current and proposed Project boundaries are shown in **Table 4.6.1.1-1**.

Table 4.6.1.1-1 Cover Types within the Current and Proposed Hayward Project Boundary

Detailed Land Cover Description	Land Cover Current Boundary (%)	Land Cover Proposed Boundary (%)
Developed, high intensity	2.42	2.38
Developed, low-intensity	3.63	3.57
Fir-spruce	4.92	4.76
Jack pine	1.04	1.45
Red pine	2.42	2.30
White pine	3.80	4.17
Aspen forest	0.00	0.09
Open water	76.77	76.28
Floating Aquatic Herbaceous Vegetation	1.99	1.96
Other broad-leaved deciduous scrub/shrub	1.30	1.87
Tamarack	1.30	1.11
Black ash	0.35	0.09
Mixed deciduous/coniferous forested wetland	0.09	0.00

Percentages do not add to 100% due to rounding
Source: (WI Department of Natural Resources, n.d.f)

4.6.1.1.1 Terrestrial Shoreline Community Characterization

The ATIS Study examined terrestrial areas within the current and proposed Project boundary. The mixed land use along the shoreline was dominated by residential properties with manicured vegetation interspersed with short sections of naturally vegetated or forested areas. The shoreline was inspected by boat, or on-foot where navigability was restricted. One small area was not accessible by foot or boat due to the presence of dense emergent vegetation that precluded canoe access and an unconsolidated bottom that precluded foot access (GAI Consultants, Inc., 2022a).

The shoreline was separated into only two segments because the terrain was fairly consistent and dominated by residential land use. Segment 1 was classified as "Developed-Residential" and was dominated by residential turf grasses, horticultural plants, and occasional trees. Segment 2 was designated as a mix of "Developed-Residential" and "Northern Mesic Forest." Vegetation within this segment was dominated with an overstory of basswood (*Tilia americana*), eastern white pine, paper birch, red pine, sugar maple (*Acer saccharum*), and white spruce (*Picea glauca)*. The understory was dominated by a variety of fern species (GAI Consultants, Inc., 2023a).

In addition to the shoreline survey, an upland terrestrial meander survey was conducted in three distinct areas, including the City of Hayward Boat Landing, the Hayward City Beach, and the NSPW-owned property adjacent to the Hayward Dam. These areas comprised a mix of mowed vegetation, trees, shrubs, and contained sizable populations of invasives species (GAI Consultants, Inc., 2023a). A discussion on terrestrial invasive species is found in Section 4.6.1.1.2.

4.6.1.1.2 Terrestrial Invasive Plant Species

The WDNR Lakes and Aquatic Invasive Species Mapping tool identified one invasive wetland plant along the lake, which is reed canary grass (*Phalaris arundinacea*) (WI Department of Natural Resources, n.d.g). While reed canary grass is present within the Project vicinity, only one cultivar (*Phalaris arundinacea var picta*) is listed as a restricted species under NR 40 (WI Department of Natural Resources, n.d.e). This cultivar is not known to be in the vicinity of the Project.

During the shoreline and terrestrial meander surveys, as described in Section 4.6.1.1.1, any invasive species listed in NR 40 that was observed had its location recorded via a handheld GPS unit. Maps showing the location of shoreline terrestrial invasive species identified during the study are located in Figure 11A of the ATIS Study Report (GAI Consultants, Inc., 2023a). Mapped upland terrestrial species found in meander surveys are shown in Figure 11B of the ATIS Study Report (**Appendix E-3**). A summary of terrestrial invasive species observed during the ATIS Study is shown in **Table 4.6.1.1.2-1**.

Invasive species comprised approximately 2.6 miles of shoreline during the terrestrial survey and included nine restricted species. Species observed during the study are shown in **Table 4.6.1.1.2-1**. The woody invasives, including glossy buckthorn, common buckthorn, and Eurasian bush honeysuckle, were among the most frequently observed, along with a large population of aquatic forget-me-not in the eastern portion of the Project area (GAI Consultants, Inc., 2023a).

Table 4.6.1.1.2-1 Terrestrial Invasive Species Observed During the 2022 ATIS Study at the Hayward Project

Common Name	Scientific Name	Mileage of Meander	Percentage of Meander	NR 40 Status
Aquatic forget-me-not	*Myosotis scopioides*	0.42	4.65	Restricted
Cattail species (Non-native)	*Typha spp.*	0.01	0.17	Restricted
Common buckthorn	*Rhamnus cathartica*	0.47	5.29	Restricted
Eurasian bush honeysuckle	*Lonicera spp.*	0.85	9.44	Restricted
Glossy buckthorn	*Frangula alnus*	0.31	3.44	Restricted
Purple loosestrife	*Lythrum salicaria*	0.34	3.79	Restricted
Spotted knapweed	*Centaurea stoebe*	0.12	1.36	Restricted

Common Name	Scientific Name	Mileage of Meander	Percentage of Meander	NR 40 Status
Tansy	*Tanacetum vulgare*	0.02	0.19	Restricted
Yellow iris	*Iris pseudacorus*	0.07	0.73	Restricted

Source: (GAI Consultants, Inc., 2023b)

The meander survey of upland areas was conducted around the Hayward City Boat Landing, Hayward City Beach, and NSPW-owned lands adjacent to the Hayward dam. The City of Hayward's facilities were characterized by a mixture of maintained turfgrass, a public beach and playground, paved and gravel surfaces, and natural herbaceous and woody vegetation. Invasive species in these areas included common buckthorn, Eurasian bush honeysuckle, glossy buckthorn, spotted knapweed, and tansy (GAI Consultants, Inc., 2023a).

The report concludes that there are well-established populations overall of several invasive species along the Project shoreline and in lands owned by NSPW adjacent to the Hayward Dam. Common buckthorn, glossy buckthorn, Eurasian bush honeysuckle, purple loosestrife, and yellow iris were the most commonly encountered species and were the dominant vegetation in some areas. Other species, while well-represented, were less frequently encountered (GAI Consultants, Inc., 2023a).

4.6.1.2 Wildlife Resources

4.6.1.2.1 Mammal Species

The Northwest Sands Ecological landscape was historically important for a variety of large mammals including wide-ranging species such as American beaver (*Castor canadensis*), American bison (*Bos bison*), elk (*Cervus canadensis*), gray wolf (*Canis lupus*), moose (*Alces americanus*), and North American river otter (*Lontra canadensis*) (WDNR, 2015). The arrival of Euro-American settlers brought many changes to the landscape including fire suppression, land conversion to farming, and logging which resulted in habitat changes. Several species have been in decline or were extirpated (WDNR, 2015). White-tailed deer, while not as abundant in this area as further south, saw its lowest population in the early 1900s due to subsistence hunting by numerous early settlers. Since the 1980s, the white-tailed deer herd has rebounded and has often been above management goals for the Northern Forest. Over browsing of palatable plants is also becoming more common in the Northwest Sands.

The federally listed northern long-eared bat and gray wolf are also potentially found in the Project vicinity and are discussed further in Section 4.7.1.1. The mammal species likely to be found in the vicinity of the Project are detailed in **Table 4.6.1.2.1-1** (NSPW, 1991b) (WI Department of Natural Resources, 2015a).

Table 4.6.1.2.1-1 Mammal Species in the Project Vicinity

Mammal Species	Scientific Name	State/Federal Status
Arctic shrew	*Sorex arcticus*	
Badger	*Taxidea taxus*	
Beaver	*Castor canadensis*	
Bobcat	*Lynx rufus*	
Big brown bat	*Eptesicus fuscus*	State endangered
Black bear	*Ursus americanus*	

Mammal Species	Scientific Name	State/Federal Status
Deer mouse	*Peromuscus maniculatus*	
Coyote	*Canis latrans*	
Eastern chipmunk	*Tamias striatus*	
Eastern cottontail	*Sylvilagus floridans*	
Eastern fox squirrel	*Sciurus niger*	
Fisher	*Martes pennanti*	
Gray fox	*Urocyon cenereoargenteus*	
Gray wolf	*Canis lupus*	Federally Endangered
Hoary bat	*Lasiurus cinereus*	
Least chipmunk	*Eutamias minimus*	
Little brown bat	*Myotis lucifugus*	State endangered
Long-tailed weasel	*Mustela frenata*	
Masked shrew	*Sorex cinerus*	
Meadow jumping mouse	*Zapus hudsonius*	
Meadow vole	*Microtus pennsylvanicus*	
Muskrat	*Ondontra zibethicus*	
Mink	*Mustela vison*	
Plains pocket gopher	*Geomys bursarius*	
Porcupine	*Erethizon dorsatum*	
Pygmy shrew	*Microsorex hoyi*	
Northern flying squirrel	*Glaucomys sabrinus*	
Northern long-eared bat	*Myotis septentionalis*	Federally Endangered
Raccoon	*Procyon lotor*	
Red bat	*Lasiurus borealis*	
Red-backed vole	*Clethrionomys gapperi*	
Red fox	*Vulpes fulva*	
Red squirrel	*Tamiasciurus hudsonicus*	
River otter	*Lutra canadensis*	
Short-tailed weasel	*Mustela erminea*	
Shorttail shrew	*Blarina brevicauda*	
Silver-haired bat	*Lasionycteris noctivagans*	
Snowshoe hare	*Lepus americanus*	
Star-nosed mole	*Condylura cristata*	
Striped skunk	*Mephitis mephitus*	
Southern bog lemming mouse	*Synaptomys cooperi*	
Thirteen-lined ground squirrel	*Citellus tridecemlineatus*	
Water shrew	*Sorex palustris*	
White-footed mouse	*Peromyscus leucopus*	
White-tailed deer	*Odocoileus virginianus*	
Woodland jumping mouse	*Napaeozapus insignis*	
Woodchuck	*Marmota monax*	

Source: (NSPW, 1991a) (NSPW, 1991b) (WI Department of Natural Resources, 2015a)

4.6.1.2.2 Avian Species

A checklist provided by the Cornell eBird web site lists 82 avian species have been identified at the Hayward City Beach, which is on Lake Hayward in Sawyer County, Wisconsin (Cornell eBird, n.d.a). Bird species from the eBird checklists are found in **Table 4.6.1.2.2-1** and included in **Appendix E-20**.

According to eBird, the most commonly observed species include the bufflehead (*Bucephala albeola)*, fox sparrow (*Passerella iliaca*), common grackle (*Quiscalus quiscula*), wood duck (*Aix sponsa*), golden-crowned kinglet (*Regulus satrapa*), American goldfinch (*Spinus tristis*), mallard (*Anas platyrhynchos*), common yellowthroat (*Geothlypis trichas*), downy woodpecker (*Dryobates pubescens*), and white-breasted nuthatch (*Sitta carolinensis*) (Cornell eBird, n.d.a).

Common waterfowl species include the bufflehead, Canada goose (*Branta canadensis*), common goldeneye (*Bucephala clangula*), common merganser (*Mergus merganser*), great blue heron (*Ardea herodias)*, greater and lesser scaup (*Aythya marila* and *Aythya affinis*), green heron (*Butorides virescens*), hooded merganser (*Lophodytes cucullatus*), mallard, and wood duck (Cornell eBird, n.d.a).

Raptor species identified at Lake Hayward include American kestrel (*Falco sparverius*), bald eagle (*Haliaeetus leucocephalus*), broad-winged hawk (*Buteo platypterus*), sharp-shinned hawk (*Accipiter striatus*), and osprey (*Pandoin haliaetus*) (Cornell eBird, n.d.a).

Lake Hayward provides summer feeding and breeding habitat for many avian species. Herons, woodpeckers, flycatchers, wood-warblers, and sparrows are among the non-game birds found at or near the lake each year. A diverse array of perching birds are also found within the Project vicinity.

Table 4.6.1.2.2-1 Avian Species in the Hayward Project Vicinity

Bird Species	Scientific Name	State/Federal Status
Alder flycatcher	*Empidonax alnorum*	
American crow	*Corvus brachyrhynchos*	
American goldfinch	*Spinus tristis*	
American kestrel	*Falco sparverius*	
American redstart	*Setophaga ruticilla*	
American robin	*Turdus migratorius*	
American tree sparrow	*Spizelloides arborea*	
Bald eagle	*Haliaeetus leucocephalus*	Eagle Act
Baltimore oriole	*Icterus galbula*	
Bank swallow	*Riparia riparia*	
Belted kingfisher	*Megaceryle alcyon*	
Black-capped chickadee	*Poecile atricapillus*	
Black tern	*Chlidonias niger*	State endangered
Broad-winged hawk	*Buteo platypterus*	
Brown thrasher	*Toxostoma rufum*	
Bufflehead	*Bucephala albeola*	

Bird Species	Scientific Name	State/Federal Status
Canada goose	*Branta canadensis*	
Cedar waxwing	*Bombycilla cedrorum*	
Chimney swift	*Chaetura pelagica*	
Chipping sparrow	*Spizella passerina*	
Clay-colored sparrow	*Spizella pallida*	
Common goldeneye	*Bucephala clangula*	
Common grackle	*Quiscalus quiscula*	
Common loon	*Gavia immer*	
Common merganser	*Mergus merganser*	
Common nighthawk	*Chordeiles minor*	
Common redpoll	*Acanthis flammea*	
Common yellowthroat	*Geothlypis trichas*	
Dark-eyed junco	*Junco hyemalis*	
Downy woodpecker	*Dryobates pubescens*	
Eastern bluebird	*Sialia sialis*	
Eastern kingbird	*Tyrannus tyrannus*	
Eastern phoebe	*Sayornis phoebe*	
European starling	*Sturnus vulgaris*	
Evening grosbeak	*Coccothraustes vespertinus*	
Fox sparrow	*Passerella iliaca*	
Golden-crowned kinglet	*Regulus satrapa*	
Gray catbird	*Dumetella carolinensis*	
Great blue heron	*Ardea herodias*	
Greater scaup	*Aythya marila*	
Green heron	*Butorides virescens*	
Hairy woodpecker	*Dryobates villosus*	
Herring gull	*Larus argentatus*	
Hooded merganser	*Lophodytes cucullatus*	
House finch	*Haemorhous mexicanus*	
House sparrow	*Passer domesticus*	
House wren	*Troglodytes aedon*	
Killdeer	*Charadrius vociferus*	
Least flycatcher	*Empidonax minimus*	
Lesser scaup	*Aythya affinis*	
Mallard	*Anas platyrhynchos*	
Mourning dove	*Zenaida macroura*	
Nashville warbler	*Leiothlypis ruficapilla*	
Northern cardinal	*Cardinalis cardinalis*	
Northern flicker	*Colaptes auratus*	

Bird Species	Scientific Name	State/Federal Status
Osprey	*Pandion haliaetus*	
Palm warbler	*Setophaga palmarum*	
Pied-billed grebe	*Podilymbus podiceps*	
Pileated woodpecker	*Dryocopus pileatus*	
Pine siskin	*Spinus pinus*	
Pine warbler	*Setophaga pinus*	
Purple finch	*Haemorhous purpureus*	
Red-breasted nuthatch	*Sitta canadensis*	
Red-eyed vireo	*Vireo olivaceus*	
Red-winged blackbird	*Agelaius phoeniceus*	
Ring-billed gull	*Larus delawarensis*	
Ring-necked duck	*Aythya collaris*	
Ruby-crowned kinglet	*Corthylio calendula*	
Scarlet tanager	*Piranga olivacea*	
Sharp-shinned hawk	*Accipiter striatus*	
Song sparrow	*Melospiza melodia*	
Tennessee warbler	*Leiothlypis peregrina*	
Tree swallow	*Tachycineta bicolor*	
Trumpeter swan	*Cygnus buccinator*	
Turkey vulture	*Cathartes aura*	
Warbling vireo	*Vireo gilvus*	
White-breasted nuthatch	*Sitta carolinensis*	
Wild turkey	*Meleagris gallopavo*	
Wilson’s warbler	*Cardellina pusilla*	
Wood duck	*Aix sponsa*	
Yellow warbler	*Setophaga petechia*	
Yellow-bellied sapsucker	*Sphyrapicus varius*	
Yellow-rumped warbler	*Setophaga coronata*	
Yellow-throated vireo	*Vireo flavifrons*	

Source: (Cornell eBird, n.d.a)

4.6.1.2.3 Herptile Species

No records of herpetological surveys within the Project boundary were found during a literature review. However, based on the range of herptile species identified on the WDNRs *Herps of Wisconsin* website, it is likely a variety of frogs, snakes, turtles, lizards, and salamanders exist in the Project vicinity. Reptiles and amphibians likely to be found in the Project vicinity, and for which vouchered collections exist, are detailed in **Table 4.6.1.2.3-1** (WI Department of Natural Resources, n.d.h).

Table 4.6.1.2.3-1 Reptile and Amphibian Species Presumed found in the Hayward Project Vicinity

Reptiles and amphibians	Scientific Name	State/Federal Status
American toad	*Anaxyrus americanus*	
American bullfrog	*Lithobates catesbeianus*	
Blanding's turtle	*Emydoidea blandinii*	
Blue-spotted salamander	*Ambystoma laterale*	
Boreal chorus frog	*Pseudacris triserieta*	
Common gartersnake	*Thamnophis sirtalis*	
Common snapping turtle	*Chelydra sepentina*	
Common watersnake	*Nerodia sipedon*	
Eastern foxsnake (pine)	*Patherophis vulpinus*	
Eastern hognose snake	*Heterodon platirhinos*	
Eastern newt	*Notophthalmus viridescens*	
Eastern red-backed salamander	*Plethodon cinereus*	
Gray treefrog	*Hyla versicolor*	
Green frog	*Lithobates clamitans*	
Mudpuppy	*Necturus maculosus*	
Northern Leopard frog	*Lithobates pipiens*	
Northern ring-necked snake	*Diadophis punctatus edwardsii*	
Painted turtle	*Chysemus picta*	
Red-bellied snake	*Storeria occipitomaculata*	
Smooth greensnake	*Opheodrys vernalis*	
Spiny softshell	*Alpone spinifera*	
Spring peeper	*Pseudacris crucifer*	
Spotted salamander	*Ambystoma maculatum*	
Wood frog	*Lithobates sylvaticus*	
Wood turtle	*Glyptemys insculpta*	State threatened

Source: (WI Department of Natural Resources, n.d.h)

The wood turtle and Blanding's turtle (*Emydoidea blandingii*) are known to be present near the Project. A turtle study was conducted on June 6 and 8, 2022 to determine if wood or Blanding's turtles, turtle nesting habitat, or evidence of turtle nesting was present along shoreline areas and within buffered areas of the shoreline. Many painted turtles (*Chrysemys picta)* were observed in the Project area. Even though no wood or Blanding's turtles or nests were observed, the Hayward Project provide suitable habitat for the species. (GAI Consultants, Inc., 2023b). The Wood and Blanding's Turtle Nesting Habitat Study results are discussed in more detail in Section 4.7.

4.6.2 Hayward Project Environmental Effects

NSPW proposed to operate the Hayward Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation will minimize adverse impacts on water quality, aquatic habitat, and other aquatic resources. At all times, NSPW will act to minimize the fluctuation of the Project reservoir and maintain the elevation between 1,187.0 and 1,187.5 feet NGVD, while targeting 1,187.4 feet NGVD. NSPW does not operate the Project between the low and high elevation on a daily basis for peaking purposes. A minimum flow of 8 cfs or inflow, whichever is less, is also released in the bypass reach of the Namekagon River at all times.

4.6.2.1 Botanical Resources

4.6.2.1.1 Terrestrial Shoreline Vegetation

The terrestrial shoreline vegetation present along Lake Hayward is common throughout the Project vicinity. NSPW is not proposing any material changes to Project operations. Throughout the term of the current license, terrestrial botanical resources in the Project vicinity have adapted to the Project operations. No additional adverse effects to terrestrial botanical resources are anticipated due to the continued operation of the Project.[20]

4.6.2.1.2 Terrestrial Invasive Species

Maintenance of Project facilities and Project works have the potential to increase the risk of spread or transfer of terrestrial invasive species. NSPW has proposed mitigation measures in Section 4.6.3 to address these increased risks.

4.6.2.2 Wildlife Resources

Environmental impacts to threatened and endangered species are discussed in Section 4.7. The wildlife resources in the Project vicinity are classified as common for the area. NSPW is not proposing any material changes to Project operations. During the current license term, wildlife species in the Project vicinity have adapted to Project operations. Therefore, no additional effects to terrestrial wildlife resources are anticipated due to the continued operation of the Project.[21]

4.6.3 Hayward Project Proposed Environmental Measures

NSPW will develop a rapid response invasive species monitoring plan to monitor for the introduction of new invasive species and limit the dispersal of established species. Within one year of license issuance, the NSWP proposes to develop said plan in consultation with the WDNR and NPS prior to filing the plan with the FERC. The plan will incorporate measures for monitoring for both aquatic and terrestrial invasive species via biennial surveys.

[20] Planned deviations for removing ice from the spillway prior to spring runoff are not expected to cause adverse impacts to terrestrial botanical resources due to their short duration and timing outside of the growing season.
[21] Planned deviations for ice removal are not expected to cause adverse impacts to wildlife species due to their short duration and timing during high flow periods, which follows the natural hydrologic cycle and are therefore, not considered material regarding impact to wildlife resources.

The proposed environmental measures will provide additional benefit for terrestrial resources when compared to the alternative of no-action or denial of the license application. Without issuance of a subsequent license for the Project, the proposed terrestrial resource improvements will not occur.

4.6.4 Hayward Project Unavoidable Adverse Impacts

With the implementation of the proposed terrestrial mitigation measures, no unavoidable adverse effects to terrestrial resources are anticipated due to the proposed Project operation.

4.7 Hayward Project Threatened and Endangered Resources

4.7.1 Hayward Project Affected Environment

4.7.1.1 Federally Listed Species

The USFWS Information for Planning and Conservation (IPaC) website was accessed on March 21, 2023 to develop an Official Species List for the Project. The list identified the potential presence of three federally listed species, one proposed species, and one candidate species in the Project vicinity. In addition, the Official Species List also identified the potential presence of the bald eagle within the Project vicinity. The IPaC Official Species List is summarized in **Table 4.7.1.1-1** and described in the following sections. The Official Species List is included in **Appendix E-21**.

Table 4.7.1.1-1 Threatened, Endangered, Candidate, and Proposed Species Identified in Hayward Project IPaC Official Species Lists

Common Name	Scientific Name	Group	Status
Canada Lynx	*Lynx canadensis*	Mammal	Threatened
Gray wolf	*Canis lupus*	Mammal	Endangered
Northern long-eared bat	*Myotis septentrionalis*	Mammal	Endangered
Tricolored bat	*Perimyotis subflavus*	Mammal	Proposed Endangered
Monarch butterfly	*Danaus plexippus*	Insect	Candidate

Source: (US Fish and Wildlife Service, 2023a)

4.7.1.1.1 Canada Lynx

The Canada lynx is a federally endangered mammal species associated with moist, cool, boreal spruce-fir forests, with rolling terrain. They are dependent upon snowshoe hare populations and need persistent deep powdery snow, which limits competition from other predators (US Fish and Wildlife Service, n.d.a). There is no designated critical habitat for the species in Wisconsin.

A breeding population has never been discovered in Wisconsin and it is believed most occurrences are travelling through the state from Michigan or Minnesota. In 1997, the species was removed from the State's endangered species list due to the lack of breeding within the state (UW Stevens Point, n.d.). While it is possible the Canada lynx may travel through the Project area, it is unlikely.

4.7.1.1.2 Gray Wolf

The gray wolf was removed from the Wisconsin state endangered species list in 2004. In 2007, the USFWS delisted the Western Great Lakes wolf population, including in Wisconsin. The delisting rule was

challenged in federal court and vacated in 2008 resulting in the gray wolf being relisted as federally endangered in Wisconsin and Michigan. In 2009, the USFWS again delisted the Western Great Lakes wolf population. Due to the failure to hold public hearings on the delisting, the rule was vacated via a federal court order in 2009 and wolves were again relisted as endangered in Wisconsin and Michigan. Wolves retained this status until 2011 when the USFWS issued a new delisting rule. The rule was vacated by a federal court and wolves reverted back to a federally endangered status in 2014. In 2020, the gray wolf was again delisted by a USFWS delisting rule. On February 10, 2022, the order was again vacated by a federal court restoring the endangered status for wolves in Wisconsin and Michigan which remains in effect (WI Department of Natural Resources, 2022c).

The gray wolf is a federally endangered mammal that lives in family groups or packs. The wolf is a habitat generalist. In Wisconsin during the winter of 2020-2021, there were an estimated 292 wolf packs with an average territory size of 63.4 square miles (WI Department of Natural Resources, 2022c). Wolves prefer areas which consist mainly of forestland and other wildland areas. They are common in northern Wisconsin and although they were not identified in Wisconsin's Natural Heritage Inventory review for the Project vicinity, they may occasionally pass through the Project boundary.

4.7.1.1.3 Northern Long-Eared Bat

The NLEB is a federally endangered and state threatened mammal. The species was reclassified from a federally threatened status to federally endangered status on November 30, 2022 (US Fish and Wildlife Service, 2022). The NLEB roosts during the summer months underneath loose bark or in cavities or crevices of both live and dead trees. Non-reproducing females and males may also roost in cool places such as caves or mines. The NLEB feeds in the forest interior and hibernates in caves and mines during the months of October through April. Sawyer County, Wisconsin is within the NLEB range. The location of hibernacula and maternity roost trees are tracked in Wisconsin's NHI. However, there are no known hibernacula or roost trees in the Project vicinity (WI Department of Natural Resources, 2022d). Project operations that involve tree removal activities may impact unknown maternity roosts.

4.7.1.1.4 Tricolored Bat

On September 13, 2022, the USFWS proposed to list the tricolored bat as an endangered species under the Endangered Species Act. The bat faces extinction due to the impacts of white-nose syndrome, a deadly disease affecting cave-dwelling bats across the country (US Fish and Wildlife Service, n.d.b).

The Tricolored bat is active from spring to fall, primarily roosting among live and dead leaf clusters of live or recently dead hardwood trees. This bat has also been known to roost among pine needles, eastern red cedar, and within artificial roosts like barns, bridges, concrete bunkers, and rarely within caves. Female bats return to the same summer roosting locations year after year. Tricolored bats typically hibernate in caves and mines during the winter. Where caves are not common, it often hibernates in road culverts and sometimes in tree cavities and abandoned wells. The tricolored bat typically returns to the same hibernaculum each year (US Fish and Wildlife Service, n.d.b).

The tricolored bat is also a state Threatened species whose location is tracked in Wisconsin's NHI database. There are no known element occurrences of the species within the Project vicinity (WI Department of Natural Resources, 2022d). Project operations that involve tree removal may impact unknown roost trees.

4.7.1.1.5 Monarch Butterfly

On December 17, 2020, the USFWS announced that the listing of the monarch butterfly as endangered or threatened was warranted but was precluded by higher priority listing actions. The decision was the result of an extensive species status review that compiled and assessed the monarch's current and future status. The monarch is now a candidate species under the ESA. As a candidate species, its status will be reviewed annually until a listing decision is made (US Fish and Wildlife Service, n.d.c).

The monarch butterfly is one of the most recognized North American butterflies with its 3.5- to 4-inch-long striking orange and black wings. Wisconsin monarchs are migratory, journeying to central Mexico for the winter each year. Adults feed on nectar collected from flowers (WI Department of Natural Resources, n.d.i).

4.7.1.2 State Listed Species

A WDNR endangered resources review of the Wisconsin NHI database, originally conducted on February 17, 2020, was renewed on December 13, 2022. The endangered resources review identified two threatened species likely to be found in the vicinity of the Hayward Project. It also noted two bald eagle nests located within the Project vicinity (WI Department of Natural Resources, 2022d). The threatened and endangered species likely to occur in the vicinity of the Project are shown in **Table 4.7.1.2-1** and the endangered resources review is included in **Appendix E-22** (privileged document).

Table 4.7.1.2-1 State Threatened and Endangered Species likely to Occur in the Hayward Project Vicinity

Common Name	Scientific Name	Group	State Status
Bald eagle	*Haliaeetus leucocephalus*	Bird	Eagle Act
Pugnose shiner	*Notropis anogenus*	Fish	Threatened
Wood turtle	*Glyptemys insculpta*	Herptile	Threatened

Source: (WI Department of Natural Resources, 2022d)

4.7.1.2.1 Bald Eagle

The bald eagle lives near rivers, lakes, and marshes. During winter, the birds congregate near open water in tall trees to locate prey and roost at night for sheltering. The bird mates for life and chooses the tops of large trees to build nests, which they typically use and enlarge each year. They may have one or more alternate nests within their breeding territory. Bald eagles typically return to breeding grounds within 100 miles of where they were raised. Project activities (e.g., maintenance, construction, etc.) that involve disturbance within 660 feet of a nest during the nesting season may cause impacts to the species (US Fish and Wildlife Service, 2021).

Two bald eagle nests have been recorded within the Project vicinity. Vegetation management and construction activities that occur between January 15 and July 30 within 660 feet of an active bald eagle nest may impact the species.

4.7.1.2.2 Pugnose Shiner

The pugnose shiner (*Notropis anogenus*) is a state threatened fish species. It prefers the weedy shoals of glacial lakes and low gradient streams over bottoms of mud, sand, cobble, silt, and clay. It spawns from mid-May through July (WI Department of Natural Resources, n.d.n). There is suitable habitat for the species within Lake Hayward and upstream in the Namekagon River.

Project operations that involve ground disturbing activities adjacent to the reservoir or river that could cause erosion or sedimentation, and work on the bed of the reservoir or river, have the potential to impact the species.

4.7.1.2.3 Wood Turtle

The wood turtle is a state threatened reptile species that prefers rivers and streams with adjacent riparian wetlands and upland deciduous forests. The species often forages in open wet meadows or shrub-carr habitats dominated by speckled alder. They overwinter in streams and rivers in deep holes or undercut banks where there is enough water flow to prevent freezing. The species typically remains within 300 meters of rivers and streams. The species nests in open or semi-open canopy areas containing gravel or sandy soils, typically within 60 meters of the water (WI Department of Natural Resources, n.d.m).

Wood Turtle Study

A Wood Turtle Study was completed on June 6 and 7, 2022, to provide additional information regarding the presence or absence of wood turtles and nesting habitat within the Project boundary. The objective of the study was to determine if wood turtles, nesting habitat, or evidence of nesting was present within the Project vicinity. The report, including maps showing areas of suitable nesting habitat, is included in **Appendix E-23**.

Prior to performing the fieldwork, NSPW mapped buffer areas within 200 feet of the shoreline. Topographic and parcel ownership maps were reviewed for terrestrial access feasibility. A portion of the buffer area is predominantly urban residential consisting of impermeable surfaces, landscaped area, and manicured lawns. These land types were not surveyed as they are not considered suitable habitat for nesting wood turtles.

Lake Hayward was surveyed for the presence of wood turtles and nesting habitat by boat while moving slowly along and parallel to the shoreline. Binoculars were used to provide a good view into the adjacent riparian and upland areas. The bypass reach and Namekagon River downstream of the Hayward Dam were surveyed on foot, as were the upland areas owned by NSPW. Shoreline areas accessible to the public were also surveyed. Field surveyors drove along public roads within the buffer areas to identify suitable nesting habitat in upland areas such as road shoulders, roads, driveways, and on private property that could be observed from the road.

Suitable nesting habitat was mapped using a Trimble R1 GNSS Receiver with a GPS device. Areas within the buffer zone not visible from locations accessible to the public were assessed via a desktop review using aerial photography. The desktop effort was combined with the information collected in the field to identify the approximate extent of suitable nesting habitat. Visual encounter surveys, which

searched for the presence or absence of basking and nesting wood turtles, were completed concurrently with the shoreline and terrestrial nesting habitat surveys.

No wood turtles or evidence of wood turtle nests were noted during the visual encounter surveys. Basking painted turtles were observed on Lake Hayward, primarily on the eastern half of the reservoir, which held more natural shoreline and suitable basking areas. A total of 6.4 acres of suitable wood turtle nesting habitat was identified within 200 feet of the shoreline. The majority of nesting habitat mapped included gravel roads, road shoulders, driveways, and parking lots. The reservoir shoreline was heavily developed and had minimal areas with suitable nesting habitat. Shoreline residential areas were generally dominated by lawns and did not have basking logs in the water. A few residential properties along the shoreline had small, sandy areas suitable for turtle nesting. Outside of roads, driveways, and parking areas, only two small natural areas suitable for nesting were located downstream of the dam (GAI Consultants, Inc., 2023b).

The study report concluded that while nesting habitat for wood turtles was present and of high quality, the majority of the habitat mapped was found along roads, road shoulders, and parking areas where disturbance of nests is more likely, rather than in naturally occurring nesting areas (GAI Consultants, Inc., 2023b).

4.7.2 Hayward Project Environmental Effects

4.7.2.1 Effects of Proposed Project Operations on Federally Listed species

4.7.2.1.1 Canada Lynx

In the NHI review, there were no Canada lynx occurrences identified within a one-mile buffer of the Project boundary. Any lynx in the Project vicinity would likely be travelling through the area rather than full-time residents. Therefore, there are no impacts to the species from current Project operations and none anticipated from proposed operations.

4.7.2.1.2 Gray Wolf

Since no gray wolf occurrences were identified within a 1-mile buffer of the Project boundary during the NHI review, any wolves in the Project vicinity would likely be travelling through the area rather than considered full time residents. Therefore, there are no impacts to the species from current Project operations and none anticipated from proposed operations.

4.7.2.1.3 Northern Long Eared Bat

NSPW has not proposed any specific activities regarding this application that could have an adverse impact upon the species. However, routine operational activities, such as removal of a hazard tree at a recreation site, could impact the NLEB if occupying said hazard tree. Therefore, NSPW has proposed mitigation measures in Section 4.7.3 to address these types of potential impacts.

4.7.2.1.4 Tricolored Bat

NSPW has not proposed any specific activities in this application that could have an adverse impact upon the species. However, routine operational activities, such as removal of a hazard tree at a recreation site, could impact the species if occupying said hazard tree. Therefore, NSPW has proposed mitigation measures in Section 4.7.3 to address these types of potential impacts.

4.7.2.1.5 Monarch Butterfly

Habitat for the monarch butterfly is located within the Project vicinity. The proposed Project operation is not expected to result in the direct take of the monarch butterfly during any life stage, nor is it expected to result in any loss of habitat. Therefore, the proposed Project operation is not expected to have an adverse effect upon the monarch butterfly.

4.7.2.2 Effects of Proposed Project Operations on State-Listed Species

4.7.2.2.1 Bald Eagle

NSPW has not proposed any specific activities in this application that involve vegetation management or construction activities within 660 feet of any active eagle nest that could result in adverse impacts to the species.[22]

4.7.2.2.2 Pugnose Shiner

NSPW has not proposed any specific activities in this application that involve ground disturbing activities adjacent to, or on the bed or banks of the reservoir or river, which could adversely impact the species.

4.7.2.2.3 Wood Turtle

As noted in the Wood Turtle Study Report, no evidence of wood turtles or active wood turtle nesting sites were identified during the 2022 surveys. However, a total of 6.4 acres of suitable wood turtle nesting habitat was identified. Although NSPW has not proposed any specific activities in this application that could have an adverse effect upon the species, day-to-day operational activities, such as regular maintenance activities at a recreation site, could cause an impact on a wood turtle if nesting at the site. Therefore, NSPW has proposed mitigation measures in Section 4.7.3 to address these effects. The measures would remain in effect as long as wood turtles remain a state-listed species.

4.7.3 Hayward Project Proposed Environmental Measures

The environmental measures discussed below are being proposed by NSPW to address potential adverse impacts to threatened, endangered, and candidate species caused by current and proposed Project operations.

The proposed environmental measures discussed below for the NLEB, tricolored bat, and wood turtle are a significant advancement for threatened and endangered resources at the Project when compared to the alternative of no-action or denial of the application. Without the issuance of a subsequent license for the Project, the threatened and endangered resource improvements will not occur.

[22] Since routine maintenance of recreation sites has been occurring over the term of the existing license, eagles with existing nests located within a 660-foot buffer of the recreation sites are accustomed to the activities and will not be adversely affected. Likewise, new nests established within a 660-foot buffer of the recreation sites are not likely to be adversely affected, because eagles are establishing a new nest despite the presence of the recreation site and its routine maintenance activities.

4.7.3.1 Northern Long-Eared Bat

Wisconsin implements the requirements of a Broad Incidental Take Permit and Broad Incidental Take Authorization for Wisconsin Cave Bats, last updated in November 2022, which are included herein as **Appendix E-24**. NSPW will follow these requirements to provide protection to any NLEB within the Project vicinity during routine recreation site maintenance. NSPW proposes to follow the applicable mitigation measures outlined in the Cave Bat BITP/A. If these measures are implemented, the proposed operation of the Project is not likely to jeopardize the continued existence and recovery of the state population of the species or the whole plant-animal community to which they belong.

4.7.3.2 Tricolored Bat

Wisconsin implements the requirements of the Cave Bat BITP/A, last updated in November 2022, which is included in **Appendix E-24**. NSPW will follow these requirements to provide protection to any tricolored bat within the Project vicinity during routine recreation site maintenance. Therefore, the Applicant proposes to follow the applicable mitigation measures outlined in the Cave Bat BITP/A. If these measures are implemented, the proposed operation of the Project is not likely to jeopardize the continued existence and recovery of the state population of the species or the whole plant-animal community to which they belong.

4.7.3.3 Wood Turtle

NSPW is not proposing to conduct any ground disturbing activities within 200 feet of Lake Hayward or the Namekagon River as part of this relicensing proceeding.[23]

The WDNR has implemented an Incidental Take Permit/Authorization for Common Activities for the Wood Turtle dated April 2016. To mitigate for the impacts of any recreation site maintenance within 200 feet of the reservoir or river, NSPW is proposing to follow the terms of the Wood Turtle BITP/A as long as the wood turtle remains a state-listed endangered or threatened species. Under the Wood Turtle BITP/A, Project activities are not likely to jeopardize the continued existence and recovery of the state population of the protected turtle or the whole plant community to which they belong. The Wood Turtle BITP/A is included in **Appendix E-25**.

4.7.4 Hayward Project Unavoidable Adverse Impacts

With the implementation of the proposed environmental measures discussed above, the proposed operation of the Project is not expected to result in unavoidable adverse effects to threatened, endangered, or candidate species.

[23] Grading of existing gravel parking areas, trail maintenance involving trimming of brush, and removal of hazard trees at recreation sites are not considered ground disturbing activities.

4.8 Hayward Project Recreation Resources

Lake Hayward was formed when the current dam was built in 1907, impounding the Namekagon River. The Project is located within the City of Hayward and the Town of Hayward in Sawyer County, Wisconsin. It is located approximately 50 miles southwest of the City of Ashland, Wisconsin and 120 miles northeast of the City of Minneapolis, Minnesota. The Project reservoir has a surface area of 246.9 acres at the maximum reservoir elevation of 1,187.5 feet NGVD, a maximum depth of 17 feet, and approximately 17.81 miles of shoreline.[24] During the open water season, Lake Hayward provides opportunities for fishing, wildlife viewing, water sports, and paddling. It is also popular during winter for ice fishing and snowmobiling.

4.8.1 Hayward Project Affected Environment

4.8.1.1 Existing Recreational Resources

NSPW operates and maintains three FERC-Approved recreation sites at the Project (**Table 4.8.1.1-1**). Three additional non-project recreation sites are located in the Project vicinity; none of which are owned or operated by NSPW (**Table 4.8.1.1-2**). The locations of all six sites are shown in **Figure 4.8.1.1-1**.

Table 4.8.1.1-1 FERC-Approved Recreation Sites within the Hayward Project Boundary

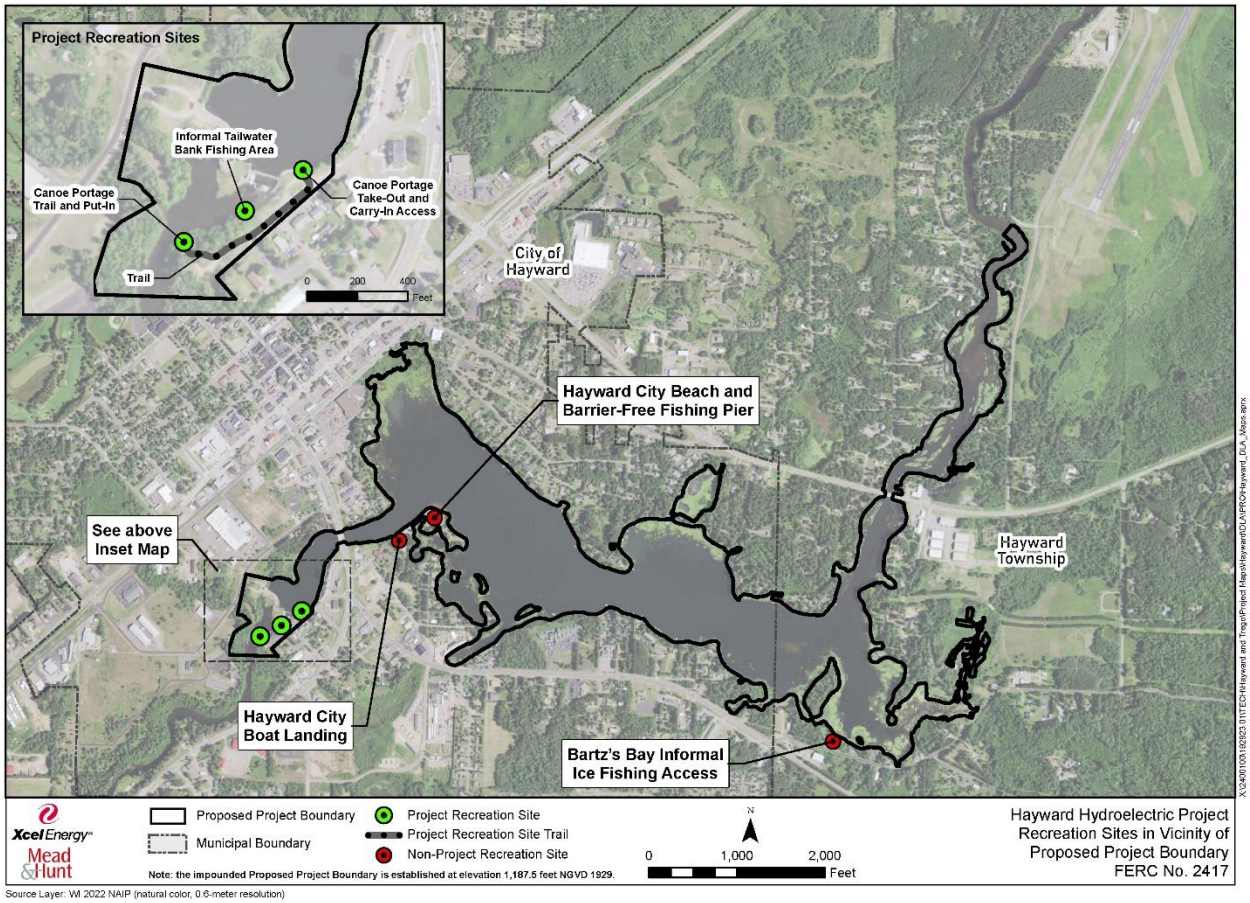
Recreation Site	Site Type	County	Owner	Operator
Canoe Portage Take-Out and Carry-In Access	FERC-Approved	Sawyer	NSPW	NSPW
Canoe Portage Trail and Put-In	FERC-Approved	Sawyer	NSPW	NSPW
Informal Tailwater Bank Fishing Area	FERC-Approved	Sawyer	NSPW	NSPW

Table 4.8.1.1-2 Project Recreation Sites in the Hayward Project Vicinity

Recreation Site	Site Type	County	Owner	Operator
Hayward City Boat Landing	Non-Project	Sawyer	City of Hayward	City of Hayward
Hayward City Beach and Barrier Free Fishing Pier	Non-Project	Sawyer	City of Hayward	City of Hayward
Bartz's Bay Informal Ice Fishing Access	Non-Project	Sawyer	Private	Private

[24] Maximum reservoir depth from WDNR Find-A-Lake Hayward Lake Webpage (WI Department of Natural Resources, n.d.a) Length of shoreline from ATIS Study Report (**Appendix E-3**).

Figure 4.8.1.1-1 Recreation Sites in the Hayward Project Vicinity



4.8.1.2 Recreation Plans

4.8.1.2.1 License Article 414

There is no approved recreation plan for the Hayward Project. However, Article 414 of the current license requires NSPW to monitor recreation use of the Project area every six years to determine whether the existing recreation facilities are meeting recreation needs. The monitoring is summarized in a report that includes annual recreation use figures, discussion of the adequacy of the facilities to meet recreation demand, methodology used, and documentation of consultation with the City of Hayward, NPS, USFWS, and WDNR.

Recreation monitoring was last conducted in 2020 and the corresponding report was filed with the FERC on February 24, 2021. The report concluded recreational facilities were in good condition and were sufficient to accommodate the current use on all but the busiest of days. Recreation use has increased gradually since the last report and is most concentrated in the evening hours and weekends. The report recommended only one action item for NSPW-owned facilities and that was to evaluate signage condition and consider replacement. The 2021 Recreation Report is included in **Appendix E-26**.

4.8.1.2.2 Wisconsin Statewide Comprehensive Outdoor Recreation Plan

Wisconsin regularly publishes a Statewide Outdoor Comprehensive Recreation Plan (SCORP) as required by the Federal Land and Water Conservation Fund Act of 1965. The SCORP is used to help

allocate federal funds among local communities and focuses on preserving and improving recreation opportunities in Wisconsin while targeting relationships such as public health and wellness, urban access to outdoor recreation, and public-private partnerships. The latest SCORP covering the period 2019-2023 recognizes one of the top-priority needs is to provide more recreation places near urban centers, trails, and water access to support a variety of nature-based recreation (WI Department of Natural Resources, 2019). A copy of the SCORP was provided in the PAD as Appendix 4.8.3.1-1.

4.8.1.2.3 Sawyer County

The Sawyer County Plan for Outdoor Recreation 2021-2025 identified several recommended improvements to county, town, and city recreation facilities. The plan did not identify any improvements to county-owned recreation facilities located within or adjacent to the Hayward Project boundary. However, the plan did recommend improvements for facilities within the City of Hayward. The plan recommended establishing bike trails to tie into the City of Hayward and county trail systems and defined parking for boat access at the Hayward City Beach (Sawyer County, 2021). No other specific needs identified in the plan are located within the Project vicinity. A copy of the 2021-2025 Plan is in **Appendix E-27**.

4.8.1.2.4 St. Croix National Scenic Riverway

As previously noted, the entire mainstem of the Namekagon River is included in the Wild and Scenic Rivers System as part of the St. Croix National Scenic Riverway. While the Hayward Project is located within the boundaries of the scenic riverway, there are no NPS or other federal lands located within the Project boundary. The NPS maintains several recreation sites on the Namekagon River, as well as a visitor center in the Town of Trego. The NPS has developed a series of maps depicting NPS and other recreation access sites along the Namekagon River. The maps also include general use regulations within the scenic riverway (**Appendix E-28**).

4.8.1.3 Recreation Study

Pursuant to the final Recreation Study Plan filed with FERC on April 21, 2022, NSPW conducted a Recreation Study to provide a subjective assessment of recreation facility conditions and needed enhancements. The study was also to determine if the capacity of existing facilities is sufficient to meet current and future demand as well as provide sufficient information for making recommendations regarding recreation enhancements.

The study is described in the sections below and consisted of the following study protocols:

- Recreation Site Inventory
- Facility Condition Assessment
- Recreation Use Survey
- Recreation Spot Counts
- Future and Potential Recreation Questionnaires

4.8.1.3.1 Recreation Site Inventory

An inventory of recreation amenities at each of the six recreation sites as discussed in Section 4.8.1.1 is included in **Table 4.8.1.3.1-1**. The inventory was conducted in May 2022 during the primary open water recreation season for all recreation sites except for Bartz's Bay. Bartz's Bay, an informal ice fishing access, was evaluated January 2022.

Table 4.8.1.3.1-1 Hayward Project Recreation Site Inventory

Recreation Site	Parking Spaces	Boat Launch / Carry-In	Picnic Facilities	Bank Fishing	Part 8 Sign	Other Signage
FERC-Approved Recreation Sites						
Canoe Portage Take-Out and Carry-In Access	Vehicle (20)	Stairs and carry-in path to reservoir	No	Informal	Yes	Regulatory (4) Directional (2)
Canoe Portage Trail and Put-In	Vehicle (6)	Carry-in Path to River	No	Informal	No	Regulatory (1) Directional (2)
Informal Tailwater Bank Fishing Area	Shared parking with Take-Out	No	No	Informal	No	Directional (2)
Non-Project Recreation Sites						
Hayward City Boat Landing	Vehicle (20) or Trailer (10)	1-lane (concrete)	No	Dock/pier	No	Regulatory (1) Informative (1) Interpretive (2)
Hayward City Beach & Barrier Free Fishing Pier	Vehicle (22) Barrier-free (2)	Informal Carry-In Access	Shelter Tables (13) Grills	Barrier-free Dock/pier	No	Regulatory (4)
Bartz's Bay Informal Ice Fishing Access	Vehicle (6)	Informal trail to reservoir	No	No	No	None

Completed Recreation Facility Inventory and Condition forms, and more detailed descriptions of the amenities found at each recreation site, are found in the Recreation Study Report included in **Appendix E-29**. A summary of the amenities for each recreation site is provided in the sections below.

Canoe Portage Take-Out- and Carry-In Access

This FERC-Approved recreation site is owned and operated by NSPW. The site features a carry-in access consisting of a timbered stairway and earthen pathway which also serves as a take-out for portaging around the dam. The site shares a parking area with the Informal Tailwater Bank Fishing Area and can accommodate parking for up to 20 vehicles. The site is shown in **Figure 4.8.1.3.1-1**. Additional photographs are included in Appendix 3 of the Recreation Study Report found in **Appendix E-29**.

Figure 4.8.1.3.1-1 Canoe Portage Take-Out and Carry-In Access

Canoe Portage Trail and Put-In

This FERC-Approved recreation site is owned and operated by NSPW. The canoe portage trail runs approximately 600 feet southwest from the Take-Out along the side of 1st Street and a gravel road to a path leading to the Namekagon River. There is parking along the gravel road to accommodate six vehicles in addition to the parking available at the Take-Out. The portage trail is clearly marked. The site is shown in **Figure 4.8.1.3.1-2**. Additional photographs taken during the study are included in Appendix 3 of the Recreation Study Report included in **Appendix E-29**.

Figure 4.8.1.3.1-2 Canoe Portage Signage and Path to Put-In at the Hayward Project

Informal Tailwater Bank Fishing Area

This FERC-Approved recreation site is owned and operated by NSPW. The site is located approximately 270 feet downstream of the Take-Out and has a terraced approach to provide access to the river that is often utilized by anglers. The site shares a parking area with the Take-Out. There is no signage specifically identifying the site; however, there are directional signs for the canoe portage trail that passes by the site. The site is shown in **Figure 4.8.1.3.1-3**. Additional photographs taken during the study are included in Appendix 3 of the Recreation Study Report included in **Appendix E-29**.

Figure 4.8.1.3.1-3 Path to Informal Tailwater Bank Fishing Area at the Hayward Project

Hayward City Boat Landing

This non-project recreation site is owned and operated by the City of Hayward. Only the portion of the boat ramp extending below elevation 1,187.5 feet NGVD and the dock are included within the Project boundary. The site includes a single-lane boat launch with a cement launch pad and a paved approach and dock with a gravel approach. The City maintains a "Lifejacket Loaner" program to encourage lifejacket use on Lake Hayward. The site also features a large gravel parking lot that can accommodate 20 vehicles or 10 vehicles with trailers. The site also provides overflow parking for the Hayward City Beach. The boat landing is depicted in **Figure 4.8.1.3.1-4**. Additional photographs taken during the recreation inventory are found in Appendix 3 of the Recreation Study Report included in **Appendix E-29**.

Figure 4.8.1.3.1-4 Hayward City Boat Landing and Dock on Lake Hayward

Hayward City Beach and Barrier Free Fishing Pier

This non-project recreation site is owned and operated by the City of Hayward. The site includes a 100-foot sand beach with designated swimming area, changing rooms, restroom facilities, picnic shelter, playground facilities, park bench, picnic tables, walking bridge, and barrier-free fishing pier. Only the portion of the beach area below reservoir elevation 1,187.5 feet NGVD, the walking bridge over a portion of the reservoir, and the barrier-free fishing pier are located within the Project boundary. The area has a paved parking area with spaces for 24 cars, two of which are dedicated as barrier-free spaces. The site is shown in **Figure 4.8.1.3.1-5**. Additional photographs taken during the study are included in Appendix 3 of the Recreation Study Report found in **Appendix E-29**.

Figure 4.8.1.3.1-5 Hayward City Beach, Picnic Shelter, and Barrier-Free Parking on Lake Hayward

Bartz's Bay Informal Ice Fishing Access

This non-project recreation site is privately owned and is not a formal designated access site. The site has historically been used for informal ice-fishing access during the winter months. While this site provides winter access to Lake Hayward, it is not located within the Project boundary. The access consists of an unimproved trail on private land, located between two private residential lots. Ice anglers typically park along the road (Chippewa Trail) which is plowed wider in the winter to facilitate parking for up to six vehicles. There are no amenities or signage at the site. The site is shown in **Figure 4.8.1.3.1-6**. Additional photographs taken during the study are found in Appendix 3 of the Recreation Study Report included in **Appendix E-29**.

Figure 4.8.1.3.1-6 Informal Ice-fishing Access Trail to Lake Hayward

4.8.1.3.2 Recreation Facility Condition Assessment

An assessment of recreation facilities was conducted to determine the condition of their amenities. Recommended site improvements are listed in **Table 4.8.1.3.2-1**. Complete results of the condition assessments are found in **Appendix E-29**.

Table 4.8.1.3.2-1 Recommended Recreation Facility Improvements Identified in Condition Assessment

Recreation Site	Recommended Improvements
Canoe Portage Take-Out and Carry-In Access	No recommended improvements
Canoe Portage Trail and Put-In	Need to replace invasive species sign
Informal Bank Fishing Area	No recommended improvements
Hayward City Boat Landing	No recommended improvements
Hayward City Beach and Barrier Free Fishing Pier	No recommended improvements
Bartz's Bay Informal Ice Fishing Access	No recommended improvements

4.8.1.3.3 Recreation Use Survey

In accordance with the final study plan, NSPW developed a recreation use survey form to collect visitor information on the following:

- Number of people in party.
- Primary reason for visiting the site.
- Perception of level of use.
- Opinions regarding amount, type, and condition of recreation facilities.

Recreation use surveys were conducted on 16 randomly selected weekdays, weekends, and holiday weekend days between January and September. The survey schedule is shown in **Table 4.8.1.3.3-1**. Surveyors remained at each site for at least one hour between the hours of 7:00 am and 7:00 pm. Surveys were completed on a rotating schedule to avoid repeatedly conducting surveys at the same time of day and to account for time-of-day use patterns. When first arriving at the site, the surveyor conducted a spot count of recreation use observed at that time. The results of the spot counts are discussed in Section 4.8.1.3.4.

Table 4.8.1.3.3-1 2022 Recreation Use Survey Dates at the Hayward Project

Survey Date	Type of Day	Survey Date	Type of Day
January 22	Weekend	June 20	Weekday
January 27	Weekday	June 25	Weekend
February 9	Weekday	July 4	Holiday Weekend
February 19	Weekend	July 5	Weekday
April 10	Weekend	August 6	Weekend
May 1	Weekend	August 13	Weekend
May 28	Holiday Weekend	August 19	Weekday
June 12	Weekend	September 11	Weekend

Recreation use was collected from 44 user interviews among the six sites. Three interviews were conducted from January through February, 14 from April through June, and 27 from July through September. The majority of interviews were completed at the City of Hayward Beach (27), followed by City of Hayward Boat Landing (8), Hayward Canoe Portage Take-Out and Carry-In Access (4), Hayward Informal Bank Fishing Access (3), Canoe Portage Trail and Put-In (1), and Bartz's Bay Informal Ice Fishing Access (1).

Visitors were asked which of the nine activities listed in **Table 4.8.1.3.3-2** they participated in during their visit. Each of the nine activities was identified as the primary activity by at least one visitor and several visitors participated in more than one of the recreation activities. A summary of recreational activities each visitor participated in is also shown in the table below. The most popular activities for the 44 users interviewed at the Hayward Project were shoreline/tailwater fishing (24%), swimming (24%), and other (22%). Dog walking was the most common "other" activity.

Table 4.8.1.3.3-2 Recreational Activities Listed for Current Visit

Recreation Site	Shore Fishing	Boat Fishing	Motorized Boating	Paddling	Swimming	Picnicking	Wildlife Viewing	Ice Fishing	Other
Canoe Portage Take-Out and Carry-In Access	1	0	1	1	0	0	0	0	2
Informal Tailwater Bank Fishing Area	2	0	0	0	0	0	1	0	0
Canoe Portage Trail and Put-In	1	0	0	0	0	0	0	0	0
Hayward City Boat Landing	3	4	1	0	1	0	0	2	0
Hayward City Beach and Barrier Free Fishing	5	0	1	1	11	1	1	1	9
Bartz's Bay Informal Ice Fishing Access	0	0	0	0	0	0	0	1	0
Total	**12**	**4**	**3**	**2**	**12**	**1**	**2**	**4**	**11**

Visitors were asked if they were prevented from participating in an activity of their choice. If so, they were asked to provide the reason(s) why. Only two of the 44 respondents indicated they were unable to participate in their preferred activity. One individual indicated they were unable to locate the ATV trail they wanted to use and another said there was a suspicious individual using the restroom for an inordinate amount of time. Nobody indicated that physical condition or personal limitation prevented them from participating in an activity.

Users were asked several questions about resource crowding at the recreation sites. The results are shown in **Table 4.8.1.3.3-3**. Eighty three out of a total of 92 respondents (90%) stated that the recreation sites were not crowded. Six of 92 respondents (6.5%) indicated some of the sites were slightly crowded. One respondent each stated that at least some of the resources were moderately, very, or extremely crowded. Three respondents indicated crowding affected their plans and they went elsewhere to avoid crowding.

Table 4.8.1.3.3-3 Crowding During Visit to Hayward Project

Resource	Not Crowded	Slightly Crowded	Moderately Crowded	Very Crowded	Extremely Crowded
Parking	33	4	0	1	0
Trails	14	0	0	0	0
Campground	11	0	1	0	0
Boat-in Campsite	4	0	0	0	0
Shore Fishing	13	2	0	0	1
Boating	8	0	0	0	0
Total	**83**	**6**	**1**	**1**	**1**

Visitors were also asked to rate their satisfaction with recreation amenities according to the following scale:

1- very satisfied,
2- somewhat satisfied,
3- neither,
4- dissatisfied, or
5- very dissatisfied.

The average rating of all facilities was 1.89, which falls between satisfied and totally satisfied. Visitors were asked to comment on the amenities and needs or concerns with the facilities near the Project. Recommended improvements were divided into two categories: maintenance and new amenities. The recommendations are summarized in **Table 4.8.1.3.3-4**.

Table 4.8.1.3.3-4 Recreation Site Maintenance and New Amenity Recommendations

Location	Maintenance Recommendations	New Amenity Recommendations
Canoe Portage Put-In and Carry-In Access	None	Trash receptacles (1)
		Picnic Table (1)
Informal Tailwater Bank Fishing Area	None	None
Canoe Portage Trail and Put-In	None	More/better signage (2)
		Barrier-free viewing and Parking (1)
Hayward City Boat Landing	None	New better signage (2)
Hayward City Beach	Improve Restroom (2)	Dog waste bag station (1)
		Fishing Pier (2)
	Manage Geese (3)	New/more signage (4)
		Trash receptacles (3)
		Public Wi-Fi (1)
	Maintain Pavilion (1)	Campground (1)
		Buoys for the beach (1)
		Widen entry road (2)
Bartz's Bay Ice Fishing Access	None	None

4.8.1.3.4 Recreation Spot Counts

The 16 recreational surveys conducted between January and September resulted in a total of 84 spot count reports during which 175 users were observed. The average spot count was 10.9 users per location. The Hayward City Beach and Barrier-Free Fishing Pier site showed the most use with 81% of the total users observed. Seasonally, the City of Hayward Boat Landing showed the most use during winter while the Hayward City Beach showed the most use in spring and summer. The spot counts are summarized in **Table 4.8.1.3.4-1**. A more detailed description of the results are available in the Recreation Study Report in **Appendix E-29**.

Table 4.8.1.3.4-1 Recreation Use Based on Recreation Survey Spot Counts at the Hayward Project

Recreation Site	January	February	April	May	June	July	August	September	Total
Canoe Portage Take-Out and Carry-In Access	0	0	0	0	0	0	5	1	**6**
Informal Tailwater Bank Fishing Area	0	0	0	0	2	0	0	0	**2**
Canoe Portage Trail and Put-In	0	0	1	0	1	0	0	0	**2**
Hayward City Boat Landing	2	3	0	0	1	5	3	5	**19**
Hayward City Beach and Barrier Free Fishing Pier	0	0	0	3	35	45	49	10	**142**
Bartz's Bay Informal Ice Fishing Access	2	2	0	0	0	0	0	0	**4**
Totals	**4**	**5**	**1**	**3**	**39**	**50**	**57**	**16**	**175**

Source: (EA Engineering, Science, and Technology, Inc., 2023)

4.8.1.3.5 Future and Potential Recreation Questionnaires

Future and potential recreation use questionnaires were mailed to representatives from the City of Hayward, Hayward Area Chamber of Commerce, Sawyer County, Town of Trego, TLD, Washburn County, and NPS on July 14, 2022. Stakeholders were asked about their interest in recreation sites in the vicinity of the Hayward Project as well as their primary function and responsibilities in regard to the recreation sites. Only the NPS and TLD provided responses.

National Park Service

The NPS stated that the Namekagon River is protected as part of the Wild and Scenic Rivers System and the National Park System. The river is managed by the St. Croix National Scenic Riverway for the "preservation and protection of the aquatic, cultural, recreational, scenic-aesthetic, water quality, and free-flowing condition values." The NPS does not manage sites near the Project, but has "an interest in providing safe, high-quality, recreational opportunities to the public as part of the NPS experience."

The NPS owns and manages the County K Landing, which is approximately 30 miles downstream of the Hayward Dam. This site includes a gravel river access, picnic tables, interpretive and informational signage, a paved parking lot, and a vault toilet. NPS also maintains the Namekagon Visitor Center in the Town of Trego. The Earl Landing is located on the Namekagon River

approximately midway between the Hayward and Trego Projects. This landing includes a gravel parking area, concrete boat ramp, vault toilet, primitive camping, potable water, and picnic tables.

The NPS noted that the two access points near their visitor center on the north and south banks of the Namekagon River were recently removed due to the redevelopment of the Highways 63 and 53 Interchange Project. The Lakeside Road Bridge was also removed as part of the highway interchange project. No recreational facilities remain at these sites. The removal of these facilities has reduced access to the river and has resulted in the Earl Landing frequently exceeding its parking capacity. The NPS is considering constructing a new access point near the Highway 63 Bridge east of the Namekagon River Visitor Center and is also currently in the design stage to make improvements to the Earl Landing.

Trego Lake District

TLD's comments were specific to the Trego Project and are discussed in Section 5.8.1.3.5.

4.8.1.3.6 Adequacy of Existing Facilities to Address Current and Future Demand

Results from the Recreation Study spot counts showed 166 users over 12 observations during the open water recreation season for an average of 13.8 users per day.[25] During the winter recreation survey, nine users were counted over two observations for an average of 2.3 users per day. Each observation was assumed to account for an entire recreation day. Therefore, the total recreation days during the 2022 primary open water recreation season was estimated at 2,953 or 13.8 users per day. The total recreation days during the winter recreation season was estimated at 347 or 2.3 users per day. This calculates to an annual estimated total of 3,300 recreation days in 2022.

As stated in the Recreation Study Report, 69% of recreationists interviewed were from the City of Hayward or lived within 25 miles of the Hayward Project. Therefore, it is appropriate to utilize projected population growth from Sawyer County, Wisconsin to address current and future recreation demand. As outlined in Section 4.12.1.1 of this application, the population of Sawyer County is projected to decrease by 3.6% between 2020 and 2040. Therefore, the number of recreation days at recreation facilities is not expected to increase by 2040.

4.8.2 Hayward Project Environmental Effects

4.8.2.1 Adequacy of Recreation Facilities

Information provided in Section 4.8.1 indicates that recreation facilities at the Hayward Project are adequate and can accommodate projected recreation use during the term of the subsequent license. While the recreation survey showed that most recreationists were satisfied with the existing facilities, several respondents made recommendations for maintenance and/or new amenities. These recommendations are shown in **Table 4.8.1.3.3-4**.

At FERC-Approved recreation sites owned by NSPW, recommendations included the addition of waste receptacles, picnic table, barrier-free viewing, and barrier-free parking. NSPW does not provide waste

[25] Open water recreation season is defined as April 1 to October 31 for a total of 214 days.

receptacles at any of its recreational facilities, which is a common practice at many recreation facilities. NSPW is not proposing to add picnic tables, barrier-free viewing, or barrier-free parking as the Hayward City Beach already provides these facilities along with a barrier-free trail, picnic tables and fishing pier. However, NSPW is proposing signage improvements as discussed in Section 4.8.3.

Several maintenance and new amenity recommendations were made for the City of Hayward's (non-project) facilities as shown in **Table 4.8.1.3.3-4**. The Recreation Study Report, included in **Appendix E-29**, outlines recommended improvements for the owners to consider for these of the non-project facilities.

4.8.2.2 Effects of Project Operation on Recreation

NSPW proposes to continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resource values. At all times, NSPW will act to minimize the fluctuation of the Project reservoir and maintain the elevation between 1,187.0 and 1,187.5 feet NGVD, while targeting 1,187.4 feet NGVD. NSPW will not operate the Project between the low and high elevation on a daily basis for peaking purposes. In addition, a minimum flow of 8 cfs or inflow, whichever is less, is currently released into the bypass reach for the protection of fish and wildlife resources and water quality at all times as discussed in Section 2.2.2.1.

The information included in Section 4.8.1 did not identify any environmental concerns regarding existing recreation facilities, such as erosion or reservoir fluctuation, due to Project operation. Therefore, the proposed operation of the Project is not expected to adversely affect recreational resources.

4.8.3 Hayward Project Proposed Environmental Measures

NSPW is proposing that the environmental measures discussed below regarding recreation be implemented during the term of the subsequent license. The proposed environmental measures are an advancement of recreation at the Project compared to the alternative of no-action or denial of the license application. Without the issuance of a subsequent license, these improvements would not occur.

4.8.3.1 Hayward Canoe Portage Takeout and Carry-In Access

- Review and maintain or improve signage, including Part 8 signage that meets current FERC standards.
- Conduct routine maintenance of site, including signage, during term of the subsequent license.[26]
- Install and maintain portable restroom facilities during the open water recreation season throughout the term of the subsequent license.
- Implement the Cave Bat BITP/A for any routine vegetation management activities.
- Implement the Wood Turtle BITP/A as long as the turtle remains a state-listed species.

[26] Routine maintenance includes mowing lawn, trail maintenance, trimming of woody vegetation, grading of existing gravel parking areas, and removal of hazard trees.

4.8.3.2 Hayward Canoe Portage Trail and Put-In

- Coordinate with the WDNR to obtain current invasive species signage for installation at the Canoe Portage Put-In.
- Review and maintain or improve signage, including Part 8 signage that meets current FERC standards.
- Conduct routine maintenance of site, including signage, during term of the subsequent license.
- Implement the Cave Bat BITP/A for any routine vegetation management activities.
- Implement the Wood Turtle BITP/A as long as the turtle remains a state-listed species.

4.8.4 Hayward Project Unavoidable Adverse Impacts

With the implementation of the proposed environmental measures, the proposed operation of the Hayward Project is not expected to result in unavoidable adverse impacts.

4.9 Hayward Project Land Use

4.9.1 Hayward Project Affected Environment

4.9.1.1 Existing Land Use

Based on the USGS National Land Cover Database, major land uses within the Project vicinity include deciduous forest, evergreen forest, wooded wetlands, and a mix of developed lands (low, medium, and high intensity) (US Geological Survey, n.d.a). A map showing the major land uses in the Project vicinity is included as **Appendix E-30**.

The Hayward Project is located within the both the City of Hayward and the Town of Hayward in Sawyer County, Wisconsin. In Wisconsin, development is vested with the counties and municipalities. As such, Sawyer County shoreland and floodplain zoning regulations apply to the Hayward Project. Major land uses in the City of Hayward consist of 52.7% residential, 45.2% commercial, and 2.1% manufacturing (City of Hayward, 2010). According to the Town of Hayward Comprehensive Plan 2018-2038, major land uses consist of 34.0 % Lac Courte Oreilles Tribe reservation, 33.9% wooded, 7.3% agricultural, 6.8% water, 5.9% single family residential, 4.8% open space/pasture, 2.6% transportation, 1.2% vacant, with the remaining 11 categories each being under 1% (Town of Hayward, 2019).

The NPS developed the General Management Plan for the Upper St. Croix and Namekagon Rivers in 1998 to guide future development and management of federally owned lands within the riverway. The lands adjacent to Trego Lake were designated as Developed Recreation Areas where high density, clustered, and sensitively placed planned developments that blend with the Northwoods ecosystem are permitted. This classification can accommodate a moderate to high level of recreation or development (National Park Service, 1998). On non-federal lands, the NPS encourages tribal, state, county, municipal, and private landowners within the riverway boundary to manage their lands in a manner consistent with the NPS.

4.9.2 Hayward Project Environmental Effects

NSPW proposes to continue to operate the Hayward Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation minimizes the potential for adverse impacts on water quality, aquatic

habitat, and other aquatic resource values At all times, NSPW will act to minimize the fluctuation of the Project reservoir and maintain the elevation between 1,187.0 and 1,187.5 feet NGVD, while targeting 1,187.4 feet NGVD. NSPW does not operate the Project between the low and high elevation on a daily basis for peaking purposes. A minimum flow of 8 cfs or inflow, whichever is less, is also released into the bypass reach of the Namekagon River at all times.

Since no material changes to Project operations are being proposed, its continued operation is not expected to cause any adverse impacts to land use.[27]

4.9.3 Hayward Project Proposed Environmental Measures

No environmental measures for land use have been proposed in this application.

4.9.4 Hayward Project Unavoidable Adverse Impacts

The proposed Project operation is not expected to cause unavoidable adverse impacts to land use.

4.10 Hayward Project Aesthetic Resources

4.10.1 Hayward Project Affected Environment

The Hayward Dam impounds the Namekagon River creating Lake Hayward. The Project has been operating in its current configuration since 1928 when the original powerhouse in the middle embankment was abandoned and a new powerhouse was built. From its original construction to the present, the Project has become a part of the local environment and an integral part of the viewshed as the City of Hayward developed around the Project reservoir. The Hayward Dam and powerhouse are shown in **Figure 4.10.1-1** and **Figure 4.10.1-2**. The Project reservoir is shown in **Figure 4.10.1-3**. The Namekagon River downstream of the Project is shown in **Figure 4.10.1-4**.

[27] The planned deviations for ice removal purposes are not expected to cause adverse effects to land use due to their short duration and timing during high flow periods, which coincides with the natural hydrologic cycle. Therefore, the planned deviation is not considered a material change regarding impacts to the land use resource.

Figure 4.10.1-1 View of the Hayward Dam Spillway looking upstream from bypass reach.

Figure 4.10.1-2 Hayward Dam and powerhouse from the East Bank (looking west)

Figure 4.10.1-3 View of Lake Hayward looking upstream from the dam

Figure 4.10.1-4 View of the Namekagon River downstream of the canoe portage put-in and Hayward Dam

4.10.2 Hayward Project Environmental Effects

Lake Hayward provides for an aesthetically pleasing urban setting which is not expected to be adversely impacted by continued operation of the Project.

4.10.3 Hayward Project Proposed Environmental Measures

NSPW will continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resource values. At all times, NSPW will act to minimize the fluctuation of the Project reservoir and maintain the elevation between 1,187.0 and 1,187.5 feet NGVD, while targeting 1,187.4 feet NGVD. NSPW does not operate the Project between the low and high elevation on a daily basis for peaking purposes. A minimum flow of 8 cfs or inflow, whichever is less, is also released into the bypass reach of the Namekagon River at all times.

No other environmental measures for aesthetics have been proposed.

4.10.4 Hayward Project Unavoidable Adverse Impacts

With the implementation of the mitigation measures described in this section, the continued operation of the Project will not result in unavoidable adverse impacts to aesthetics.

4.11 Hayward Project Cultural Resources

Section 106 of the NHPA directs federal agencies to consider the effects of their undertakings on historic properties within the APE and to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment. The regulations implementing Section 106 define "historic properties" as any pre-contact or historic period district, site, building, structure, or individual object included in or eligible for inclusion in the NRHP. This term includes artifacts, records, and remains related to and located within historic properties, as well as Traditional Cultural Properties that meet the NRHP criteria.

To meet the interests and requirements of all consulting parties, NSPW identified historic and archaeological properties within the Project's APE in accordance with Section 106 of the NHPA and 36 CFR 800 - Protection of Historic Properties. In Wisconsin, the specific monitoring requirements are outlined in the December 30, 1993, Programmatic Agreement (Section 1.3.4).

The Programmatic Agreement defines the APE as:

- Lands enclosed by the Project boundary as delineated in the existing license.
- Attached or associated buildings and structures extending beyond the Project boundary which contribute to the NRHP eligibility of the hydroelectric generating facility.
- Lands or properties outside the Project boundary where the Project may cause changes in the character or use of historic properties, if any historic properties exist.

The Cultural Resources Study is composed of two efforts, an Architecture/History Investigation and Archaeological Shoreline Monitoring.

4.11.1 Hayward Project Affected Environment

4.11.1.1 Area of Potential Effect

The APE for the Project as defined in the Programmatic Agreement is coincident with the proposed Project boundary. More specifically, the APE encompasses land up to 1,187.5 feet NGVD as well as the lands immediately surrounding the Hayward Dam and its appurtenant facilities. The Project boundary is depicted in Exhibit G of this application.

4.11.1.2 Cultural Historical Properties

Per the requirements of the Programmatic Agreement, in 2022, an investigation of the Project's historical properties was conducted. A review of the Architectural and Historic Inventory revealed two historic structures within the Project boundary. The first structure, the Hayward Dam, was evaluated for eligibility for the NRHP and determined ineligible for listing (WI Historical Society, n.d.). The second structure, the Hayward Water Works, is a historic building near the banks of the Project reservoir. This structure, however, is located above the maximum reservoir elevation of 1,187.5 feet NGVD and is therefore outside the Project boundary. Thus, no further investigation of this structure was completed.

4.11.1.3 Archaeological Properties

Per the requirements of the Programmatic Agreement, in 2022, an investigation of archaeological properties was conducted The literature review identified three archaeological sites and one unverified

burial site mapped adjacent to the Project boundary. A Cultural Resources Study, which supplemented the literature review, involved a survey of the entire shoreline by boat to look for areas of erosion where artifacts may be exposed. The shoreline survey also included an inspection of the seven previously identified sites whose boundaries overlapped or were mapped close to the shoreline. For the previously mapped areas, a boat was used to access the site and then an inspection was conducted on foot. The field survey did not identify any erosion or archaeological properties impacted by Project operations. The Cultural Resource Study Report is found in **Appendix E-7**.

4.11.1.4 Historic Properties Management Plan

A Historic Properties Management Plan (HPMP) is a compliance and management plan that integrates the entirety of federal and state cultural resources program requirements with ongoing practices, such as water level changes, allowing for the identification of potential compliance and preservation actions that may occur over the course of the upcoming license period. The intent is to ensure historic properties, as defined under federal law and which may be affected by Project operation, are appropriately managed for future generations. The HPMP is designed to comply with the requirements of applicable federal and state laws and regulations, including the NHPA, Native American Graves Protection and Repatriation Act of 1990, Archaeological Resources Protection Act of 1979, the Commission guidelines for development of the HPMP, and the Programmatic Agreement.

Per the requirements of the Programmatic Agreement, an HPMP will be developed in consultation with the Wisconsin SHPO and interested Native American Nations. The plan will be developed within one year of license issuance.

4.11.2 Hayward Project Environmental Effects

4.11.2.1 Effects of Project Operation on Historic and Archaeological Resources

The Cultural Resource Study Report noted that no areas of erosion were identified during the survey and that little erosion is expected in the future due to the run-of-river operations and lack of erosion documented in previous surveys. The archaeologist recommended future shoreline monitoring follow the schedule outlined in the current HRMP of every 10 years.

The Cultural Resource Study findings and recommendations were provided to the Wisconsin SHPO for review and comment. On March 28, 2023, the Wisconsin SHPO concurred with the Cultural Resources Report findings (Howe, Tyler, 2023a). Current Project operations are not having an adverse effect on cultural resources.

4.11.3 Hayward Project Proposed Environmental Measures

Per the requirements of the Programmatic Agreement, NSPW proposes to develop an HPMP in consultation with the Wisconsin SHPO and interested Native American Nations within one year of license issuance. The HPMP will include a requirement to revisit previously mapped archaeological sites and monitor the entire shoreline for the occurrence of any substantial shoreline erosion not previously documented within 10 years of license issuance. The HPMP will also include measures to protect, mitigate,

or enhance cultural, historical, and archaeological resources such that the continued operation of the Project does not adversely impact properties currently identified and properties that may be identified in the future.

The proposed environmental measure is a significant advancement for cultural resources when compared to the alternative of no-action or denial of the license application. Without the issuance of a subsequent license for the Project, the development of a new HPMP will not occur.

4.11.4 Hayward Project Unavoidable Adverse Impacts

The proposed operation of the Project is not anticipated to result in unavoidable adverse impacts to cultural resources with the implementation of the proposed environmental measures described in this section.

4.12 Hayward Project Socioeconomic Resources

4.12.1 Hayward Project Affected Environment

4.12.1.1 Population Size and Density

The Hayward Project is located partly within the City of Hayward and partly within the Town of Hayward. Data from the 2020 census indicated the population of the City of Hayward was 2,533, which is an increase of 1.9% from the 2010 census. The 2020 population of the Town of Hayward was 3,785, which is an increase of 9.3% over the 2010 census (WI Department of Administration, n.d.a).

The 2020 population of Sawyer County was 18,074, which is an increase of 9.2% from the 2010 census. This results in an average population density of 14.4 persons per square mile. From 2016 to 2020, there were an estimated 7,932 households in Sawyer County with an average of 2.21 persons per household (WI Department of Adminsitration, n.d.b).

Table 4.12.1.1-1 depicts the City of Hayward, Town of Hayward, and Sawyer County population changes between 1980 and 2020. During that time, the City of Hayward's population increased by 49.2%, Town of Hayward's increased by 61.5%, and Sawyer County's increased by 40.7%.

Table 4.12.1.1-1 City of Hayward, Town of Hayward, and Sawyer County Historic Populations

Municipality	1980	1990	2000	2010	2020
City of Hayward	1,698	1,897	2,129	2,318	2,533
Town of Hayward	2,331	3,024	3,279	3,567	3,765
Sawyer County	12,843	14,181	16,196	16,557	18,074

Source: (WI Department of Administration, n.d.a) (WI Department of Adminsitration, n.d.b)

Population projections from the Demographic Services Center of the Wisconsin Department of Administration for the City of Hayward, Town of Hayward, and Sawyer County from 2020 to 2040 are shown in **Table 4.12.1.1-2**.

Table 4.12.1.1-2 City of Hayward, Town of Hayward, and Sawyer County Population Projections

Municipality	Population				
	2020 Census	2025	2030	2035	2040
City of Hayward	2,533	2,600	2,690	2,710	2,680
Town of Hayward	3,765	3,805	3,895	3,880	3,790
Sawyer County	18,074	17,645	18,010	17,895	17,430

Source: (WI Department of Administration, 2013a) (WI Department of Administration, 2013b)

4.12.1.2 Labor Force and Employment

The largest employment sectors for the City of Hayward are shown in **Table 4.12.1.2-1** and include the following in order of prevalence: educational services, health care and social assistance; manufacturing; arts, entertainment, recreation, accommodation, and food services; and retail trade.

Table 4.12.1.2-1 Employment Status, City of Hayward

Industry	Estimate	% Jobs*
Civilian employed population 16 years and over	1,221	-
Agriculture, forestry, fishing, hunting, and mining	70	5.7
Construction	46	3.8
Manufacturing	242	19.8
Wholesale trade	26	2.1
Retail trade	173	14.2
Transportation, warehousing, and utilities	35	2.9
Information	0	0
Finance and insurance, real estate, rental, and leasing	31	2.5
Professional, scientific, and management; administrative; and waste management services	31	2.5
Educational services, health care, and social assistance	265	21.7
Arts, entertainment, recreation, accommodation, and food services	184	15.1
Other services, except public administration	63	5.2
Public administration	55	4.5

**Does not add to 100% due to rounding; Source:* (US Census Bureau, 2020a)

The largest employment sectors for Sawyer County, as shown in **Table 4.12.1.2-2**, include the following in order of prevalence: educational services, health care, and social assistance; arts, entertainment, recreation, accommodation, and food services; manufacturing; and retail trade.

Table 4.12.1.2-2 Employment Status, Sawyer County

Industry	Estimate	% Jobs*
Civilian employed population 16 years and over	7,428	-
Agriculture, forestry, fishing, hunting, and mining	277	3.7
Construction	544	7.3
Manufacturing	984	13.2

Industry	Estimate	% Jobs*
Wholesale trade	156	2.1
Retail trade	898	12.1
Transportation, warehousing, and utilities	434	5.8
Information	95	1.3
Finance and insurance, real estate, rental, and leasing	304	4.1
Professional, scientific, and management; administrative; and waste management services	417	5.6
Educational services, health care, and social assistance	1,640	22.1
Arts, entertainment, recreation, accommodation, and food services	1,079	14.5
Other services, except public administration	261	3.5
Public administration	339	4.6

**Does not add to 100% due to rounding; Source:* (US Census Bureau, 2020a)

4.12.2 Hayward Project Environmental Effects

The Project has a beneficial effect upon the socioeconomic resources in its vicinity by providing outdoor recreational opportunities which contribute to the local economy.

4.12.3 Hayward Project Proposed Environmental Measures

NSPW is not proposing any new measures related to socioeconomic resources.

The proposed environmental measures for recreation discussed herein are an improvement for recreation, and consequently socioeconomic resources in vicinity of the Project, when compared to the alternative of no-action or denial of the license application. Without the issuance of a subsequent license for the Project, the recreation and resulting socioeconomic resource enhancements would not occur.

4.12.4 Hayward Project Unavoidable Adverse Impacts

The Project's proposed operation will not result in unavoidable adverse impacts to socioeconomic resources.

4.13 Hayward Project Environmental Justice

4.13.1 Hayward Project Affected Environment

Environmental Justice (EJ) communities are those composed of a substantial proportion of people of minority heritage or a substantial proportion of people living below the poverty level. The following sections provide information on EJ communities within the geographic scope of the proposed Project boundary, which includes areas within the City of Hayward and Town of Hayward in Sawyer County, Wisconsin.[28]

[28] The area within one mile of the both the current and proposed Project boundaries is known as the geographic scope in regard to EJ communities.

4.13.1.1 Race, Ethnicity and Low-Income Data

The US Census Bureau's 2020 five-year estimates were reviewed for race, ethnicity, and low-income data within the geographic scope of the Project. The state, county, census block group, and census tract data are summarized in **Table 4.13.1.1-1**.

Table 4.13.1.1-1 Environmental Justice Community Information for the Hayward Project

Data within the Project Geographic Scope										
RACE AND ETHNICITY										LOW INCOME
Total Population (count)	White Alone Not Hispanic (count)	African American (count)	Native American/ Alaska Native (count)	Asian (count)	Native Hawaiian & Other Pacific Islander (count)	Some Other Race (count)	Two or More Races (count)	Hispanic or Latino (count)	Total Minority (%)	Households Below Poverty Level (%)
State of Wisconsin										
5,806,975	4,681,072	360,526	43,830	162,010	2,174	14,407	134,689	408,267	19.4	10.7
Sawyer County										
16,477	12,652	66	2,668	90	5	2	539	455	23.2	14.8
Block Group 1, Census Tract 1003										
1,758	1,664	0	39	0	0	0	23	32	5.3	5.2
Block Group 2, Census Tract 1003										
1,707	1,477	0	21	38	0	0	162	9	13.5	11.1
Block Group 3, Census Tract 1003										
1,277	923	6	262	0	0	0	23	63	**27.7**	**33.4**
Block Group 3, Census Tract 1005.2										
750	736	0	14	0	0	0	0	0	1.9	7.6

Source: (US Census Bureau, 2020b) (US Census Bureau, 2020c)

4.13.1.2 Environmental Justice Communities

NSPW evaluated the census block groups and tracts within the Project's geographic scope to determine if any EJ communities were present. Three evaluation methods were used to make this determination; the 50% analysis method, meaningful greater analysis method, and low-income threshold method.

To qualify as an EJ community under the 50% analysis method, the percentage of the minority population must exceed 50% of the total population.

To qualify as an EJ community under the meaningful greater analysis method, the block group minority population must exceed 25.2%.[29]

[29] Meaningful greater analysis method: Sawyer County minority population of 23.2% X 1.1 = 25.5%.

To qualify as an EJ community under the low-income threshold method, the percent of the population below the poverty level must equal or exceed the poverty level in Sawyer County of 14.8%.

The three analysis methods identified one EJ community within the Project's geographic scope as indicated with a "Yes" in **Table 4.13.1.2-1**.

Table 4.13.1.2-1 Environmental Justice Communities within the Geographic Scope of the Hayward Project

Block Group and Census Tract Number	50% Analysis Method (Yes/No)	Meaningful Analysis Method (Yes/No)	Low Income Threshold Method (Yes/No)
Block Group 1, Tract 1003	No	No	No
Block Group 1, Tract 1003	No	No	No
Block Group 3, Tract 1003	No	**Yes**	**Yes**
Block Group 3, Tract 1005.2	No	No	No

A map depicting the Project boundary in relation to all identified EJ communities within the Project's geographic scope is shown in **Figure 4.13.1.2-1**. The map also identifies all sensitive receptor locations, including childcare centers, fire departments, hospitals, nursing homes, police stations, and schools located within the same geographic scope. Detailed information regarding each of the sensitive receptor locations within the Hayward Project's geographic scope is provided in **Table 4.13.1.2-2**.

Figure 4.13.1.2-1 Sensitive Receptor Locations for the Hayward Project

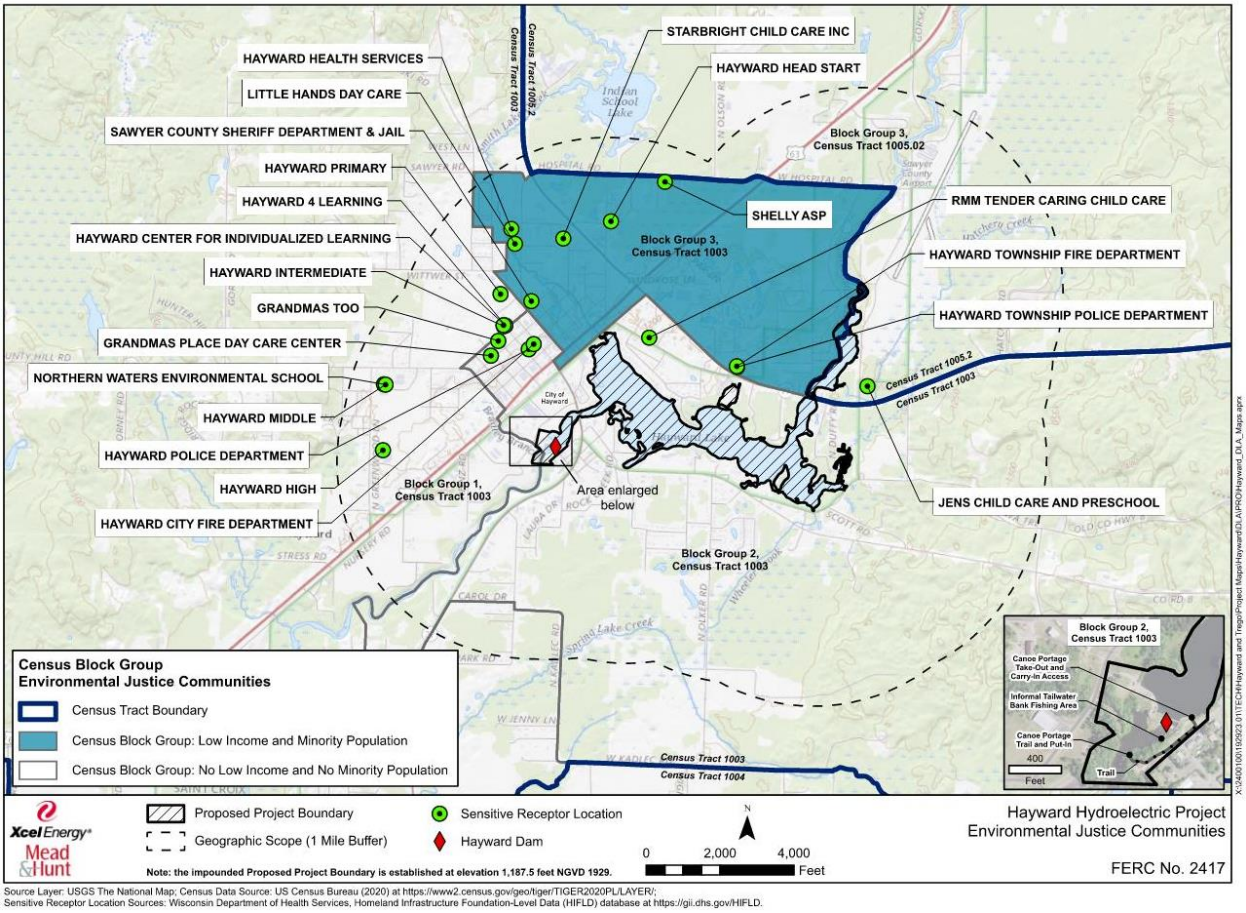


Table 4.13.1.2-2 Sensitive Receptor Locations within the Geographic Scope of the Hayward Project

Name	Type	Distance from Current Project Boundary	Project Related Effects	Mitigation Measures to Minimize Project-Related Impacts
Hayward Health Services	Adult Care	0.71 miles	None	None
Grandma's Place Day Care Center	Child Care	0.51 miles	None	None
Grandma's Too	Child Care	0.47 miles	None	None
Hayward Head Start	Child Care	0.57 miles	None	None
Jen's Child Care	Child Care	0.12 miles	None	None
Little Hands Day Care	Child Care	0.64 miles	None	None
RHM Tender Caring Child Care	Child Care	0.16 miles	None	None
Shelly Asp	Child Care	0.79 miles	None	None
Starbright Child Care, Inc.	Child Care	0.53 miles	None	None
Hayward City Fire Dept.	Fire Department	0.29 miles	None	None
Hayward Township Fire Dept	Fire Department	0.09 miles	None	None
Hayward Police Department	Law Enforcement	0.31 miles	None	None
Hayward Township Police Dept.	Law Enforcement	0.09 miles	None	None
Sawyer County Sheriff's Dept. & Jail	Law Enforcement	0.39 miles	None	None
Hayward 4 Learning	School	0.45 miles	None	None
Hayward Center for Individualized Learning	School	0.46 miles	None	None
Hayward High School	School	0.77 miles	None	None
Hayward Intermediate School	School	0.46 miles	None	None
Hayward Middle School	School	0.82 miles	None	None
Hayward Primary School	School	0.54 miles	None	None
Northern Waters Environmental School	School	0.83 miles	None	None

4.13.1.3 Project Related Impacts to EJ Communities and Sensitive Receptor Locations

NSPW does not believe there are any adverse impacts on any EJ communities or sensitive receptor locations due to the current operation of the Hayward Project. Under the proposed operation, NSPW will operate the Project according to the following parameters:

- Operate in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resource values.
- Maintain a minimum flow of 8 cfs or inflow, whichever is less, into the bypass reach at all times.
- Operate the Project to minimize the fluctuation of the Project reservoir and maintain the elevation between 1,187.0 and 1,187.5 feet NGVD, while targeting 1,187.4 feet NGVD.

NSPW is not proposing any construction as part of this application. Since there are no material operational changes or construction-related impacts, no adverse impacts to EJ communities or sensitive receptor locations are anticipated from the proposed operation of the Project.[30] Several recreational enhancements have been proposed and are expected to have an overall positive impact on recreation.

The proposed environmental measures are an advancement for recreation resources, and consequently EJ communities in the Project vicinity, when compared to the alternative of no-action or denial of the license application. Without the issuance of a subsequent license for the Project, the EJ community improvements would not occur.

4.13.1.4 Public Outreach

NSPW conducted numerous public outreach activities as outlined in Section 1.4. In order to determine if additional outreach was needed for non-English speaking communities, NSPW reviewed the 2020 American Community Survey Table S1601 Language Spoken At Home data. This review indicated 99.4% of the population of Sawyer County speaks English only or speaks English "very well" (US Census Bureau, 2020d). Based on this data, language does not appear to be a major barrier in the Project vicinity. Therefore, no mitigation measures for non-English-speaking communities or EJ communities have been proposed in this application. Information regarding languages spoken in the Project vicinity is shown in **Table 4.13.1.4-1**.

Table 4.13.1.4-1 Languages Spoken in the Vicinity of the Hayward Project

Location	Speak Only English (%)	Speak English only or Speak English "Very Well" (%)	Speak Language Other Than English (%)	Other Languages Spoken (%)			
				Spanish	Asian and Pacific Islander	Indo-European	Other Languages
Sawyer County	95.5	99.4	4.5	1.4	0.2	1.0	1.9

Source: (US Census Bureau, 2020d)

4.13.2 Hayward Project Environmental Effects

Based upon NSPW's review of EJ communities and sensitive receptor locations within the geographic scope of the Project, no adverse impacts to EJ communities have been identified.

4.13.3 Hayward Project Proposed Environmental Measures

NSPW is not proposing any new environmental measures regarding EJ communities in the vicinity of the Project.

4.13.4 Hayward Project Unavoidable Adverse Impacts

The proposed Project operation is not expected to result in unavoidable adverse impacts to EJ communities.

[30] The planned deviations for ice removal purposes are not expected to cause adverse effects to EJ communities due to their short duration and timing during high flow periods, which matches the natural hydrologic cycle. Therefore, the planned deviation is not considered a material change regarding impacts to the EJ community.

4.14 Hayward Project Tribal Resources

4.14.1 Hayward Project Affected Environment

There are 11 federally recognized tribes in Wisconsin. Those tribes include: Forest County Potawatomi, Ho-Chunk Nation, Menominee Indian Tribe of Wisconsin, Oneida Nation of Wisconsin, Stockbridge-Munsee Band of Mohican Indians, and six Ojibwe (Chippewa) tribes. The Ojibwe tribes include the Bad River Band of Lake Superior Chippewa, Lac Courte Oreilles Band of Lake Superior Chippewa, Lac du Flambeau Band of Lake Superior Chippewa, Red Cliff Band of Lake Superior Chippewa, St. Croix Band of Chippewa Indians of Wisconsin, and Sokaogon Chippewa (Mole Lake) Community (WI Department of Public Instruction, n.d.). There are no Tribal lands located within the Project boundary.

The Commission initiated Tribal consultation for the Hayward Project via letter on July 22, 2020, and again by telephone and email on September 11, 22, and 28, 2020 (Federal Energy Regulatory Commission, 2020a) (Federal Energy Regulatory Commission, 2020b). The Commission reached out to the Bad River Band of Lake Superior Chippewa, Fond du Lac Band of Lake Superior Chippewa, Fort Belknap Indian Community, Grand Portage Band of Chippewa Indians, Keweenaw Bay Indian Community, Lac Courte Oreilles Band of Lake Superior Chippewa Indians, Lac du Flambeau Band of Lake Superior Chippewa Indians, Lac Vieux Desert Band of Lake Superior Chippewa Indians of Michigan, Leech Lake Band of Chippewa Indians, Menominee Indian Tribe of Wisconsin, Miami Tribe of Oklahoma, Mille Lacs Band of Ojibwe, Minnesota Chippewa Tribe, Red Cliff Band of Lake Superior Chippewa Indians, Sokaogon Chippewa Community/Mole Lake Band, St. Croix Chippewa Indians of Wisconsin, and the White Earth Band of Minnesota.

4.14.1.1 Forest County Potawatomi

Potawatomi oral tradition speaks of three brothers, the Ojibwe (kept the faith), Odawa (handled trade), and Bodewadmi (kept the fires lit). Today, the three brothers are known as Ojibwe, Ottawa, and Potawatomi. Within a century of their migration back to the Great Lakes region, the three brothers had evolved into separate but closely aligned nations. The Potawatomi still refer to themselves as the “keepers of the Fire” and arrived in Wisconsin in the mid-17th century from Canada and the western United States. In the early 1800s, the government took away Potawatomi land rights. In 1913, the Forest County Potawatomi bought back approximately 12,000 acres located in northern Wisconsin (Loew, 2001).

4.14.1.2 Ho-Chunk Nation

The Ho-Chunk people, who were driven from Wisconsin to the west, have gradually returned to reclaim their ancestral lands. No treaty lands have been reserved; therefore, present Ho-Chunk lands are tribal lands that have been repurchased. Today, 4,700 members of the Wisconsin Ho-Chunk hold title to 2,000 acres of land in Wisconsin (Loew, 2001).

4.14.1.3 Menominee Indian Tribe of Wisconsin

The Menominee people are believed to have occupied Wisconsin for more than 5,000 years. As Europeans arrived, the Menominee lost most of their lands but maintained a significant presence in the state. Menominee County was created from part of Shawano County in 1959 in anticipation of the Menominee Indian Reservation termination in 1961. Reservation status was restored in 1973. Today,

most land within Menominee County is designated as tribal trust lands by the U.S. Bureau of Indian Affairs; non-tribal regulations do not apply. The Menominee Tribe also holds a small amount of land within the Town of Red Springs, Shawano County (Loew, 2001).

4.14.1.4 Oneida Nation of Wisconsin

The Oneida people were part of the New York Iroquois League prior to the Revolutionary War. In 1822, the Oneida purchased land in a territory that would later become the State of Wisconsin. Much of these lands were taken away by the 1900s; however, 1,270 acres were repurchased in 1937 (Loew, 2001).

4.14.1.5 Stockbridge Munsee Band of Mohican Indians

The Stockbridge-Munsee are a blend of Mohican Tribes from Massachusetts and Delaware who moved west, settling near Lake Winnebago. In 1856, they obtained their present treaty lands from neighboring Menominee Native Americans. Tribal fee lands are owned by the Stockbridge-Munsee and remain subject to non-tribal regulations. As such, lands held in fee title are subject to county zoning and subdivision regulation. The Stockbridge-Munsee population was estimated at 1,527 in 2000, which represents a 163% increase from 1990 (Loew, 2001).

4.14.1.6 Ojibwe (Chippewa) Tribes

The Ojibwe (Chippewa) people originally from the Great Lakes had moved east near the Atlantic Ocean. Over 1,000 years ago, the Tribe returned to the Great Lakes Region, settling amidst fertile wild rice beds. Their final resting stop was Madeline Island in Wisconsin. The Ojibwe had a close relationship with the French, but the effort to convert the Ojibwe people to Christianity divided their belief systems into various bands of Ojibwe who established themselves in other locations.

As the pursuit of furs for trade progressed inland, conflicts with other Tribes, including the Dakotas, culminated with a Treaty assembled by the U.S. Government in 1825. The Treaty forced the Ojibwe to cede their territory to the U.S. under negotiations in 1837 and 1842. The Hayward Project is located within the territory ceded in 1837 (Loew, 2001).

Certain areas within the ceded territory have cultural significance; however, these areas are not publicly documented or recorded. If these areas are expected to be impacted by Project operations, this information will need to be disclosed through consultation with the appropriate Tribal representatives.

4.14.2 Hayward Project Environmental Effects

NSPW is not proposing any material changes to the Project's run-of-river operation, reservoir elevation operating range, or minimum flows.[31] Therefore, the proposed operation of the Project is not expected to have adverse impacts on Tribal resources in the area.

[31] The planned deviations for ice removal purposes are not expected to cause adverse effects to Tribal resources due to their short duration and timing during high flow periods, which matches the natural hydrologic cycle. Therefore, the planned deviation is not considered a material change regarding impacts to the Tribal resources.

4.14.3 Hayward Project Environmental Measures

As noted in Section 4.11.3, NSPW proposes to develop a new HPMP as an environmental measure to protect known cultural resources.[32] The HPMP will include a requirement to inspect previously mapped archaeological sites, and monitor the entire reservoir shoreline for the occurrence of any substantial shoreline erosion not previously documented, within 10 years of license issuance. The HPMP will also include measures to protect, mitigate, or enhance cultural, tribal, historical, and archaeological resources such that the proposed Project operation does not adversely impact properties currently identified and properties that may be identified in the future.

The proposed environmental measures are a significant advancement for cultural and tribal resources when compared to the alternative of no-action or denial of the license application. Without the issuance of a subsequent license for the Project, the development of a new HPMP will not occur.

4.14.4 Hayward Project Unavoidable Adverse Impacts

With the implementation of the proposed environmental measures, the proposed operation of the Project will not result in any unavoidable impacts.

[32] Cultural resources include tribal resources.

5. Trego Project Environmental Analysis

5.1 Trego Project General Description of the River Basin

5.1.1 Namekagon River Basin

The Trego Project is located on the Namekagon River, a small river that originates from Namekagon Lake in southern Bayfield County, Wisconsin. The river flows approximately 100 miles through Bayfield, Sawyer, Washburn, and Burnett Counties before its confluence with the St. Croix River. The Namekagon River is the largest tributary to the St. Croix River and has a rather uniform gradient of 6 to 8 feet per mile (NSPW, 1991a) (NSPW, 1991b). From Lake Namekagon, the Namekagon River flows approximately 33 miles southwest to the Hayward Project and continues flowing southwesterly for another 37 miles to the Trego Project. At the Trego Project, the river begins flowing northwesterly for its final 30 miles before entering the St. Croix River (US Geological Survey, n.d.a).

The entire mainstem of the Namekagon River is included in the Wild and Scenic Rivers System as part of the St. Croix National Scenic Riverway, which was established as a result of the enactment by Congress of the Wild and Scenic Rivers Act in 1968 (National Park Service, n.d.a).

The Namekagon River basin has a drainage area of approximately 1,030 square miles at its mouth. The drainage area extends 206 square miles upstream of the Hayward Dam and 488 square miles upstream of the Trego Dam (Heinrich, E.W. and D.N. Daniel, 1983). The Trego Lake-Middle Namekagon River Watershed, which extends from the Trego Dam upstream to the Hayward Dam, is dominated by forests, wetlands, and grasslands (WI Department of Natural Resources, 2010c).

There are two FERC-licensed hydroelectric dams and three non-power dams on the Namekagon River. The five facilities are listed from upstream to downstream in **Table 5.1.1-1**. A map showing the location of the dams on the Namekagon River is included in **Appendix E-4**. The FERC-regulated dams include the Hayward and Trego Hydroelectric Projects. The remaining three dams do not generate power and are regulated by the State of Wisconsin.

Table 5.1.1-1 Dams on the Namekagon River

Dam Name	Owner	County	National Dam Inventory No.	FERC or State Regulated	FERC No.	Authorized Capacity
Namekagon	Town of Namekagon	Bayfield	WI-00623	State	N/A	N/A
Pac-Wa-Wong	US Dept. of Interior	Sawyer	WI-10489	State	N/A	N/A
Phipps	US Dept. of Interior	Sawyer	WI 10488	State	N/A	N/A
Hayward	NSPW	Sawyer	WI-00795	FERC	P-2417	168 kW
Trego	NSPW	Washburn	WI-00812	FERC	P-2711	1,200 kW

5.1.2 Trego Project Major Land Uses

While the area was historically used for timber production, current land use within the Namekagon River basin is primarily devoted to forest management, wildlife habitat, outdoor recreation, and rural residential properties. A more detailed description of current land use in the Project vicinity is included in Section 5.9.

5.1.3 Trego Project Major Water Uses

Water from the Trego Project serves multiple purposes including hydropower generation, public recreation, and fish and wildlife habitat. A more detailed description of water use in the Project vicinity is included in Section 5.4.

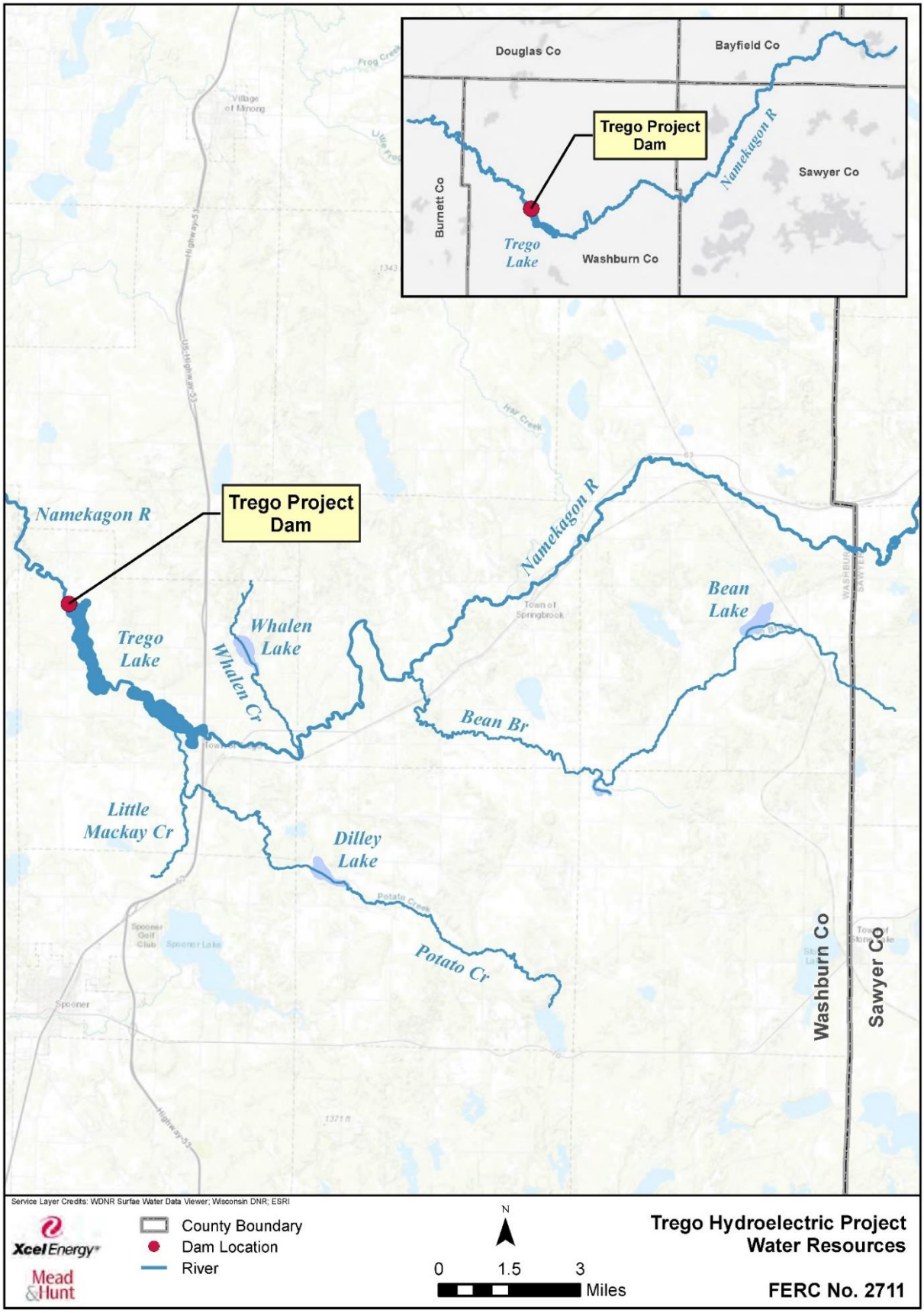
5.1.4 Trego Project Flow Management

The Trego Project is operated in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. The reservoir is maintained at a target elevation of 1,034.9 feet NGVD, with fluctuations limited to 0.3 feet around the target elevation (i.e., between 1,034.6 and 1,035.2 feet NGVD) (NSPW, 1991a).

5.1.5 Trego Project Tributary Streams

Tributaries in the vicinity of the Trego Lake include Bean Brook, Little Mackay Creek, Potato Creek, and Whalen Creek as shown in **Figure 5.1.5-1**.

Figure 5.1.5-1 Trego Project Water Resources



5.1.6 Trego Project Climate

The Trego Project is located in the Northwest Sands Ecological Landscape in Washburn County. This ecological landscape has a continental climate with cold winters and warm summers, similar to other northern ecological landscapes. The northern ecological landscapes in Wisconsin tend to have shorter growing seasons, cooler summers, colder winters, and less precipitation than the ecological landscapes located father south in the state (WI Department of Natural Resources, 2015a).

Climate information for the Trego Project is based on data collected in the City of Spooner, located approximately 8 miles south of the Project. The average monthly minimum temperatures range from 1°F in January to 58°F in July. The average monthly maximum temperatures range from 21°F in January to 80°F in July. The overall monthly average temperatures range from 11°F in January to 69°F in July. The average annual precipitation is 31 inches, with approximately 63% of the precipitation falling during the growing season from May through September. The area receives an average of 51 inches of snow each year (US Climate Data, n.d.b).

5.2 Trego Project Cumulative Effects

The Council on Environmental Quality's regulations for implementing the NEPA (40 CFR § 1508.7), define a cumulative effect as an impact on the environment resulting from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over time, including hydropower and other land and water development activities. NSPW has not identified any cumulatively affected resources. Therefore, no further discussion regarding cumulative effects is included in this DLA.

5.3 Trego Project Geology and Soils

5.3.1 Trego Project Affected Environment

5.3.1.1 Topography

The topography surrounding the Trego Project varies in elevation by approximately 196 feet. The highest land surface elevation of about 1,200 feet descends to the Namekagon River surface elevation of approximately 1,004 feet downstream of the powerhouse (US Geological Survey, n.d.a) (NSPW, 2017). A topographic map of the Trego Project vicinity is included in **Appendix E-5**.

5.3.1.2 Geology

Surficial geology near the Trego Project is primarily glacial in origin, ranging from flat outwash plains to knob and kettle end moraine, which include stratified sands and gravels that vary in thickness from about 50 to 150 feet. Depth to bedrock is generally about 100 feet in the area of the Trego Dam, although it may be less in the river valley. Bedrock is Cambrian sandstone with limited areas of Precambrian crystalline igneous and metamorphic rocks or lava flows, which are mostly basalt. The Project structures are founded on a layer of hardpan located approximately 8 feet below the river bottom. The hardpan is approximately 15 feet thick and is underlain by sand and gravel (NSPW, 2017). The foundations and footings of the spillway and powerhouse structures were constructed to terminate in the hardpan layer (NSPW, 1991a).

5.3.1.3 Soils

There are 16 soil types found throughout the vicinity of the Trego Project which are grouped into eight major soil associations with distinct soil patterns, relief, and drainage factors (Natural Resources Conservation Service, n.d.b). A custom soils report and map for the general Project vicinity is included in **Appendix E-31**.

The most prevalent soil series identified in the Project vicinity include Menahga sands (43.7%), Mahtomedi loamy sands (14.9%), and Graycalm-Menahga complex soils (4.2%) (Natural Resources Conservation Service, n.d.b). Soil characteristics for each soil series are shown in **Table 5.3.1.3-1**.

Table 5.3.1.3-1 Prevalent Soil Characteristics in the Trego Project Vicinity

Soil Series	Drainage Classification	Formation	Water Transmittal Capacity	Runoff Class
Menahga Sand	Excessively drained	Outwash plains	High to Very High	Very Low
Mahtomedi Loamy Sand	Excessively drained	Outwash plains and stream terraces	High to Very High	Very Low
Graycalm-Menahga Complex	Excessively to somewhat excessively drained	Outwash plains	High to Very High	Low

Source: (Natural Resources Conservation Service, n.d.b)

The NRCS uses a computer software model called RUSLE 2 to estimate soil loss from erosion caused by rainfall on cropland. Several factors are viewed in RUSLE 2 to estimate soil erosion based on the soil type's inherent erodibility. Those factors include hydrologic group, T factor, Kf factor, and soil texture.

The hydrologic group for each soil type is based upon runoff potential for saturated and bare soils and range from Group A to Group D, with Group A having the lowest runoff potential and Group D having the highest. The T factor is an estimate of the maximum average rate of soil erosion in tons per acre that can occur without affecting crop productivity over a sustained period. T factor values range from 1 to 5 tons per acre, with higher values being less subject to damage from erosion. The T factor also relates to the ability of the soil to revegetate once it has been disturbed. The Kf factor gives an indication of how susceptible a soil type is to sheet and rill erosion. Kf factor values range from 0.02 to 0.69, with 0.69 having the highest susceptibility to erosion (Natural Resources Conservation Service, 2001).

NRCS also provides representative values of the amounts of sand, silt, and clay to describe the representative soil texture in each soil type (Natural Resources Conservation Service, 2001).

A summary of the RUSLE 2 related attributes for the three most prevalent soil series in the Project vicinity is shown in **Table 5.3.1.3-2**.

Table 5.3.1.3-2 RUSLE 2 Related Attributes for the Four Most Prevalent Soil Series in the Trego Project Vicinity

Soil name	Percent of Project Vicinity	Hydrologic Group	Kf Factor	T Factor	Soil Texture Representative Values (%)		
					Sand	Silt	Clay
Menahga sand							
0 to 6 % slopes	18.5	A	0.02	5.0	94.6	1.4	4.0
6 to 12% slopes	20.6	A	0.02	5.0	94.6	1.4	4.0
12 to 30% slopes	4.6	A	0.02	5.0	94.6	1.4	4.0
Mahtomedi loamy sand							
0 to 6% slopes	7.3	A	0.1	5.0	82.5	9.0	8.5
6 to 12% slopes	7.0	A	0.1	5.0	82.5	9.0	8.5
12 to 30% slopes	0.6	A	0.1	5.0	82.5	9.0	8.5
Graycalm-Menahga complex							
0 to 6% slopes	1.5	A	0.02-0.2	5.0	77.7-94.6	1.4-16.3	4.0-6.0
6 to 12% slopes	2.1	A	0.02-0.2	5.0	77.7-94.6	1.4-16.3	4.0-6.0
12 to 30% slopes	0.6	A	0.02-0.2	5.0	77.7-94.6	1.4-16.3	4.0-6.0

Source: (Natural Resources Conservation Service, n.d.b)

5.3.1.4 Reservoir Shoreline

Trego Lake is a narrow body of water with a maximum width of 0.35-miles. The Project is operated in a run-of-river mode with a target reservoir elevation of 1,034.9 feet NGVD with fluctuations limited to 0.3 feet around the target elevation (i.e., between 1,034.6 and 1,035.2 feet NGVD) (NSPW, 1991a). These factors minimize the likelihood of active bank erosion from wind or wave action. The shoreline surrounding the Trego Lake is steeply sloped and rises 5 to 35 feet above the water surface (US Geological Survey, n.d.a). Approximately 30% of the shoreline is developed as permanent or seasonal residential properties. NSPW owns the shoreline area in the immediate vicinity of the Trego dam. The Trego Lake shoreline was surveyed for erosion in 1998 and 2003 in conjunction with archaeological monitoring. These surveys concluded that the reservoir shoreline was very stable and well vegetated with little or no erosion (AVD Archaeological Services, Inc., 1998) (AVD Archaeological Services, Inc., 2003).

NSPW conducted another shoreline erosion survey in 2022 as part of the relicensing process for the Trego Project. Previously identified archaeological sites were inspected during the survey along with surveying for actively eroding sites. The survey was conducted on August 17, 2022, and involved an inspection of the entire shoreline for erosion. The survey was conducted via boat which moved slowly along the reservoir in close proximity to the shoreline. No overall areas of erosion were identified during the survey.

Representative photographs of the Trego Lake shoreline are included in the monitoring report (**Appendix E-32**). The archaeologist who conducted the study noted that, “Since the Trego Project is operated as run-of-river, little erosion is expected in the future and none has been reported by any of the previous surveys. Some of the shoreline is comprised of residential lots and no areas of riprap or manmade stabilization were noted, attesting to the overall natural stability of the reservoir.” The archaeologist recommended any “follow-up monitoring should follow the schedule outlined in any future HRMP” (TRC, 2023b).

5.3.1.5 Sedimentation

Sediment accumulation in the upper portion of the Project reservoir (upper reservoir) has been an ongoing concern at the Project.

5.3.1.5.1 WDNR Sediment Study

The WDNR conducted a study in 1989 in response to requests from the Trego Lake District (TLD) and state senator Robert Jauch. The WDNR evaluated the nature of sedimentation on the Trego reservoir, sources of sediment reaching the reservoir, and sediment management alternatives. This study included three components, which were the collection of nine in-lake sediment samples to characterize the sediment accumulated in the lake, 45 depth transects to define the flowage volume, and two ground penetrating radar transects to describe the accumulated sediment.

The WDNR study report indicated that the Namekagon River carries very low quantities of sediment compared to other similar sized river systems in Wisconsin. The study report referenced a USGS survey conducted in the Namekagon River above the flowage between 1978 and 1983 showed suspended sediment concentrations averaging 4 mg/L compared to the average sediment concentration of 157 mg/L in river systems in Wisconsin (WI Department of Natural Resources, 1989). The study report also indicated that the Namekagon River upstream of the reservoir is undergoing a natural transition from a meandering river system to a braided river system, which results in the undercutting of banks, slumping of unsupported banks, and subsequent transporting of the eroded material downstream. When the transported sediment reaches the upper reservoir where the reservoir/river flows are slower, heavier sand sized particles are dropped out of suspension and deposited in the inlet area (WI Department of Natural Resources, 1989). The same process takes place where rivers enter natural lakes.

The study estimated an average of 2,000 cubic yards of sediment accumulated annually between 1927 and 1988 in the upper reservoir. The WDNR noted that this infill rate, when compared to rates observed in other impoundments in Wisconsin, is extremely low. The study also showed that while sedimentation had taken place since the reservoir was created, water depths in two transects increased and the remaining transects were relatively unchanged between 1978 and 1988. The lake volume cross-sections were calculated to be the same in both 1978 and 1988 (WI Department of Natural Resources, 1989).

The study report was obtained from the TLD website and is included in **Appendix E-33**. The version of the study report obtained from the website does not include all the maps and figures from the full WNDR study report. NSPW requested a copy of the full report from the WDNR on May 17, 2021. WDNR responded on June 7, 2021 indicating that the report was not uploaded to their online database and is no longer available.

5.3.1.5.2 ATIS Study Bathymetry and Bed Substrate Information

NSPW conducted an ATIS study that included the development of a bathymetric map for the Trego Project reservoir and collection of detailed substrate information. The bathymetric map and substrate information are provided in the ATIS Study Report as Figure 24 and Figure 25, respectively (**Appendix E-3**). The bathymetric map in the ATIS Study Report was created using five-foot contours, which did not provide sufficient information regarding sediment deposition within the upper reservoir. Therefore, NSPW's consultant, Mead & Hunt, utilized the depth data collected during the ATIS Study to create detailed bathymetric map of the upper reservoir with one-foot contours. The map is included in **Appendix E-2**.

5.3.2 Trego Project Environmental Effects

5.3.2.1 Erosion

NSPW proposes to continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. NSPW also proposes to continue to maintain a reservoir target elevation of 1,034.9 feet NGVD, with fluctuations limited to 0.3 feet around the target elevation (i.e., between 1,034.6 and 1,035.2 feet NGVD) (Section 3.2.2.1).

The run-of-river operation, when combined with local shoreland zoning regulations and existing vegetated buffers (emergent aquatic vegetation and terrestrial shoreline vegetation), helps protect the Project's shoreline from widespread erosion. While no active erosion sites were noted during the 2022 surveys, continued periodic monitoring of the shoreline, as a proposed mitigation measure described below, will help NSPW to identify and address any new erosion sites before they have an opportunity to cause adverse environmental impacts.

5.3.2.2 Sedimentation

As noted in the WDNR's 1989 study report, sedimentation occurring in the upper reaches of Trego Lake originates upstream in the Namekagon River. Suspended sediment is naturally deposited when river gradients and velocities decrease when entering the Project reservoir. This is a natural process that also takes place when rivers enter natural lakes. Since the sedimentation in the upper reservoir is caused by natural processes beyond the control of NSPW, it will not be impacted or exacerbated by continued operation of the Project.

The effects of aquatic plant growth on navigation in the upper reservoir are discussed in Section 5.5.2.1.1.

5.3.3 Trego Project Proposed Environmental Measures

NSPW is proposing to conduct an erosion survey of the Project's shoreline, including the tailwater area, every 10 years over the term of the new license. The survey will include an inspection of all shorelines within the Project boundary for newly identified eroding sites, a review of the status of previously identified sites, and a report to be submitted to the FERC, NPS, and WDNR. The report will provide a recommendation on whether mitigation of any erosion sites located on NSPW-owned lands are warranted.

The proposed mitigation measures will benefit the environmental resources at the Project when compared to the alternative of no-action or denial of the application. Without issuance of a subsequent license for the Project, the resource enhancements discussed would not occur.

5.3.4 Trego Project Unavoidable Adverse Impacts

With the implementation of the proposed environmental measures discussed above, proposed operation of the Project is not expected to adversely affect geology and soil resources.

5.4 Trego Project Water Resources

5.4.1 Trego Project Affected Environment

5.4.1.1 Water Quantity

5.4.1.1.1 Existing Uses of Project Waters

A review of the WDNR's Water Quantity Data Viewer did not identify any state-permitted surface water withdrawals within the Project vicinity (WI Department of Natural Resources, n.d.c).

The Project is currently operated in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. The reservoir is currently operated at a target elevation of 1,034.9 feet NGVD, with fluctuations limited to 0.3 feet around the target elevation (i.e., between 1,034.6 and 1,035.2 feet NGVD). This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resources.

The reservoir encompasses 435.2 acres with a gross storage capacity of 43,250 acre-feet at the maximum reservoir elevation of 1,035.2 feet NGVD (Mead & Hunt, 2023b). A bathymetric map created in conjunction with the ATIS Study is included as Figure 24 of the study report (**Appendix E-3**). A more detailed bathymetric map with one-foot contours of the upper reservoir is found in **Appendix E-2**.

5.4.1.1.2 Proposed Uses of Project Waters

NSPW is not proposing any material changes to Project operations.[33]

5.4.1.1.3 Hydrology and Streamflow

Inflow to Trego Lake comes primarily from the Namekagon River. Other tributaries include Bean Brook, Little Mackay Creek, Potato Creek, and Whalen Creek. The drainage basin for the Project is 488 square miles (US Geological Survey, n.d.b). Mean monthly flows at the Trego Dam, based on streamflow data from 2017 to 2022, are shown in **Table 5.4.1.1.3-1**.

Figure 5.4.1.1.3-1 Mean Monthly Flows at the Trego Project, 2017 to 2022[34]

Month	Mean Monthly Flow (cfs)
January	472
February	448
March	575
April	862
May	798
June	667
July	520
August	474
September	533
October	664
November	562
December	489

Source: (Mead & Hunt, 2023c)

[33] Due to the shore duration of the ice removal event, and its timing during high flow periods, which coincides with the natural hydrologic cycle, the proposed planned deviations for ice removal purposes are not considered a material change in operations.
[34] Flow data provided by NSPW from operational records.

5.4.1.2 Water Quality

5.4.1.2.1 Water Quality Standards

The State of Wisconsin established water quality standards under NR 102 to protect, maintain, and enhance surface waters for a variety of designated uses. The standards set limits for each designated use described below for which water quality cannot be artificially lowered unless a variance has been provided. NR 102 standards are consistent with CWA § 301. A copy of NR 102 was provided in Appendix 4.3.7.1-1 of the PAD.

The Namekagon River in the vicinity of the Trego Project is not classified as trout water and has been designated as Default-FAL.

Fish and Aquatic Life Standards

Fish and aquatic life standards in Wisconsin are as follows:

- pH shall be between 6.0 and 9.0, with no change greater than 0.5 units outside the estimated natural seasonal maximum and minimum.
- Surface water DO shall never be lowered below 5 mg/L.
- Total phosphorus shall be less than 100 µg/L or 0.1 mg/L.
- Water bodies classified as trout waters by WDNR or as Great Lakes or cold-water communities may not be altered from natural background DO levels to such an extent that trout populations are adversely affected. Additionally, all the following conditions shall be met:
    - DO in classified trout streams shall not be artificially lowered to less than 6.0 mg/L at any time, nor shall the DO be lowered to less than 7.0 mg/L during the spawning season.
    - DO in Great Lakes tributaries used by stocked salmonids for spawning runs shall not be lowered below natural background during the period of habitation.

Temperature Standards

Per WDNR's May 7, 2021 comments on the PAD, the Namekagon River in the vicinity of the Project is subject to the "Warm-Large" temperature standard shown in Table 2 of NR 102. Although Trego Lake is an impoundment, it is not subject to the temperature standards for inland lakes and impoundments under Table 4 of NR 102 since it has an estimated residence time of only 11 days. Residence times must exceed 14 days in order for an impoundment to be subject to the inland lake and impoundment temperature standards. A summary of the monthly acute temperature standards applicable to Project waters is shown in **Table 5.4.1.2.1-1**.

Table 5.4.1.2.1-1 Monthly Acute Temperature Standards for Waters Within the Trego Project

Month	NR 102 Table 2 (Warm-Large) Maximum Acute Temperature Standards (°F)
January	76
February	76
March	76
April	79
May	82
June	85
July	86
August	86

Month	NR 102 Table 2 (Warm-Large) Maximum Acute Temperature Standards (°F)
September	84
October	80
November	77
December	76

Recreational Use Standards

NR 102.04(6) states that a recreation use classification requires the geometric mean of bacterial counts of *Escherichia coli* (*E. coli*) to not exceed a most probable number of 200 counts per 100 milliliters (mL), based on five or more water samples per month. Under the WDNR Beach Advisory Program, a beach advisory is issued when the bacterial counts reach an action value of 235 per 100 mL and a beach closure is issued at 1,000 per 100 mL.

Public Health Standards

NR 102.14 establishes taste and odor criteria standards for public health and welfare, which are outlined by specific substance, and will not be summarized here.

Fish Consumption Standards

NR 105.07 establishes wildlife use standards, which are outlined based upon specific substance concentrations, and will not be discussed here.

Total Phosphorus Standards[35]

Phosphorus criteria in Wisconsin are as follows:

- River criterion (NR 102 specified rivers): 100 µg/L
- Stream criterion: 75 µg/L
- Stratified “reservoir” criterion: 30 µg/L
- Non-stratified “reservoir” criterion: 40 µg/L

5.4.1.2.2 Historic Water Quality Conditions

The State of Wisconsin listed Trego Lake as an impaired water in 2018 due to excessive algal growth from chlorophyll-a levels exceeding the listing threshold for recreation use (WDNR, 2020f).

The PAD identified four water quality monitoring stations within the current Trego Project boundary, all within the reservoir. Station 663162 is located in a deep hole near the dam and has water quality monitoring data from 2006 to 2014 and 2016 to 2020. Station 663176 is located at the Town of Trego Landing and has monitoring data from 2019. Station 10034498 is located within the reservoir near the inlet of Little Mackay Creek and has water quality monitoring data from 2005 to 2006, 2008 to 2014, and 2016 to 2020. Station 10022021 is located just upstream of the U.S. Highway 53 Bridge and has water quality data from 2007 and 2008.

[35] The Namekagon River is subject to the stream standard of 75 µg/L.

A review of the water quality monitoring data from these sites shows the pH ranging from 6.9 to 8.14 (7.6 average), total phosphorous ranging from 0.006 to 0.069 mg/L (0.028 mg/L average), and DO, ranging from 7.9 to 14.3 mg/L (11.2mg/L average). This data was provided in Appendix 4.3.8.2-2 of the PAD.

A search of the WDNR's Surface Water Data Viewer identified additional monitoring data for the deep hole monitoring station (Station 663162) and for the Little Mackay Creek monitoring station (Station 10034498) that was compiled after the PAD was finalized. Monitoring data for both of these sites was collected in 2021 and 2022 and is included in **Appendix E-34**.

5.4.1.2.3 Current Water Monitoring Data

In 2022, GLEC conducted a water quality monitoring study on behalf of NSPW at the Trego Project to characterize current water quality conditions and determine compliance with Wisconsin NR 102. Study results are described below in the following sections and the complete Water Quality Study Report is included in **Appendix E-8**.

Surface water quality monitoring was conducted at two locations within the Project boundary using the WDNR's river monitoring protocols (Site 1 and Site 3) and one site using WDNR's lake monitoring protocols (Site 2). Site 1 was located upstream of the Highway 53 Bridge at existing WDNR monitoring station 10022021. Site 2 was located at the existing deep hole WDNR monitoring station 663162. Site 3 was located approximately 250 feet downstream of the Trego Dam. The monitoring locations are shown in **Figures 5.4.1.2.3-1** and **5.4.1.2.3-2**.

Table 5.4.1.2.3-1 lists the parameters monitored, type of sampling conducted, and the sampling frequency for Sites 1 and 3. **Table 5.4.1.2.3-2** lists the parameters monitored, type of sampling conducted, and sampling frequency for Site 2.

Data was collected and analyzed using the standard operating procedures of the WisCALM. The WDNR Nutrient Grab Sample Protocols were used to monitor ammonia, dissolved phosphorus, nitrate (plus nitrite), sulfate, total mercury, total nitrogen, total phosphorus, and total suspended solids. The procedures listed in the Wisconsin Citizen Lake Monitoring Training Manual (Chemistry Procedures) were used to monitor bacteria (*E. coli*), chlorophyll A, chloride, and Secchi depth.

Discrete multi-parameter water quality measurements of DO, pH, specific conductance, and temperature were collected at each monitoring location during each field visit. The fieldwork incorporated the use of a calibrated Yss ProDSS multi-parameter meter.

Depth profile monitoring for DO, pH, specific conductance, and temperature was also conducted. The monitoring was conducted using a calibrated YSI ProDSS multi-parameter meter in the deepest part of the reservoir (Site 2). Sampling began at the water surface and continued at 1-meter intervals until the reservoir bed was reached.

Continuous hourly monitoring was conducted for DO, pH, specific conductance, and temperature at Site 1 and Site 3. The four parameters were measured using a calibrated YSI-EX03 Multi-parameter sondes. Continuous (hourly) temperature monitoring was also conducted using Onset HOBO tidbit Temperature Data Loggers.

Figure 5.4.1.2.3-1 2022 Trego Project 2022 Water Quality Monitoring Study Monitoring Locations (Site 1)

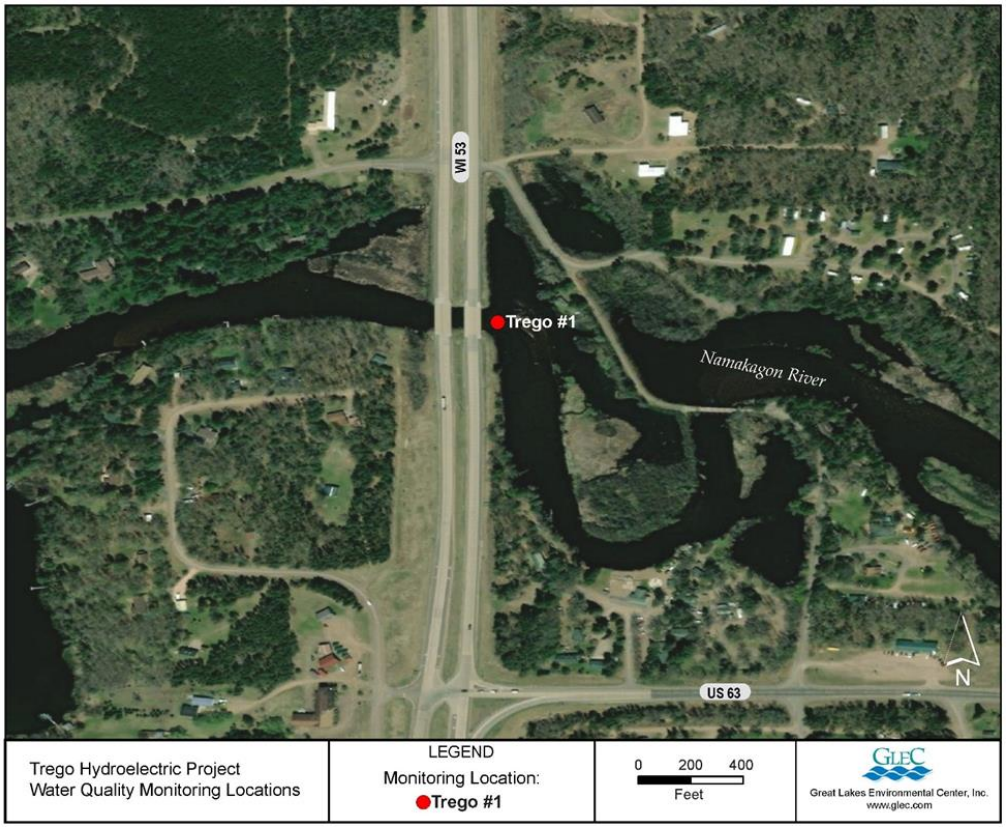


Figure 5.4.1.2.3-2 Trego Project 2022 Water Quality Study Monitoring Locations (Sites 2 and 3)

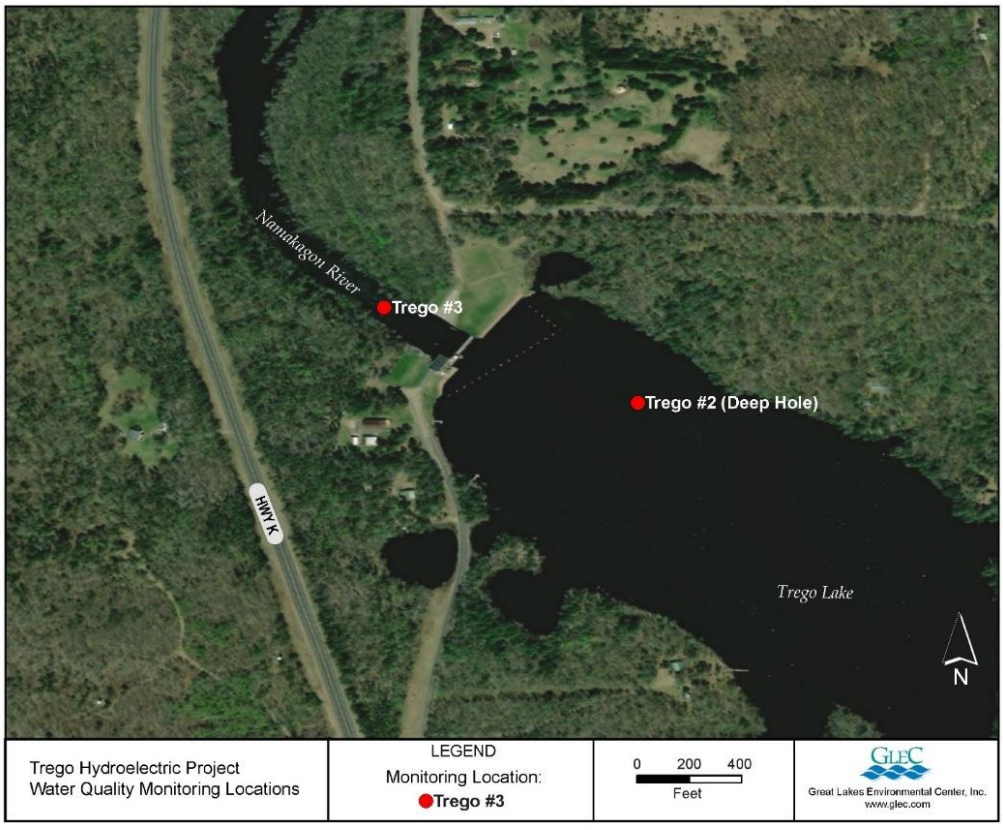


Table 5.4.1.2.3-1 Water Quality Monitoring at Trego Sites 1(Upstream) and 3 (Downstream)

Monitored Parameter	Number of Samples	Type of Sampling	Sampling Frequency					
			May	June	July	Aug.	Sept.	Oct.
Ammonia	6 total	Lab	X	X	X	X	X	X
Bacteria	6 total	Lab	X	X	X	X	X	X
Chloride	6 total	Lab	X	X	X	X	X	X
Chlorophyll a	6 total	Lab	X	X	X	X	X	X
Conductivity	Continuous July – Sept.	Field Measurement			X	X	X	
Dissolved Oxygen	Continuous July – Sept.	Field Measurement			X	X	X	
Dissolved Phosphorus	6 total	Lab	X	X	X	X	X	X
Nitrate/Nitrite	6 total	Lab	X	X	X	X	X	X
pH	Continuous July – Sept.	Field Measurements			X	X	X	X
Sulfate	1 total	Lab	X					
Total Mercury	1 total	Lab	X					
Temperature	Continuous July – Sept.	Field Measurement			X	X	X	
Total Nitrogen	6 total	Lab	X	X	X	X	X	X
Total phosphorus	6 total	Lab	X	X	X	X	X	X
Total Suspended Solids	6 total	Lab	X	X	X	X	X	X

Table 5.4.1.2.3-2 Water Quality Monitoring at Trego Site 2 (Deep Hole)

Monitored Parameter	Number of Samples	Type of Sampling	Sampling Frequency			
			May	July	Aug.	Sept.
Ammonia	1 total	Lab	X	X	X	X
Bacteria	4 total	Lab	X	X	X	X
Chloride	4 total	Lab	X	X	X	X
Chlorophyll a	3 total	Lab		X	X	X
Conductivity	4 total	Field Profile	X	X	X	X
Color	1 total	Lab		X		
Dissolved Oxygen	4 total	Field Profile	X	X	X	X
Dissolved Phosphorus	4 total	Lab	X	X	X	X
Iron	4 total	Lab	X	X	X	X
Manganese	4 total	Lab	X	X	X	X
Nitrate/Nitrite	1 total	Lab		X		
pH	4 total	Field Profile		X	X	X
Secchi depth	4 total	Field	X	X	X	X
Sulfate	1 total	Lab	X			

Monitored Parameter	Number of Samples	Type of Sampling	Sampling Frequency			
			May	July	Aug.	Sept.
Sulfide	4 total	Lab	X	X	X	X
Total Mercury	1 total	Lab	X			
Temperature	4 total	Field Profile	X	X	X	X
Total Nitrogen	1 total	Field Fixed	X			
Total Phosphorus	4 total	Field Fixed	X	X	X	X
Total Suspended Solids	4 total	Lab	X	X	X	X

Water Monitoring Results for Lab Analyzed Water Quality Parameters

Lab analyzed water quality parameters are summarized below and in **Table 5.4.1.2.3-3**.

Ammonia

Ammonia concentrations ranged between 24.2 µg/L and 92.6 µg/L, or 0.0242 and 0.0926 mg/L, respectively. These concentrations are far below the 33.52 mg/L toxicity threshold of freshwater aquatic organisms.

Bacteria *(E. coli)*

E. coli colony counts ranged between <1.0 and 114.5 MPN, well below the State's "Beach Action Value" of 235 counts per 100 mL.

Chloride

The chloride concentrations ranged from 5.2 to 7.5 mg/L, which is typical of waterbodies in the area.

Chlorophyll a

The concentration of chlorophyll-a ranged between 0.98 and 2.8 µg/L. These values are considered very low concentrations and typical of waterbodies in the area.

Color

Color is measured in Platinum Color Units. Color values can range from 0 to 500 PCU. One color measurement was taken in mid-July with a PCU of 34, which is typical for lakes in the area.

Dissolved and Total Phosphorus

Dissolved phosphorus ranged from <1.5 to 6.2 µg/L and total phosphorus ranged from 4.3 to 16.4 µg/L. While there is no specific state standard for dissolved phosphorus, the concentration was far lower than that required to support algal growth. The total phosphorus concentration was well below the 75 µg/L State standard for streams.

Iron

Concentration of total iron ranged between 180 and 470 µg/L, which is typical for waterbodies in the area.

Manganese

Concentration of total manganese ranged from 38.5 and 477.0 µg/L, which is typical for waterbodies in the area.

Nitrate/Nitrite and Total Nitrate

Nitrate/Nitrite concentrations ranged from 0.31 to 0.69 mg/L and total nitrate concentrations ranged between <0.0411 and 0.1392 mg/L. These concentrations are not a water quality concern.

Sulfide and Sulfates

Concentrations of sulfide and sulfate were either below or just above detectable levels and are not a water quality concern.

Total Mercury

Total mercury levels were sampled during the May 2022 sampling event. Concentrations were below detectable levels and are not a water quality concern.

Total Suspended Solids

Total suspended solids can affect water clarity. Water typically appears clear when TSS concentrations are 20 mg/L or less. TSS concentrations ranged between 2.6 and 9.2 mg/L. These levels do not cause any water clarity concerns.

Water Monitoring Results for Field Analyzed Water Quality Parameters (Grab samples)

Field analyzed monthly water quality parameters are summarized in **Table 5.4.1.2.3-4**.

Table 5.4.1.2.3-3 Summary of Lab Analyzed Water Quality Monitoring Results for the Trego Project (2022)

Parameter	Site 1 (upstream)						Site 2 (deep hole)						Site 3 (downstream)					
	May	Jun	Jul	Aug	Sept	Oct	May	Jun	Jul	Aug	Sept	Oct	May	Jun	Jul	Aug	Sept	Oct
Ammonia (µg/L)	44.1	34.3	33.4	24.2	33.0	51.0	x	x	67.5	x	x	x	59.9	41.3	92.6	50.3	57.0	29.0
E. coli (MPN)	22.8	72.7	93.2	114.5	36.4	13.5	3.0	x	2.0	2.0	<1.0	x	7.5	4.1	3.1	2.0	9.8	3.0
Chloride (mg/L)	5.8	6.5	6.2	5.2	7.5	7.5	5.7	x	6.6	6.4	6.7	x	5.7	6.7	5.2	6.6	7.0	7.0
Chlorophyll a (µg/L)	x	x	2.8	1.2	1.08	x	x	x	1.49	1.27	0.98	x	x	x	2.1	1.81	1.26	x
Color (PCU)	x	x	x	x	x	x	x	x	34	x	x	x	x	x	x	x	x	x
Dissolved P (µg/L)	4.1	2.7	3.6	1.5	5.8	2.3	2.5	x	4.1	4.4	6.2	x	1.9	3.2	3.4	2.3	5.3	3.3
Iron (µg/L)	x	x	x	x	x	x	470	x	188	180	202	x	x	x	x	x	x	x
Manganese (µg/L)	x	x	x	x	x	x	77.0	x	61.3	38.5	48.2	x	x	x	x	x	x	x
Nitrate (plus nitrite) (µg/L)	139.2	122.4	118.2	92.3	91.6	112.1	x	x	46.4	x	x	x	114.2	68.1	63.5	41.1	78.9	77.2
Sulfide (mg/L)	x	x	x	x	x	x	<1.0	x	<1.2	<1.2	<1.2	x	x	x	x	x	x	x
Sulfate (mg/L)	<0.71	x	x	x	x	x	<0.71	x	x	x	x	x	<0.71	x	x	x	x	x
Total Mercury (µg/L)	<0.16	x	x	x	x	x	<0.16	x	x	x	x	x	<0.16	x	x	x	x	x
Total N Nitrogen (mg/L)	0.58	0.62	0.40	0.37	0.31	0.31	x	x	0.47	x	x	x	0.66	0.69	0.47	0.31	0.32	0.32
Total Phosphorus (µg/L)	5.3	4.8	9.0	6.8	15.5	11.2	10.0	x	6.2	6.1	11.6	x	5.4	4.3	7.0	8.2	16.4	9.7
Total suspended solids (mg/L)	8.6	6.1	8.7	3.7	4.4	5.9	3.8	x	5.5	3.3	3.8	x	2.6	4.8	5.2	2.6	4.8	9.2

Source: (Great Lakes Environmental Center, 2023)

Table 5.4.1.2.3-4 Summary of Field Analyzed Water Quality Monitoring Results for the Trego Project (2022)

Parameter	Site 1 (upstream)						Site 2 (deep hole)						Site 3 (downstream)					
	May	Jun	Jul	Aug	Sept	Oct	May	Jun	Jul	Aug	Sep	Oct	May	Jun	Jul	Aug	Sep	Oct
Specific Conductance (µmhos/cm)	293	X	187	191	205	204	279	X	197	194	207	X	280	X	197	195	207	205
DO (mg/L)	8.77	X	7.37	7.79	8.75	10.2	7.87	X	7.27	9.28	7.58	X	9.05	X	6.29	8.16	7.95	10.41
pH (su)	7.51	X	7.74	7.67	7.64	7.78	7.47	X	7.84	8.17	7.76	X	7.53	X	7.62	7.72	7.71	7.79
Secchi Depth (inches)	X	X	X	X	X	X	57	X	87	114	150	X	X	X	X	X	X	x
Temperature (°C)	14.3	21.9	19.6	19.4	14.7	9.4	18.8	X	24.6	22.5	19.6	X	17.9	19.8	23.5	20.9	19.0	11.6
Temperature (°F)	57.7	71.4	67.3	66.9	58.5	48.9	65.8	x	76.3	72.5	67.3	x	64.2	67.6	74.3	69.6	66.2	52.9

Source: (Great Lakes Environmental Center, 2023)

Depth Profiles

Depth profile monitoring for temperature, DO, pH, and specific conductance was completed at Site 2 in May, July, August, and September. The profile data showed no stratification in terms of water temperature with the exception of a slight thermocline in August around 3 meters below the surface. DO dropped by approximately 1 mg/L between the four and five- meter depths in July, approximately 2 mg/L between the two- and three-meter depths in August, and approximately 1.5 mg/L at the three-to-four-meter depths in September. All DO values, with the exception of one, remained above the 5 mg/L State standard for the waterbody. The lone exception was a DO reading of 4.59mg/L, which occurred in July at bottom of the reservoir (9-m depth). The specific conductance readings were fairly consistent throughout the water column and were not profiled. The depth profiles are shown in **Figures 5.4.1.2.3-3** to **5.4.1.2.3-6**.

Figure 5.4.1.2.3-3 Trego Project Site 2 May Profiles

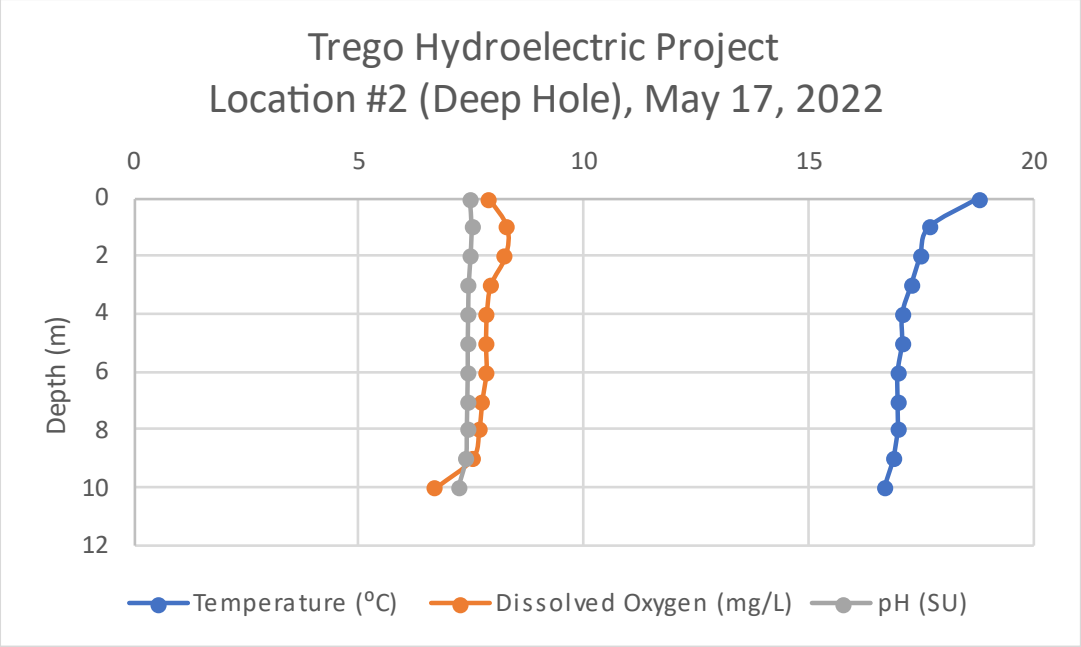


Figure 5.4.1.2.3-4 Trego Project Site 2 July Profiles

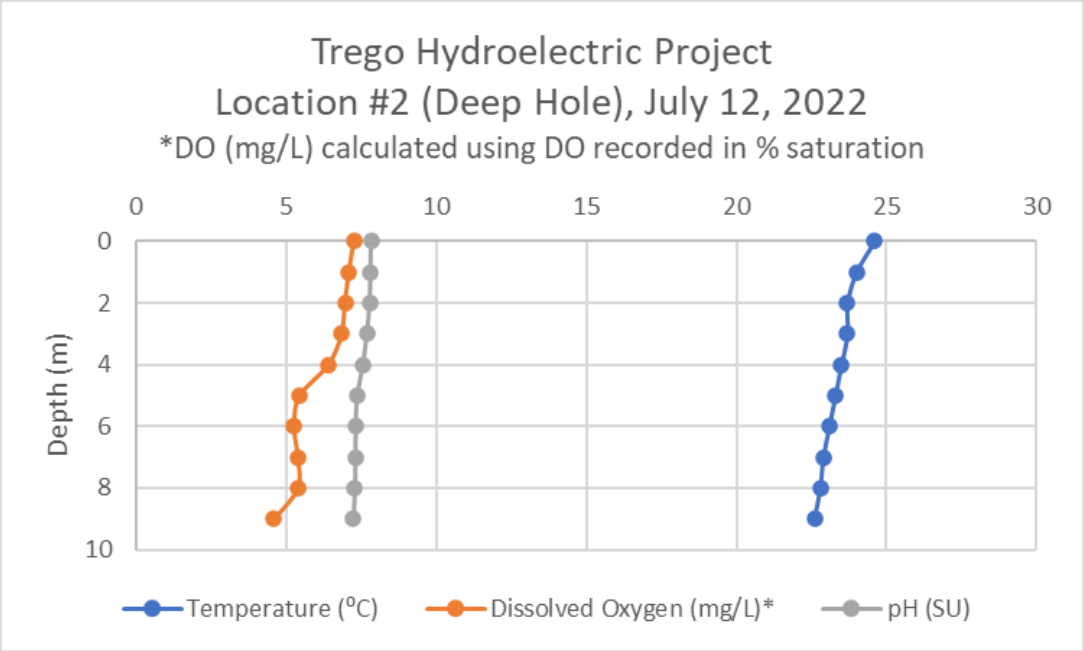


Figure 5.4.1.2.3-5 Trego Project Site 2 August Profiles

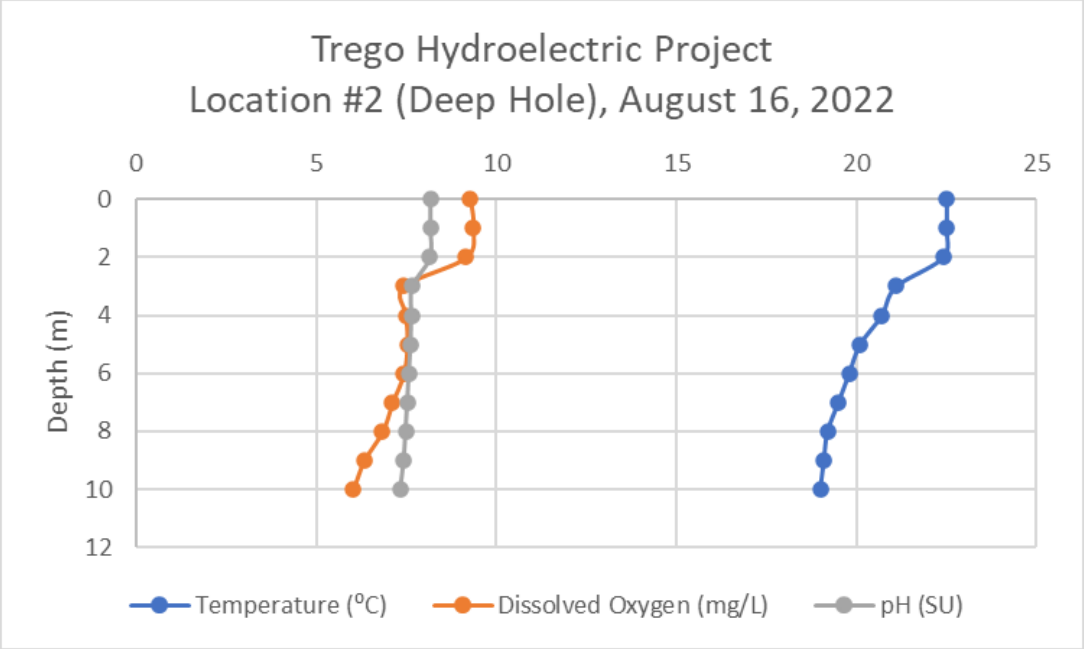
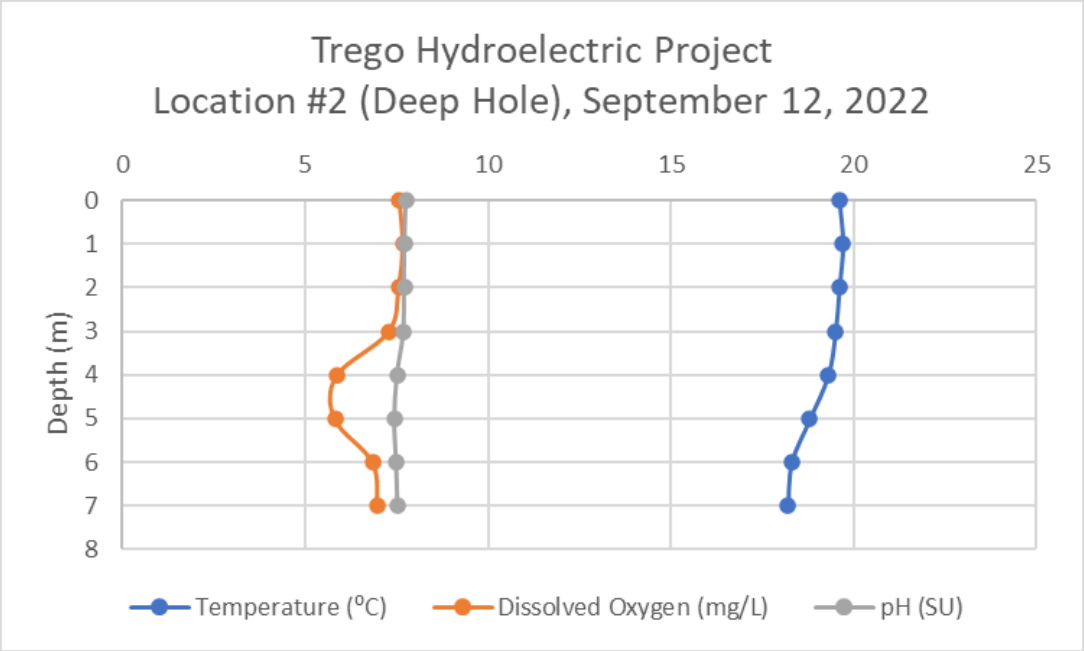


Figure 5.4.1.2.3-6 Trego Project Site 2 September Profile



Continuous Monitoring Results

The results of continuous monitoring for temperature, DO, specific conductance and pH are shown in **Tables 5.4.1.2.3-5** and **5.4.1.2.3-6**.

Table 5.4.1.2.3-5 Continuous Monitoring Results at Trego Site 1 (May 17, 2022 to October 11, 2022)

Monitoring Site 1 (Upstream)	Hobo Tidbit		YSI EXO3 Multi-parameter Sonde		
	Temperature		DO (mg/L)	Specific Conductance (µS/cm)	pH
	(°C)	(°F)			
Min	7.16	44.89	6.23	168.0	7.54
Max	28.28	82.90	11.91	215.5	8.65
Mean	19.10	66.38	8.83	194.5	7.96
Median	19.71	67.48	8.68	185.4	7.93

Table 5.4.1.2.3-6 Continuous Monitoring Results at Trego Site 3 (May 17, 2022 to October 11, 2022)

Monitoring Site 3 (Downstream)	Hobo Tidbit		YSI EXO3 Multi-parameter Sonde		
	Temperature		DO (mg/L)	Specific Conductance (µS/cm)	pH
	(°C)	(°F)			
Min	11.64	52.95	5.69	187.8	7.58
Max	26.23	79.21	9.94	221.9	8.33
Mean	20.31	68.56	7.93	207.5	7.81
Median	21.38	70.48	7.98	214	7.78

Continuous Monitoring Results-Temperature

Hobo Tidbit temperature readings at Site 1 ranged from 44.89°F to 82.9°F with an average of 66.38°F. Site 3 temperature readings ranged from 52.95°F to 79.21°F with an average of 64.69°F.

NSPW reviewed the collected water temperature data in accordance with Section 6.2 of the 2022 WisCALM guidelines to determine compliance with the temperature standards. This review showed that none of the Hobo Tibdit hourly temperature readings exceeded the applicable acute temperature standards at either monitoring site. Therefore, both upstream and downstream water temperatures met the State standard.

Continuous Monitoring Results-DO

The DO at Site 1 ranged from 6.23 to 11.91 mg/L and averaged 8.83mg/L. DO at site 3 ranged from 5.69 to 9.94 mg/L and averaged 7.93 mg/L. All DO readings recorded met the State standard of 5.0 mg/L for warm waters.

Continuous Monitoring Results-Specific Conductance

The specific conductance at Site 1 ranged from 168.0 to 215.5 µS/cm with an average of 194.5 µS/cm. Specific conductance at Site 3 ranged from 187.8 to 221.9 µS/cm with an average of 207.5 µS/cm.

Continuous Monitoring Results-pH

The pH at Site 1 ranged from 7.54 to 8.65 and averaged 7.96. The pH at Site 3 ranged from 7.58 to 8.33 and averaged 7.81. All pH readings recorded met the State standards.

5.4.2 Trego Project Environmental Effects

Under the proposed operation, NSPW will continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. NSPW also proposes to continue to maintain a target reservoir elevation of 1,034.9 feet NGVD, with fluctuations limited to 0.3 feet around the target elevation (i.e., between 1,034.6 and 1,035.2 feet NGVD) (Section 3.2.2.1). This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resources.

Trego Lake is listed as an impaired water in the WDNR's 2022 Impaired Waters List for excess algal growth due to an unknown pollutant (WI Department of Natural Resources, 2022a). The nutrients typically associated with excessive algal growth (i.e., nitrogen, phosphorus, and chlorophyll a) were not found in levels that would promote additional algae growth. Despite Trego Lake being listed as impaired, the results from water quality sampling conducted in 2022 met all water quality standards.

No material changes to Project operations are being proposed; therefore, no adverse effects to water quality are anticipated from continued operation of the Project.[36]

[36] Due to the shore duration of the ice removal event, and its timing during high flow periods, which coincides with the natural hydrologic cycle, the proposed planned deviations for ice removal purposes are not considered a material change in operations.

5.4.3 Trego Project Proposed Environmental Measures

Under Section 6 of Exhibit A, NSPW proposes to continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. NSPW further proposes to continue to maintain the reservoir at a target elevation of 1.034.9 feet NGVD, with fluctuations limited to 0.3 feet around the target elevation (i.e., between 1,034.6 and 1,035.2 feet NGVD). This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resources.

5.4.4 Trego Project Unavoidable Adverse Impacts

With the implementation of the proposed environmental measures, the proposed operation of the Project is not expected to result in unavoidable adverse impacts to water quality.

5.5 Trego Project Fish and Aquatic Resources

The Project consists of a dam, powerhouse, tailrace or tailwater, transmission equipment, appurtenant equipment, a 435.2-acre reservoir, and surrounding land extending landward to an elevation of 1,035.2 feet NGVD. A bathymetric map developed as part of the 2022 ATIS study is included in Figure 25 of **Appendix E-3**. The main dam structures from left to right when looking downstream consist of the left earth embankment, powerhouse, sluice gate spillway, radial gate spillway, and right earth embankment.

The Project currently operates in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. NSPW maintains a target elevation of 1,034.9 feet NGVD with fluctuations limited to 0.3 feet around the target (i.e., between 1,034.6 and 1,035.2 feet NGVD). This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resources.

5.5.1 Trego Project Affected Environment

5.5.1.1 Aquatic Vegetation

5.5.1.1.1 Trego Lake Aquatic Plant Management Plan

The TLD obtained a planning grant from the WDNR to update their aquatic plant management plan for the Trego Lake. The primary goal of the *Trego Lake, Washburn County 2022 to 2026 Aquatic Plant Management Plan* (Trego APMP) is to protect Trego Lake's ecosystem and native plant community for the benefit of the general public and all lake users through management efforts that control invasive aquatic plant species and maintain lake usability. The primary goals of the Trego APMP include management of existing aquatic invasive species through mechanical harvesting, management of nuisance native species through mechanical harvesting, and education and outreach regarding aquatic invasive species and water quality (Lake Education and Planning Services, LLC, n.d.). A copy of the final plan is included in **Appendix E-35**.

2020 Aquatic Vegetation Survey

In 2020, on behalf of TLD, Endangered Resources Services completed a whole-lake point-intercept aquatic plant survey. The previous survey was completed in 2011. The 2020 survey, conducted in late July, documented a total of 47 species with a maximum rooting depth of 10.0 feet. The most common species observed were wild celery (43% of sites), coontail (32% of sites), and flatstem

pondweed (29% of sites). Another notable species observed was wild rice (26% of sites). The frequency of occurrence of aquatic plants at sites shallower than the maximum rooting depth was 71.1 (Lake Education and Planning Services, LLC, n.d.). Aquatic invasive species identified during the survey are discussed further in Section 5.5.1.6. Detailed information on all species observed during the survey was not included in the Trego APMP. A general summary of the 2011 and 2020 aquatic vegetation surveys is shown in **Table 5.5.1.1.1-1**.

The 2022 ATIS Study, conducted on behalf of NSPW, documented a total of 35 native and two invasive aquatic species. The plants observed had a maximum rooting depth of 11.0 feet, and the frequency of occurrence at sites shallower than the maximum rooting dept was 57.8 (GAI Consultants, Inc., 2023a).

Table 5.5.1.1.1-1 Overall TLD 2020 Point Intercept Vegetation Survey Summary

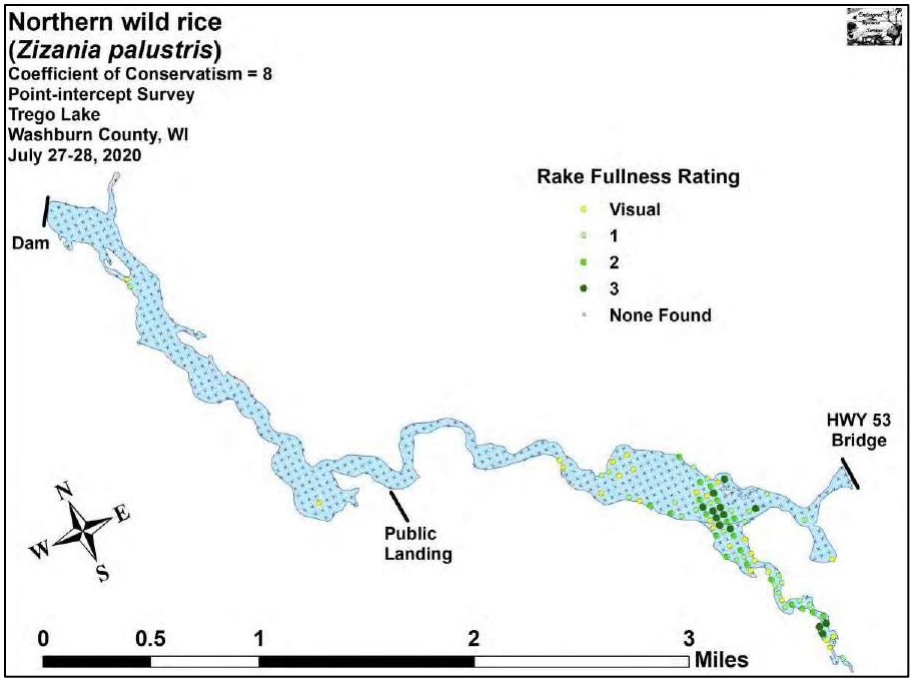
Statistic	2011 Results	2020 Results
Littoral Frequency of Occurrence	83.7	71.1
Maximum Plant Depth	9.3	10.0
Species Richness[37]	25	42
Floristic Quality Index	29.8	34.3

Source: (Lake Education and Planning Services, LLC, n.d.)

Wild Rice

As noted in the Trego APMP, there are significant beds of wild rice on Trego Lake. **Figure 5.5.1.1.1-1** lists the sites where wild rice was identified.

Figure 5.5.1.1.1-1 Wild Rice Observed during 2020 Point-Intercept Aquatic Plant Survey



The image above is referred to as Figure 18 (pg. 28) in the Trego APMP, which can be found in **Appendix E-35**.
Source: (Lake Education and Planning Services, LLC, n.d.).

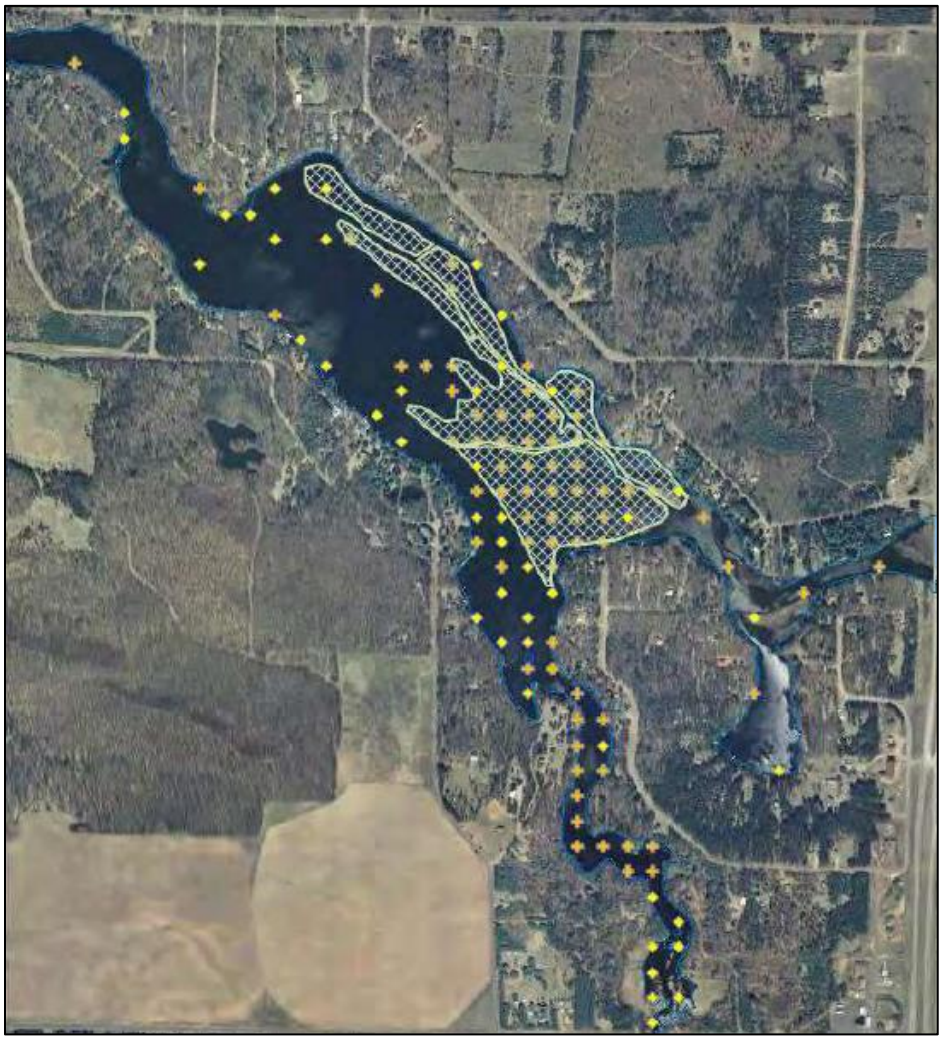
[37] Species richness in this instance included all species identified on the rake at designated survey points, visual sightings were not included.

Wild rice is an annual plant that typically grows in soft, mucky sediments with gently-flowing water in rivers, streams, lakes, and ponds, generally at depths between 10 inches and 3 feet. Water level has a major impact on the species. If water is too shallow or too deep, or if sudden fluctuations occur, wild rice growth and seed production can be limited (WI Department of Natural Resources, 2021d).

Wild rice is present on Trego Lake at the primary inlets to the flowage, i.e., Namekagon River, Little Mackay Creek, and Potato Creek. The Trego APMP noted that the amount of wild rice present within Trego Lake increased between the 2011 and 2020 surveys. In 2011, 74 sample points had wild rice present. In 2020, the number increased to 84 sample points. **Figure 5.5.1.1.1-2** shows the wild rice mapped within the east basin from the 2011 and 2020 surveys.

Under the Treaty of 1837, the Lake Superior Chippewa tribes reserved their rights to hunt, fish, and gather food (including wild rice) within the ceded territory. As a result, when wild rice is present within a waterbody, any management, including physical removal, is regulated and subject to review by the State and Tribal Resources (Lake Education and Planning Services, LLC, n.d.).

Figure 5.5.1.1.1-2 Wild Rice Mapped within the East Basin of the Trego Reservoir



The image above is referred to as Figure 36 (pg. 53) in the *Trego Lake, Washburn County 2022-26 Aquatic Plant Management Plan*, which is included in **Appendix E-35**. The figure is labeled as "Figure 36: Wild Rice in Trego Lake. Orange crosses (2011 WDNR PI), Yellow Squares (2020 ERS PI), Green hash - 2021 bedmapping only in the east basin (LEAPS)".
Source: (Lake Education and Planning Services, LLC, n.d.).

Trego Aquatic Plant Mechanical Harvesting Program

Over the past 25 years, TLD has coordinated a mechanical harvesting program that focused on the east basin of Trego Lake. In this region of the lake, wild rice covers approximately one third of the area and curly-leaf pondweed covers approximately 20% of the area (Lake Education and Planning Services, LLC, n.d.). Once curly-leaf pondweed completes its life cycle and dies back, it is replaced by a dense growth of native aquatic vegetation. Currently, EWM only covers about 4% of the east basin, primarily in the same areas where curly-leaf pondweed is present (Lake Education and Planning Services, LLC, n.d.).

NSPW has annually reimbursed TLD for one mechanical harvesting of aquatic vegetation since 1997 pursuant to License Article 405. Since that time, TLD has managed the east basin of Trego Lake primarily for the purpose of establishing and maintaining navigation channels through the dense aquatic vegetation. According to the Trego APMP, the area harvested each year has ranged between 5,000 and 5,400 feet in length by 30 feet wide, resulting in the mechanical harvesting of 3.4 to 3.8 acres each year (Lake Education and Planning Services, LLC, n.d.).

In the Trego APMP, TLD is proposing to increase the amount of mechanical harvesting to encompass approximately 35 acres. In addition to the current harvesting performed, the plan proposes to mechanically harvest three new areas within the east basin and Potato Creek inlet, totaling about 23 acres. The purpose of the additional harvesting is to reduce navigation impairment due to the dense invasive and native aquatic vegetation. The plan also recommended extending the navigation lanes within the east basin and adding new navigation lanes within the Potato Creek inlet, Sunfish Bay, and other areas. This would result in the addition of 3.3 miles of new navigation lanes comprising approximately 12.0 acres (Lake Education and Planning Services, LLC, n.d.).

5.5.1.1.2 2022 ATIS Study

As part of the 2022 ATIS study, NSPW conducted a point-intercept aquatic vegetation survey of Trego Lake. To account for both early and late season species, two surveys were completed, one in June and one in late July and early August. WDNR provided a point intercept plan with 493 sampling grid points distributed evenly throughout the flowage. However, the sampling grid only extended upstream to the US Highway 53 Bridge which does not encompass the entire area within the current Project boundary. Therefore, an additional 28 grid points were added upstream of US Highway 53 increasing the total number of grid points to 521. Per WDNR guidelines, grid points to be sampled included those located in water depths of less than 15 feet or to the MDC if less than 15 feet (WI Department of Natural Resources, 2010b).

The survey was conducted from a boat using a GPS with submeter accuracy to navigate to the grid points. Points were sampled using a double-sided rake mounted on a pole. The rake was lowered until it rested gently on the river bottom, twisted twice, and then raised straight up out of the water. The density for each rake sample was recorded based on rake fullness. Plants not collected on the rake sample, but visible within six feet of the sample point, were recorded as visual sightings.

A meander survey of the near shore littoral zone (areas less than 5 feet in water depth) was also conducted for aquatic invasive species. A summary of aquatic and terrestrial invasive species identified during the ATIS survey is provided in Section 5.5.1.6 and Section 5.6.1.1.2, respectively.

Additional information on bed substrates and water depths was collected during the July/August survey at points with water depths less than 15 feet. Substrate was categorized using nine substrate types: clay, silt, sand, gravel, cobble, boulder, bedrock, wood, or organic. During rake sampling, the presence or absence of woody debris on the lake bottom was also noted. Locations with coarse woody habitat greater than four inches in diameter and five feet in length that were observed in the water at or below the ordinary high-water mark were mapped. Maps depicting the substrate types and coarse woody habitat are shown in Figures 18 and 19, respectively, of the ATIS Study Report. The ATIS Study Report is included in **Appendix E-3**.

During the June survey, 272 of the 521 grid points were sampled. The remaining grid points were not sampled for the following reasons:

- Grid point was terrestrial (8)
- Grid point was in an unnavigable area or in an area deeper than 15 feet (238)
- Grid point was within the dam safety buoys (1)
- Grid point was inaccessible due to an obstacle (2)

Of the 272 sampled points, 263 were shallower than the MDC (10.3 feet) of which 144 had vegetation. A total of 27 native species were found during the survey. In addition to the native species, curly-leaf pondweed and EWM were also identified. Seven of the species identified during the survey were observed visually but not present on the rake. The predominant species from the June survey, in order from most to least prevalent, included coontail, flat-stem pondweed, common waterweed, wild rice (Zizania spp.), and wild celery. The average rake fullness during the study was 1.3 (GAI Consultants, Inc., 2023a).

During the July/August survey, all navigable sample points of 15 feet or less (301 total) were sampled to assess the sediment types. Of those points, 258 were found to be within the littoral zone and 149 of the sites contained vegetation. A total of 28 native species were identified during the July/August survey. Of those, four species were observed visually but not found on the rake. In addition to the native species, curly-leaf pondweed and EWM were again present. Narrowleaf cattail presence was also confirmed. More discussion on aquatic invasive species is found in Section 5.5.1.6. The predominant species observed, in order from most to least prevalent, included coontail, wild celery, common waterweed, flat-stem pondweed, and stonewort (*Nitella spp*.). Wild rice, where present, had grown to a point that it was no longer navigable. Wild rice locations are shown in Figure 8 of the ATIS report. The average rake fullness during the July/August survey was 1.6 (GAI Consultants, Inc., 2023a).

Table 5.5.1.1.2-1 lists all submerged aquatic plant species identified during the early season and late season ATIS surveys. **Table 5.5.1.1.2-2** provides an overall summary of the ATIS survey. The ATIS Study Report, including all maps and datasheets, is included in **Appendix E-3**.

Table 5.5.1.1.2-1 Species of Aquatic Vegetation Observed During Trego ATIS Surveys

Common Name	Scientific Name
Clasping-leaf pondweed	*Potamogeton richardsonii*
Common arrowhead	*Sagittaria latifolia*
Common bladderwort	*Utricularia minor*
Common bur-reed	*Sparganium eurycarpum*

Common Name	Scientific Name
Common waterweed	*Elodea canadensis*
Coontail	*Ceratophyllum demersum*
Creeping spikerush	*Eleocharis palustris*
Crested arrowhead	*Sagittaria cristata*
Curly-leaf pondweed	*Potamogeton crispus*
Eurasian watermilfoil	*Myriophyllum spicatum*
Fern pondweed	*Potamogeton robbinsii*
Flat-stem pondweed	*Potamogeton zosteriformis*
Floating-leaf pondweed	*Potamogeton natans*
Forked duckweed	*Lemna trisulca*
Fries' pondweed	*Potamogeton gramineus*
Grass-leaved arrowhead	*Sagittaria graminea*
Large duckweed	*Spirodela polyrhiza*
Large-leaf pondweed	*Potamogeton amplifolius*
Marsh cinquefoil	*Comarum palustre*
Muskgrass	*Chara spp.*
Non-native cattail	*Typha spp.*
Northern watermilfoil	*Myriophyllum sibiricum*
Sago pondweed	*Stuckenia pectinata*
Slender naiad	*Najas flexilis*
Small duckweed	*Lemna minor*
Spatterdock	*Nuphar variegata*
Spiny hornwort	*Ceratophyllum echinatum*
Stoneworts	*Nitella spp.*
Tassel stonewort	*Tolypella intricata*
Water marigold	*Bidens beckii*
Watermeals	*Wolffia spp.*
Water stargrass	*Heterantherra dubia*
White-stem pondweed	*Potamogeton praelongus*
White water crowfoot	*Ranunculus aquatilis*
White water lily	*Nymphaea odorata*
Wild calla	*Calla palustris*
Wild celery	*Ballisneria americana*
Wild rice	*Zizania spp.*

Source: (GAI Consultants, Inc., 2023a)

Table 5.5.1.1.2-2 Overall Point Intercept Vegetation Survey Summary for the Trego Project

Statistic	June 2022	July/August 2022
Littoral Frequency of Occurrence	54.8	57.8
Maximum Plant Depth	10.3	11.0
Native Species Richness[38]	20	22
Floristic Quality Index	26.4	29.2

Source (GAI Consultants, Inc., 2023a)

5.5.1.2 Wetlands

Wetlands are transition habitat between land and water that have unique hydrologic, soil, and vegetative characteristics that allow them to be differentiated (delineated) from other habitat types. Wetlands function to improve water quality, wildlife habitat, nutrient cycling and storage, aesthetics, and recreation. Large wetlands absent from human influence are generally higher quality wetlands. In riverine systems, wetlands provide for flood water storage and filtration for water contaminants and sediment. They also provide an environmental corridor for enhanced recreation and aesthetics. The USFWS National Wetland Inventory data layers were used to determine the types of wetlands located within the current and proposed Project boundaries.

Wetland types and their corresponding acreages within the current and proposed Trego Project boundaries are shown in **Table 5.5.1.2-1**. Maps showing wetlands within the current and proposed project boundaries are in **Appendix E-36**.

Table 5.5.1.2-1 Wetlands Identified within the Current and Proposed Trego Project Boundary

Wetland Type	Current Boundary	Proposed Boundary
	Acres	Acres
Lacustrine	373.9	356.7
Freshwater Forested/Shrub	0.5	0.8
Freshwater Emergent	12.1	11.4
Freshwater Pond	14.9	16.6
Riverine	40.7	35.6
Total Wetlands	442.1	421.14

Source (Mead & Hunt, 2023d)

5.5.1.3 Fisheries

5.5.1.3.1 Fish Assemblage

In 2020, WDNR provided fish survey data for three locations within the Trego Project. Those locations included Trego Lake[39], the Namekagon River upstream of Trego Lake, and the Namekagon River downstream of the Trego Dam. Fish species identified during WDNR fish surveys are shown in **Table 5.5.1.3.1-1.** Fish data for all three locations is included in **Appendix E-37**. A description of the predominant fish present in each of the areas is discussed in the following sections. WDNR has not conducted any additional fish surveys in the Project vicinity since the PAD was filed in 2020.

[38] Native species richness in this instance includes native species identified on the rake at a designated survey point, visual sightings were not included.
[39] WDNR classifies Trego Lake as the area between the Trego Dam and US Highway 53.

Trego Lake

Twenty-nine species of fish were identified within Trego Lake based on WDNR data collected between 2003 and 2019. Of the 2,041 fish collected, the five most predominant species were, in order of abundance, (WI Department of Natural Resources, 2020c):

- Bluegill at 660 or 32.3%
- Black crappie at 260 or 12.7%
- Lake sturgeon at 205 or 10%
- Walleye at 180 or 8.8%
- Smallmouth bass at 156 or 7.6%

Namekagon River Upstream of Trego Lake

Twenty-eight species of fish were identified in the Namekagon River immediately upstream of Trego Lake based on WDNR survey data collected between 2003 and 2019. Of the 2,193 fish identified, the five most predominant species collected included (WI Department of Natural Resources, 2020c):

- Hornyhead chub (*Nocomis biguttatus*) at 244 or 11.1%
- Shorthead redhorse (*Moxostoma macrolepidotum*) at 219 or 10.0%
- Common shiner (*Luxilus cornutus*) at 207 or 9.4%
- Blackside darter (*Percina maculata*) at 183 or 8.3%
- Greater redhorse (*Moxostoma valenciennesi*) at 182 each or 8.3%

Namekagon River Downstream of Trego Lake

Six species of fish were identified in the Namekagon immediately downstream of Trego Lake based on WDNR survey data collected between 2003 and 2019. Of the 2,399 fish identified, the five most predominant species collected in order of abundance included (WI Department of Natural Resources, 2020c):

- Shorthead redhorse at 629 or 26.2%
- Northern hogsucker (*Hypentelium nigricans*) at 498 or 20.8%
- Golden redhorse (*Moxostoma erythrurum*) at 428 or 17.8%
- River redhorse (*Moxostoma carinatum*) at 266 or 11.1%
- Common shiner at 126 or 5.3%

Table 5.5.1.3.1-1 Fish Species Collected during WDNR Fish Surveys in the Trego Project Vicinity

Fish Species	Scientific Name
Black bullhead	*Ameiurus melas*
Black crappie	*Pomoxis nigromaculatus*
Blackside darter	*Percina maculata*
Bluegill	*Lepomis macrochirus*
Bluntnose minnow	*Pimephales notatus*
Bowfin	*Amia calva*
Brown bullhead	*Ameiurus nebulosus*
Brown trout	*Salmo trutta*
Burbot	*Lota lota*

Fish Species	Scientific Name
Central mudminnow	*Umbra limi*
Channel catfish	Ictalurus punctatus
Chestnut lamprey	*Icthyomyzon castaneus*
Common logperch	*Percina caprodes*
Common shiner	*Luxilus cornutus*
Creek chub	*Semotilus atromaculatus*
Fathead minnow	*Pimephales pomelas*
Gilt darter	*Percina evides*
Golden redhorse	*Mosostoma erythrurum*
Golden shiner	*Notemigonus crysoleucas*
Greater redhorse	*Moxostoma valenciennesi*
Hornyhead chub	*Nocomis biguttatus*
Johnny darter	*Etheostoma nigrum*
Lake sturgeon	*Acipenser fulvescens*
Largemouth bass	*Micropterus salmoides*
Largescale stoneroller	*Campostoma oligolepsis*
Longnose dace	*Rhinichthys cataratae*
Madtom	*Noturus spp.*
Mimic shiner	*Notropus volucellus*
Muskellunge	*Esox masquinongy*
Northern hogsucker	*Hypentelium nigricans*
Northern pike	*Esox lucius*
Pumpkinseed	*Lepomis gibbosus*
River redhorse	*Moxostoma carinatum*
Rock bass	*Ambloplites rupestris*
Shorthead redhorse	*Onchohynchus mykiss*
Silver redhorse	*Moxostoma anisurum*
Smallmouth bass	*Micropterus dolomieu*
Spottail shiner	*Notropus hudsonius*
Walleye	*Sander vitreus*
White sucker	*Catostomus commersonii*
Yellow bullhead	*Ameiurus natalis*
Yellow perch	*Perca flavescens*

Source: (WI Department of Natural Resources, 2020c)

5.5.1.3.2 Fish Stocking Information

A review of the WDNR Fish Stocking Database showed that a total of 2,325,599 fish were stocked in Trego Lake between 1972 and 2022 as shown in **Table 5.5.1.3.2-1**. Information regarding the year stocked, along with the number, source, and size of the fish, is found in **Appendix E-38**.

Table 5.5.1.3.2-1 Fish Stocked in Trego Lake between 1972 and 2022

Species	Age	Number stocked	Stocking Timeframe
Bluegill	Adult	3,319	1972 - 1994
Crappies	Adult	7,000	1984
Lake sturgeon	Fingerlings and yearlings	20,015	1995 - 2019
Muskellunge	Fingerling	8,823	1979 - 2022
Northern pike	Fry	58,523	1983
Panfish	Adult	2,030	1976 - 1981
Walleye	Fingerlings and fry	2,225,889	1979 - 2011

Source: (WI Department of Natural Resources, n.d.d)

5.5.1.3.3 Fish Entrainment and Impingement

The intake structure is vertically separated into two intake and discharge flumes. The left passage is 13.5 feet wide and the right passage is 21 feet wide. The trashrack covers both intakes and has a total width of 36 feet with 1.5 inch clear spacing between bars. The calculated approach velocity is 1.1 fps based on a combined maximum hydraulic capacity of 663 cfs.[40] Since fish larger than three inches in length feature sustained or burst swim speeds greater than 1.1 fps, the risk of fish impingement at the Project is very low.

The combination of low intake velocities and existing narrow trashrack spacing precludes the entrainment of larger fish while allowing primarily young-of-year fish to pass through the turbines. While young-of-year fish are more susceptible to entrainment, they are less prone to mortality due to their small size. Natural mortality in the first year for most resident fish species is very high; therefore, an additional small increment in mortality due to turbine passage at the early life stage should not significantly affect the overall fishery.

5.5.1.4 Mussel Species

5.5.1.4.1 Historic Mussel Information

According to the mussel information provided by the WDNR via email on August 17, 2020, there are no federal or state threatened, endangered, or special concern mussel species known to occur in Trego Lake. However, listed species may occur within the Namekagon River upstream or downstream of the Project (WI Department of Natural Resources, 2020b). **Table 5.5.1.4.1-1** provides a list of native mussel species that have been identified in the Namekagon River in Washburn County.

[40] Approach velocity calculated based upon a width of 36 feet, a vertical length of 17.75 feet at a maximum headwater elevation of 1,035.2 feet NGVD at a maximum hydraulic capacity of 663 cubic feet per second.

Table 5.5.1.4.1-1 Mussel Species in the Namekagon River (Washburn County, WI)

Common Name	Scientific Name	State Status	Last Observed
Black sandshell	*Ligumia recta*		2016
Creeper	*Stophitus undulatus*		2016
Cylindrical papershell	*Anodontoides ferussacianus*		2016
Deertoe	*Truncilla truncate*		2016
Elktoe	*Alasmidonta marginata*	Special Concern	2016
Fatmucket	*Lampsilis siliquodea*		2016
Fluted-shell	*Lasmigona costata*		2016
Fragile papershell	*Leptodea fragilis*		1995
Giant floater	*Pyganodon grandis*		1995
Hickorynut	*Obovaria olivaria*		1988
Mapleleaf	*Quadrula quadrula*	Special Concern	2016
Mucket	*Actinonaias ligamentina*		2016
Paper pondshell	*Utterbackia imbecillis*		2016
Pimpleback	*Quadrula pustulosa*		2016
Pink heelsplitter	*Potamilus alatus*		2016
Plain pocketbook	*Lampsilis cardium*		1987
Purple wartyback	*Cyclonaias tuberculata*	WI Endangered	1995
Round pigtoe	*Pleurobema sintoxia*		2016
Salamander mussel	*Simpsonaias ambigua*	WI Threatened	1988
Spike	*Elliptio dilatata*		2016
Threeridge	*Amblema plicata*		2016
Wabash pigtoe	*Fusconaia flava*		2016

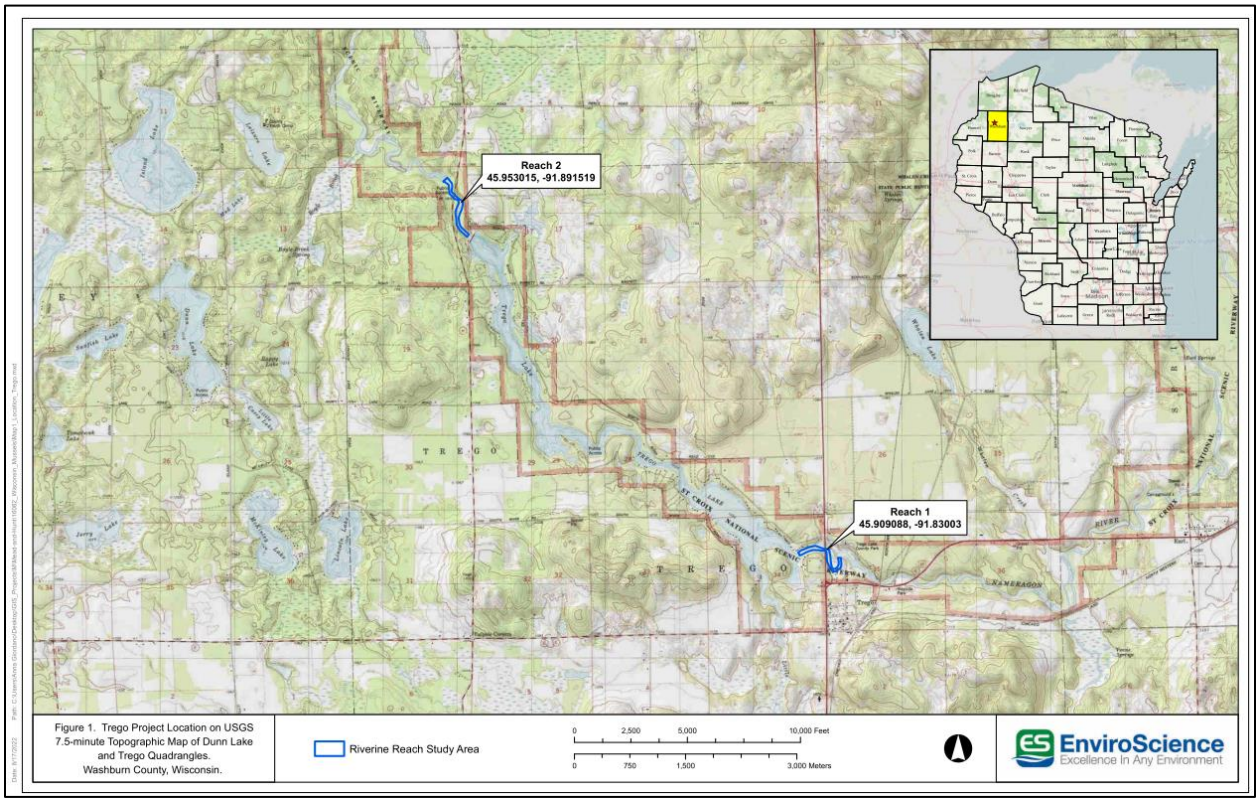
Source: (WI Department of Natural Resources, 2020b)

5.5.1.4.2 Current Mussel Information

In order to provide additional information regarding the mussel community in the vicinity of the Trego Project, mussel surveys were conducted within two riverine reaches in 2022, one upstream and one downstream of the Trego Dam. The objective of the survey was to provide baseline data on the general density and diversity of freshwater mussels, including characterizing mussel habitat within the Project area.

The mussel surveys were performed according to the 2015 WDNR Guidelines for Sampling Freshwater Mussels in Wadable Streams and other standard protocols. Two river reaches were sampled. Reach 1 (upstream reach) began at the Wagon Bridge Road Crossing and extended 1,000 m upstream. Reach 2 (downstream reach) began 45 m downstream of the Trego dam and extended 1,000m downstream. The locations of each reach are shown in **Figure 5.5.1.4.2-1**.

Figure 5.5.1.4.2-1 Trego Mussel Study Locations



Source: (Enviroscience, 2023b)

Within each reach, a series of transects extending bank to bank were established every 100 m creating a series of 10 possible transects for each reach. Transects were numbered sequentially from downstream to upstream and a random number function was used to select five transects to survey within each reach.

Searches along each transect were conducted in 10-m segments and extended 0.5 m on each side of the transect. A rapid visual search for signs of freshwater mussels was performed within each segment. The rapid visual search entailed an initial search of 0.2 minute/meter^2 along each 10-m segment to determine if mussels were present. If mussels were present in a particular segment, a semi-quantitative search was triggered and the time was extended for one minute/meter^2. During the semi-quantitative search, divers visually searched, probed the substrate, and turned over rocks to detect small, burrowed mussels.

General stream conditions and morphology were also recorded within the study area. Water depth and river bottom substrate composition using the Wentworth Scale were recorded for each 10-transect segment. In addition, a general description of mussel habitat characteristics within the study area was recorded.

The mussel survey was conducted on June 20, 2022. River flow at the time was 112 cfs as measured at the Leonards, Wisconsin USGS gage no. 05331833 (upstream of the Trego Project). Maximum visibility was greater than 1.0 m and the water temperature was approximately 69°F (Enviroscience, 2023b).

Reach 1 Study Results

Reach 1 (upstream) was a slow-flowing, impounded riverine reach with fine substrate. Current velocity was slow although there was a discernible flow. The streambanks were moderately sloped and large patches of cattails (*Typha spp*.) were present along the banks throughout much of the reach. Transects 3, 4, 5, 7, and 8 were randomly selected for sampling. Substrate in most transect segments was primarily sand, with some silt near the banks, and was most closely aligned with substrate composition code 1 (abundant fine substrate) in Wan, et. al, 2007. Water depth ranged from 1 to 4.5 feet.

A total of 120 live mussels, representing ten different species, were collected in Reach 1 as shown in **Table 5.5.1.4.2-1**. Fatmucket and plain pocketbook combined comprised over half of the mussels collected. The remaining eight species each represented less than 7% of the total. No state listed species were collected.

Mussel abundance was highest in Transect 4, where 70 mussels were collected. The remaining four transects had considerably lower abundance, ranging from 7 to 23 mussels per transect. The density over all the transects sampled in Reach 1 averaged 0.6 mussels per meter^2. The density ranged from a low of 0.23 mussels per meter^2 in Transects 5 and 7 to 1.75 mussels per meter^2 in Transect 4 (Enviroscience, 2023b). The study concluded that mussels were present in low abundance and that the sand substrate present within most of the channel did not provide high-quality mussel habitat. The complete Mussel Study Report for the Trego Project is included in **Appendix E-39**.

Table 5.5.1.4.2-1 Mussels Observed in Reach 1 During 2022 Mussel Study (Trego Project)

Common Name	Scientific Name	Total Live Mussels	Percentage of Mussels Collected
Black sandshell	*Ligumia recta*	4	3.3
Creeper	*Strophitus undulatus*	3	2.5
Fatmucket	*Lampsilis siliquodea*	54	45.0
Fluted-shell	*Lasmigona costata*	1	0.8
Giant floater	*Pyganodon grandis*	1	0.8
Mucket	*Actinonaias ligamentina*	8	6.7
Plain pocketbook	*Lampsilis cardium*	33	27.5
Round pigtoe	*Pleurobema sintoxia*	2	1.7
Spike	*Eurynia dilatata*	6	5.0
Wabash pigtoe	*Fusconaia flava*	8	6.7
	Totals	**120**	**100**

Source: (Enviroscience, 2023b)

Reach 2 Study Results

Reach 2 (downstream) consisted primarily of glide/run habitat with moderate current velocity. The streambanks were gently to moderately sloped, becoming steeper closer to the dam. Transects 2, 3, 5, 7, and 10 were randomly selected for sampling. Substrates most closely aligned with substrate composition code 6 (abundant fine substrate, gravel, and pebbles and present but not abundant cobbles and boulders), code 7 (abundant fine substrate, gravel, pebbles, and cobbles), and code 8 (abundant fine substrate, gravel, pebbles, and cobbles and present but not abundant boulders) in Wan, et. al, 2007.

Boulder and cobble comprised a larger portion of the substrate in the upstream transects. The maximum water depth in the transects sampled was 4 feet.

A total of 1,143 live mussels representing 16 different species were collected in Reach 2 as shown in **Table 5.5.1.4.2-2**. The most abundant species was the mucket, which was located in all five transects sampled. That species comprised 77.6% of the total mussels collected. Fluted-shell was the only other species that comprised more than 5% of the total. One state endangered mussel, the purple wartyback, and one state special concern mussel, the elktoe, were collected (Enviroscience, 2023b).

Mussel abundance was highest in Transect 4, where 382 mussels were collected. Mussel abundance ranged from 28 to 338 mussels in the remaining four transects. Mussel density in Reach 2 averaged 5.86 mussels per meter^2, ranging from a minimum of 0.7 mussels per meter^2 in Transect 10 to a maximum of 9.55 mussels per meter^2 in Transect 4. The study concluded that most of Reach 2 provides high quality mussel habitat (Enviroscience, 2023b). The complete Mussel Study Report for the Trego Project is included in **Appendix E-39**.

Table 5.5.1.4.2-2 Mussels Observed in Reach 2 During 2022 Mussel Study (Trego Project)

Common Name	Scientific Name	Total Live Mussels	Percentage of Mussels Collected
Black sandshell	*Ligumia recta*	15	1.3
Creeper	*Strophitus undulatus*	23	2.0
Elktoe (SC)	*Alasmidonta marginata*	28	2.4
Fatmucket	*Lampsilis siliquodea*	19	1.7
Fluted-shell	*Lasmigona costata*	85	7.4
Giant floater	*Pyganodon grandis*	1	0.1
Hickorynut	*Obovaria olivaria*	2	0.2
Mucket	*Actinonaias ligamentina*	887	77.6
Pimpleback	*Cyclonaias pustulosa*	3	0.3
Pink heelsplitter	*Potamilus alatus*	1	0.1
Plain pocketbook	*Lampsilis cardium*	47	4.1
Purple wartyback (End)	*Cyclonaias tuberculata*	4	0.3
Round pigtoe	*Pleurobema sintoxia*	1	0.1
Spike	*Eurynia dilatata*	7	0.6
Threeridge	*Amblema plicata*	9	0.8
Wabash pigtoe	*Fusconaia flava*	11	1.0
	Totals	**1143**	**100**

Source: (Enviroscience, 2023b)

5.5.1.5 Aquatic Invasive Species

Chapter NR 40 of the Wisconsin Administrative Code (NR 40) makes it illegal to possess, transport, transfer, or introduce certain invasive species into the state without a permit. NR 40 requirements are often used as a guide at hydroelectric projects to determine which species should be considered invasive. NR 40.03 classifies invasive species into two categories: prohibited and restricted. Prohibited species are

defined as invasive species not currently found in Wisconsin, but if introduced are likely to survive, spread, and potentially cause negative environmental and economic impacts. Restricted species are invasive species already established in Wisconsin and have caused or are believed to cause negative environmental and economic impacts. NR 40 further categorizes invasive species by group, which include plants, algae and cyanobacteria, aquatic invertebrates (except crayfish), fish and crayfish, terrestrial and aquatic vertebrates (except fish), terrestrial invertebrates and plant disease-causing microorganisms, and fungus (WI Department of Natural Resources, n.d.e).

5.5.1.5.1 Historic Invasive Species Information

WDNR Aquatic Invasive Species Mapping Tool

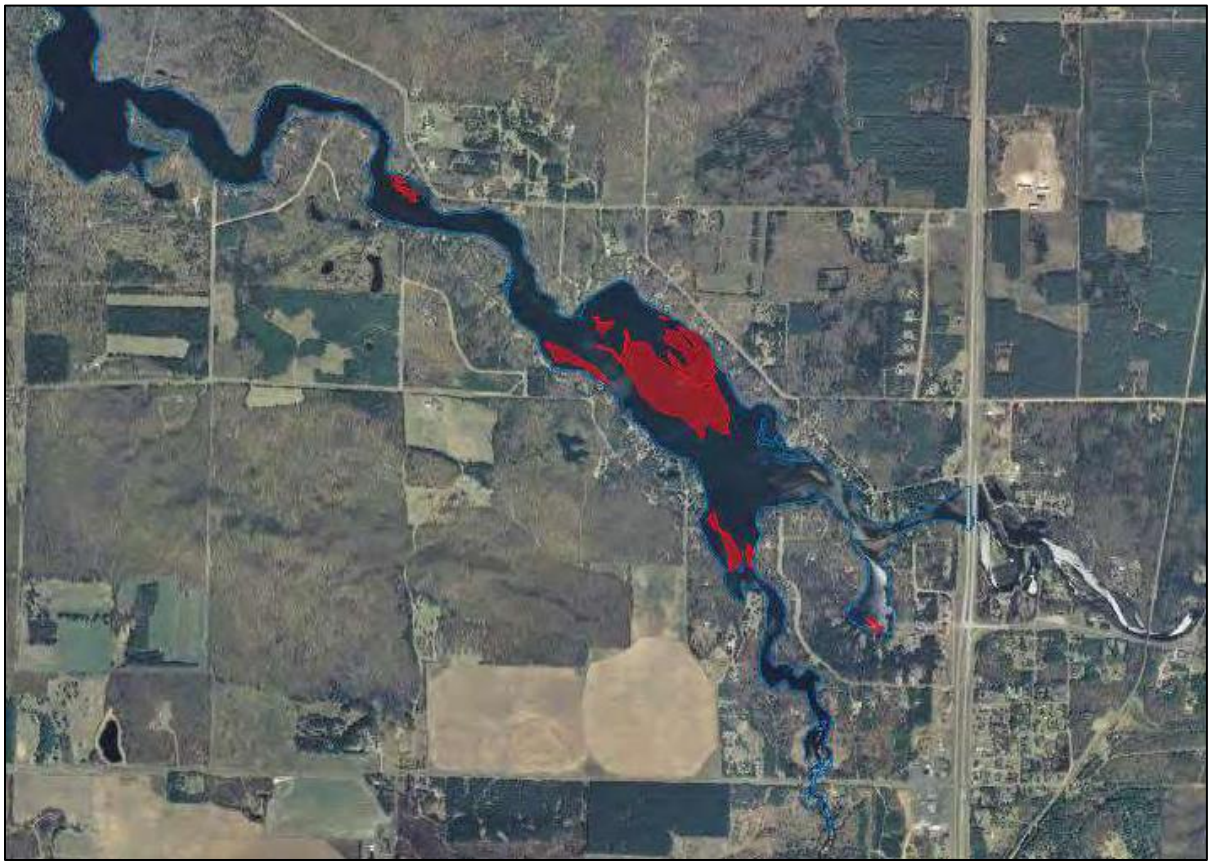
A review of the WDNR Lakes and Aquatic Invasive Species Mapping Tool identified five invasive species listed in NR 40 in the vicinity of the Trego Project. Those species include curly leaf pondweed, EWM, hybrid watermilfoil, Japanese mystery snail, and Chinese mystery snail. The mapper also identified reed canary grass (WI Department of Natural Resources, n.d.g). Currently, only the ribbon grass cultivar of reed canary grass is proposed to be listed as a restricted species under the rule (WI Department of Natural Resources, n.d.e). The remaining cultivars of reed canary grass are not currently, or proposed to be, classified as restricted or prohibited species. The ribbon grass cultivar has not been identified at the Project. The remaining species identified by the mapper are classified as restricted species under NR 40.

Trego Lake Aquatic Plant Management Plan

In 2020, a point intercept aquatic plant survey was completed on behalf of the TLD. Several invasive aquatic plant species were identified within Trego Lake. They included curly-leaf pondweed, EWM and hybrid watermilfoil (EWM and native milfoil cross), purple loosestrife, and reed canary grass (Lake Education and Planning Services, LLC, n.d.). For purposes of this DLA, both EWM and hybrid milfoil are referred to as EWM.

Curly-leaf pondweed was first identified as adversely impacting spring and early summer navigation as early as 1993. In 2020, a total of 32 acres of dense growth curly-leaf pondweed was mapped of which 30 acres was located in the east basin as shown in **Figure 5.5.1.5.1-1** (Lake Education and Planning Services, LLC, n.d.).

Figure 5.5.1.5.1-1 2020 Curly-leaf Pondweed Beds on Trego Lake



Source: (Lake Education and Planning Services, LLC, n.d.),The image above is referred to as Figure 21 (pg. 31) in the Trego APMP which can be found in Appendix E-35.

EWM was first discovered in Trego Lake in 2019. In order to determine the extent of EWM, a bed mapping study was conducted in 2020. This survey identified three low-density EWM beds covering a total of 6.37 acres. All EWM was found in areas with water depths ranging from 3 to 5 feet. While no formal survey or mapping was conducted in 2021, EWM plants were observed in Sunfish Bay. Continued monitoring of the species, without any active management, was recommended in the Trego APMP (Lake Education and Planning Services, LLC, n.d.). **Figure 5.5.1.5.1-2** shows the EWM identified during the 2020 bed mapping study.

Figure 5.5.1.5.1-2 2020 EWM Beds on Trego Lake

Source: Source: (Lake Education and Planning Services, LLC, n.d.),The image above is referred to as Figure 24 (pg. 34 in the Trego APMP which can be found in Appendix E-35.

Purple loosestrife was noted in the Trego APMP as being widespread within Washburn County and the Trego Lake area (Lake Education and Planning Services, LLC, n.d.). No specific locations or management recommendations for the species were discussed.

Although reed canary grass is not listed as a restricted or prohibited species under NR-40, the Trego APMP did identify this species in the area. The plan noted that the species was observed in a few locations along the shoreline; however, there were no monotypic stands which could impair the normal function of wetlands. The species is not considered a management issue (Lake Education and Planning Services, LLC, n.d.).

5.5.1.5.2 Current Invasive Species Information

NSPW conducted an ATIS Study at the Trego Project in 2022. The study area encompassed the aquatic portions within the current and proposed Project boundary, which includes the tailwater area and the upland shoreline areas adjacent to the reservoir including the upland areas owned by NSPW. Aquatic invasive species monitoring was conducted concurrently with the submerged aquatic vegetation survey (Section 5.5.2.1.1). Each sampling point was inspected for the presence of invasive species as listed in NR 40.

Two submergent aquatic invasive species, curly-leaf pondweed and EWM, were identified during the point intercept surveys. Curly-leaf pondweed was observed growing in a large, dense, surface matted

area impacting navigation in the large bay at the southern end of Trego Lake. The overall frequency of EWM in the lake was relatively low and no monotypic areas of EWM were observed (GAI Consultants, Inc., 2023a). Semiaquatic and terrestrial species identified during surveys of the Project's shoreline are detailed in Section 5.6.1.1.2.

In addition to aquatic vegetation sampling, two water samples (one in the reservoir and one in the tailwater) were collected during the July survey using the WDNR protocol to sample for the presence of zebra mussels. Likewise, two water samples were collected to sample for the presence of spiny and fishhook water fleas. The samples were delivered to the Wisconsin State Lab of Hygiene in Madison on August 11, 2022 for analysis. All water samples tested negative for the presence of zebra mussel veligers and water fleas (GAI Consultants, Inc., 2023a).

Sediment samples were collected at the Town of Trego Boat Landing and the Trego Park Boat Landing using the WDNR protocol. The samples were examined for the presence of invasive macroinvertebrates, including: Asian clam, faucet snail, New Zealand mud snail, Malaysian trumpet snail, rusty crayfish, and others. The area around the sampling site was also visually examined for live snails, crayfish, or shells. The sediment sampling confirmed the presence of both Chinese and Japanese mystery snails, which were already known to be present within the reservoir. No other invasive macroinvertebrates were identified (GAI Consultants, Inc., 2023a). The complete ATIS Study Report, including maps depicting the locations of aquatic invasive species, is included in **Appendix E-3**.

5.5.1.6 Macroinvertebrate Community

In 2003 and 2012 macroinvertebrate sampling was conducted at WDNR monitoring station 10037360 *Namekagon River 100 ft below Hwy K*. The station is located approximately ½ mile downstream of the Trego Dam. The sampling results are included in **Appendix E-40**.

The WDNR uses biological indices, including the MIBI, as one of the measures evaluated to determine the aquatic life portion of the FAL-Fish and Aquatic Life designated use. According to the 2022 WisCALM guidelines, condition category thresholds for non-wadable river MIBI scores are as follows (WI Department of Natural Resources, 2021b):

- >75 Excellent
- 50 - 74 Good
- 25 – 49 Fair
- <25 Poor

The MIBI value was 90 at monitoring station 10029431 in 2012, indicating the site falls in the upper end of the "excellent" condition category. For comparison purposes, the 2003 MIBI value was 75, indicating the macroinvertebrate habitat in the Namekagon River downstream of the dam improved between 2003 and 2012.

5.5.2 Trego Project Environmental Effects

5.5.2.1 Effects of Proposed Operations on Fish and Other Aquatic Resources

5.5.2.1.1 Aquatic Vegetation

NSPW proposes to continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. NSPW also proposes to continue to maintain a reservoir target elevation of 1,034.9 feet NGVD, with fluctuations limited to 0.3 feet around the target elevation (i.e., between 1,034.6 and 1,035.2 feet NGVD) (Section 3.2.2.1). This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resources

Under the current FERC license, NSPW implements a Vegetation Management Plan (approved by FERC on February 25, 1997) to address navigation concerns within the upper reservoir caused from dense growth of aquatic plants. The plan requires NSPW to reimburse TLD for annual mechanical harvesting activities to create navigation channels within the upper reservoir (Federal Energy Regulatory Commission, 1997).

The ATIS Study Report showed that Trego Lake contains a diverse aquatic plant community. This community developed under the current operating regime under the existing license. Since there are no material changes being proposed to current Project operations, continued operation of the Project is not expected to cause any adverse impacts to aquatic vegetation.[41]

5.5.2.1.2 Wetlands

NSPW proposes to continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. NSPW also proposes to continue to maintain a reservoir target elevation of 1,034.9 feet NGVD, with fluctuations limited to 0.3 feet around the target elevation (i.e., between 1,034.6 and 1,035.2 feet NGVD). This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resources.

Since the existing wetland community developed under the current operating regime, and there are no material changes to being proposed to current Project operations, the proposed operation of the Project is not expected to cause adverse effects to wetlands.[42]

Approximately 21 acres of wetlands in the current Project boundary are excluded from the proposed Project boundary because they are located in areas (primarily upstream of the proposed boundary) not inundated or impacted by Project operations at the maximum reservoir elevation of 1,035.2 feet NGVD. These wetlands, while no longer included within the Project boundary, will retain their existing protections under state and federal wetland regulations.

[41] Planned deviations for ice removal are expected to have no effect on aquatic vegetation due to their short duration and timing outside of the growing season.
[42] Planned deviations for ice removal are expected to no effect on wetlands due to their short duration and timing outside of the growing season.

5.5.2.1.3 Fisheries

NSPW proposes to continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. NSPW also proposes to continue to maintain a reservoir target elevation of 1,034.9 feet NGVD, with fluctuations limited to 0.3 feet around the target elevation (i.e., between 1,034.6 and 1,035.2 feet NGVD) (Section 3.2.2.1). This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and aquatic resources.

Fishery

The existing fisheries data for Trego Lake, and the Namekagon River upstream and downstream of the reservoir, indicate that both contain a diverse and healthy fishery. No adverse effects to the existing fish populations or habitat are anticipated due to the proposed operation of the Project.

Fish Entrainment/Impingement

As noted in Section 4.5.1.3.3, the risk of entrainment and impingement at the Project is very low. The combination of low intake velocities (1.1 fps)[43] and narrow trashracks (1.5-inch spacing) preclude larger fish from becoming entrained, and smaller fish, if entrained, are less susceptible to mortality. Therefore, the proposed operation of the Project is not expected to adversely affect the overall fish community due to entrainment or impingement.

5.5.2.1.4 Mussel Species

NSPW proposes to continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. NSPW also proposes to continue to maintain a reservoir target elevation of 1,034.9 feet NGVD, with fluctuations limited to 0.3 feet around the target elevation (i.e., between 1,034.6 and 1,035.2 feet NGVD) (Section 3.2.2.1). This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and aquatic resources.

The upstream reach sampled held low populations of mussels and its sand substrates do not provide high quality mussel habitat. The downstream reached sampled held a wide variety of mussels including one state endangered species (purple wartyback) and one state species of special concern (elktoe). The downstream sampling reach provides high quality mussel habitat (Enviroscience, 2023b).

Since no material changes to Project operations are being proposed, no adverse effects to existing mussel habitat are anticipated due to continued operation of the Project.

5.5.2.1.5 Aquatic Invasive Species

Recreational activities at the Project have the potential to increase the risk of spread or transfer of aquatic invasive species. NSPW has proposed mitigation measures in Section 5.5.3 to address these risks.

[43] Approach velocity calculated based upon a width of 36 feet, a vertical length of 17.75 feet at a maximum headwater elevation of 1,035.2 feet NGVD at a maximum hydraulic capacity of 663 cubic feet per second.

5.5.2.1.6 Macroinvertebrate Community

NSPW proposes to continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. NSPW also proposes to continue to maintain the reservoir at a target elevation of 1,034.9 feet NGVD, with fluctuations limited to 0.3 feet around the target elevation (i.e., between 1,034.6 and 1,035.2 feet NGVD) (Section 3.2.2.1). This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and aquatic resources.

Since no material operational changes are being proposed, no adverse effects to the macroinvertebrate community are anticipated due to the proposed operation of the Project.[44]

5.5.3 Trego Project Proposed Environmental Measures

Under Section 6 of Exhibit A, NSPW is proposing to continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. Additionally, under Section 6 of Exhibit A, NSPW proposes to continue to maintain the reservoir at a target elevation of 1.034.9 feet NGVD, with flucturations limited to 0.3 feet around the target elevation (i.e., between 1,034.6 and 1,035.2 feet NGVD). This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and aquatic resources

To mitigate the spread of invasive species, NSPW will develop a rapid response invasive species plan to monitor for the introduction of new invasive species and limit the dispersal of established species. Within one year of license issuance, the NSPW proposes to develop the plan in consultation with WDNR and NPS prior to filing the plan with FERC. The plan will include biennial surveys for both aquatic and terrestrial invasive species.

To address concerns of invasive aquatic plant growth impacting navigation within the upper reservoir, NSPW proposes to provide a one-time payment, not to excced $75,000, to the TLD to cost-share up to 75% of the total cost of a weed harvester. This one-time commitment would be in lieu of the annual reimbursement NSPW currently provides TLD for aquatic vegetation harvesting.

In an effort to maintain the current quality of aquatic habitat in the upstream and downstream portions of the Project boundary, NSPW will notify the FERC, NPS, USFWS, and WDNR of planned deviations with a duration of up to three weeks. This advanced notification will allow NSPW to implement agency-recommended measures to minimize adverse environmental impacts during planned deviations.

An after-the-fact notification process for unplanned deviations will allow the FERC, NPS, USFWS, and WDNR to respond to any stakeholder concerns regarding the deviations in an informed manner. This process will also allow NSPW to track deviations. Should a deviation result in unanticipated adverse environmental impacts, as identified by NSPW's responding operator(s), licensee will address the cause of the deviation to prevent similar occurrences from happening in the future.

[44] Planned deviations for ice removal purposes are not expected to cause adverse effects to macroinvertebrate populations due to their short duration and timing during high flow periods, which coincides the natural hydrologic cycle.

NSPW recommends the following deviation requirements be incorporated into any issued license:

Planned Deviations

Project operation may be temporarily modified for short periods, of up to 3 weeks, upon mutual agreement among the NPS, USFWS, and WDNR (collectively, agencies) and the Licensee. After concurrence from the agencies, the Licensee must file a report with the Secretary of the Commission as soon as possible, but no later than 14 calendar days after the onset of the planned deviation. Each report must include: (1) reasons for the deviation and how project operations were modified, (2) duration and magnitude of the deviation, (3) any observed or reported environmental effects and how the observations were made, and (4) documentation of consultation with the agencies. For planned deviations exceeding 3 weeks, the Licensee shall file for Commission approval an application for a temporary amendment of license in consultation with the agencies,.

Unplanned Deviations

Operations may be temporarily modified if required by operating emergencies beyond the control of the Licensee (i.e., unplanned deviations). For any unplanned deviation that lasts longer than 3 hours or results in visible adverse environmental effects such as a fish kill, turbidity plume, bank erosion, or downstream flooding, the Licensee shall file a report with the Secretary of the Commission as soon as possible, but no later than 14 days after each such incident. The report must include: (1) cause of the deviation, (2) duration and magnitude of the deviation, (3) any pertinent operational and/or monitoring data, (4) a timeline of the incident and the Licensee's response, (5) any comments or correspondence received from the agencies, or confirmation that no comments were received from the agencies, (6) documentation of any observed or reported environmental effects, and (7) a description of measures implemented to prevent similar deviations in the future.

For unplanned deviations lasting 3 hours or less that do not result in visible adverse environmental effects, the Licensee must file an annual report, by March 1, describing each incident that occurred during the prior calendar year. The report must include: (1) cause of the deviation, (2) duration and magnitude of the deviation, (3) any pertinent operational and/or monitoring data, (4) a timeline of the incident and the Licensee's response to each deviation, (5) any comments or correspondence received from the resource agencies, or confirmation that no comments were received from the agencies, and (6) a description of measures implemented to prevent similar deviations from occurring in the future.

NSPW will develop a compliance monitoring plan in consultation with the WDNR to document how it will comply with the operating requirements of the license, including reservoir elevation and minimum flow requirements. The plan will also include the following:

- locations of headwater monitoring gages,
- frequency of monitoring,
- procedures for maintaining and calibrating monitoring equipment,
- standard operating procedures to be implemented outside of normal operating conditions, such as scheduled or emergency facility shutdowns or maintenance activities, and
- schedule for installing and operating the monitoring equipment, and
- a procedure to remove ice from the spillway prior to spring runoff, or for emergency operations, as a planned deviation.

The proposed environmental measures are beneficial for fish and aquatic resources when compared to the alternative of no-action or denial of the license application. Without the issuance of a subsequent license for the Project, the aquatic resource improvements will not occur.

5.5.4 Trego Project Unavoidable Adverse Impacts

With the implementation of the proposed environmental measures, the proposed operation of the Project is not expected to result in unavoidable adverse impacts to fish and aquatic resources.

5.6 Trego Project Terrestrial Resources

5.6.1 Trego Project Affected Environment

5.6.1.1 Botanical Resources

Wisconsin is divided into 16 ecological landscapes primarily defined by the physical environment, which includes climate, geology and landforms, and hydrology. A map depicting the 16 ecological landscapes within Wisconsin is included in **Appendix E-16**. The Project is located within the Northwest Sands Ecological Landscape (WI Department of Natural Resources, 2015a). Historic vegetation maps developed from General Land Office surveyor's notes and inferences from physical and ecological characteristics and cultural uses show this ecological landscape contained an extensive area of jack pine, scrub oak forest, and barrens (Finley, R., 1976). A map showing Wisconsin's land cover in the 1800s is included in **Appendix E-17**.

Today, the lands within the Northwest Sands Ecological Landscape are mostly covered with barrens and dry forests of jack pine and oak. Other common tree species include red pine, white pine, tamarack, aspen and paper birch (WI Department of Natural Resources, 2015a).

WDNR maintains a detailed land cover dataset called WISCLAND 2.0 that describes the land cover across the state (WI Department of Natural Resources, n.d.f). This data was used to generate a detailed land cover map for lands within the current and proposed Project boundaries. The maps are included in **Appendix E-41**. Species-level cover types identified within the current and proposed Trego Project boundaries are shown in **Table 5.6.1.1-1**.

Table 5.6.1.1-1 Cover Types within the Existing and Proposed Trego Project Boundaries

Detailed Land Cover Description	Land Cover (%)	
	Current Boundary	Proposed Boundary
Developed, high intensity	0.55	0.00
Developed, low-intensity	1.01	0.24
Fir-spruce	2.47	1.69
Jack pine	9.67	9.35
Red pine	0.18	0.15
White pine	1.01	0.68
Aspen forest	1.15	1.21
N. pin oak, black oak	3.30	3.73

Detailed Land Cover Description	Land Cover (%)	
	Current Boundary	Proposed Boundary
Mixed deciduous-coniferous	0.73	0.92
Open water	69.90	71.48
Floating Aquatic Herbaceous Vegetation	4.72	5.53
Cattails	3.39	3.49
Other broad-leaved scrub/shrub	0.37	0.15
Broad-leaved evergreen scrub/shrub	0.27	0.44
Tamarack	0.41	0.05
Other coniferous forest wetland	0.32	0.39
Aspen forested wetland	0.41	0.48
Mixed deciduous/coniferous forested wetland	0.14	0.24

Percentages do not add to 100% due to rounding.

Source: (WI Department of Natural Resources, n.d.f)

5.6.1.1.1 Terrestrial Shoreline Community Characterization

The ATIS Study included an inspection of terrestrial areas within the current and proposed Trego Project boundary. The mixed land use along the shoreline was dominated by wooded terrain interspersed with light to moderate residential development. Roadways, emergent wetlands, and scrub/shrub areas were also observed but were minor components of the overall shoreline. The shoreline was inspected by boat or on-foot where navigability was restricted (GAI Consultants, Inc., 2023a).

The shoreline was separated into five segments based on survey logistics due to the fairly consistent mix of residential properties and northern mesic forested areas. In addition to the shoreline survey, an upland terrestrial meander survey was conducted at two areas owned by the licensee and at two boat landings. An overall characterization of the shoreline terrestrial plant community was recorded and any invasive species listed in NR 40 were documented. A discussion on terrestrial invasive species is found in Section 5.6.1.1.2.

Vegetation dominating the overstory of the northern mesic forest plant community consisted of eastern white pine, red maple (*acer rubrum*), white cedar (*Thuja occidentalis*), paper birch, white spruce, red pine, and white oak (*Quercus alba)*. Understory species consisted of a variety of fern species and common milkweed (*Asclepias syriaca*). Developed residential properties consisted of manicured turf grasses, horticultural plants, and occasional trees (GAI Consultants, Inc., 2023a).

5.6.1.1.2 Terrestrial Invasive Plant Species

The WDNR Lakes and Aquatic Invasive Species Mapping tool identified one invasive wetland plant, reed canary grass, which was observed along the southern end of the lake (WI Department of Natural Resources, n.d.g). While reed canary grass is present within the Project vicinity, only one cultivar (*Phalaris arundinacea var picta*) is listed as a restricted species under NR 40 (WI Department of Natural Resources, n.d.e). This cultivar is not known to be in the vicinity of the Project.

During the shoreline and terrestrial meander surveys, as described in Section 5.6.1.1.1, any invasive species listed in NR 40 that was observed had its location recorded via a handheld GPS unit. Maps depicting the location of shoreline terrestrial invasive species identified during the study are located in Figure 12A of the ATIS Study Report. Mapped upland terrestrial species found in meander surveys are shown in Figure 12B of the ATIS Study Report (**Appendix E-3**) (GAI Consultants, Inc., 2023a). A summary of terrestrial invasive species observed during the ATIS Study is shown in **Table 5.6.1.1.2-1**.

Invasive species comprised approximately 2 miles of shoreline during the terrestrial survey and included several restricted species. These species included: aquatic forget-me-not (*Myosotis scorpioides*), Japanese knotweed (*Fallopia japonica*), purple loosestrife, spotted knapweed (*Centaurea stoebe*), yellow iris, and suspected narrow-leaf hybrid cattail (*Typha angustifolia x T. latifolia).* Narrow-leaf cattail was the most predominant species, followed by purple loosestrife, which was restricted to a heavily infested pond area north of River Road in Segment 4. Spotted knapweed was also fairly common in drier areas, while yellow iris was intermittent along the water's edge. Aquatic forget-me-not was relatively rare and an isolated but dense population of Japanese knotweed was observed in Segment 2 (GAI Consultants, Inc., 2023a).

The meander survey of upland areas around the two boat landings, and NSPW-owned lands on either side of the dam, were characterized as partially developed. Both areas around the dam had gravel parking and mowed areas. Areas of natural herbaceous and woody vegetation were also present in both areas around the dam. The north side of the dam contained a large, forested area. Invasive species identified in the areas around the dam included common buckthorn, Eurasian honeysuckle, and spotted knapweed, all of which are classified as restricted (GAI Consultants, Inc., 2023a).

Table 5.6.1.1.2-1 Terrestrial Invasive Species Observed During the ATIS Study at the Trego Project

Common Name	Scientific Name	Mileage of Shoreline	Percentage of Meander	NR 40 Status
Aquatic forget-me-not	*Myosotis scorpioides*	0.002	0.01	Restricted
Cattail spp. (non-native)	*Typha spp.*	0.92	5.17	Restricted
Japanese knotweed	*Fallopia japonica*	0.01	0.06	Restricted
Purple loosestrife	*Lythrum salicaria*	0.86	4.83	Restricted
Spotted knapweed	*Centaurea stoebe*	0.18	1.01	Restricted
Yellow iris	*Iris pseudacorus*	0.04	0.22	Restricted

Source: (GAI Consultants, Inc., 2023b)

The report concluded that overall, invasive species populations within the Project boundary appear to be light to moderate, with the exceptions of narrow-leaf cattail, which was occasionally observed in high densities, especially along US Highway 53 and north of River Road. The heavy infestation of purple loosestrife is mostly confined to the pond area north of River Road. Yellow iris was identified along the water's edge intermittently along the water's edge, but typically not in high densities. Only one population of Japanese knotweed was observed and that was at a private residence. Finally, aquatic forget-me-not was only identified in one location (GAI Consultants, Inc., 2023a).

5.6.1.2 Wildlife Resources

5.6.1.2.1 Mammal Species

The Northwest Sands Ecological landscape was historically important for a variety of large mammals including wide-ranging species such as the American beaver, American bison, elk, gray wolf, moose, and North American river otter (WDNR, 2015). The arrival of Euro-American settlers brought many changes to the landscape including fire suppression, land conversion to farming, and logging which resulted in habitat changes. Several species have been in decline or were extirpated (WDNR, 2015). White-tailed deer, while not as abundant in this area as further south, saw its lowest population in the early 1900s due to subsistence hunting by numerous early settlers. Since the 1980s, the white-tailed deer herd has rebounded and has often been above management goals for the Northern Forest. Over browsing is also becoming more common in the Northwest Sands.

The federally listed northern long-eared bat and gray wolf are also potentially found in the vicinity of the Project and are discussed further in Section 5.7.1.1.

The mammal species likely to be found in the vicinity of the Trego Project are listed in **Table 5.6.1.2.1-1** (NSPW, 1991a) (WI Department of Natural Resources, 2015a).

Table 5.6.1.2.1-1 Mammal Species in the Vicinity of the Trego Project

Mammal Species	Scientific Name	State/Federal Status
Arctic shrew	*Sorex arcticus*	
Badger	*Taxidea taxus*	
Beaver	*Castor canadensis*	
Bobcat	*Lynx rufus*	
Big brown bat	*Eptesicus fuscus*	State endangered
Black bear	*Ursus americanus*	
Deer mouse	*Peromuscus maniculatus*	
Coyote	*Canis latrans*	
Eastern chipmunk	*Tamias striatus*	
Eastern cottontail	*Sylvilagus floridans*	
Eastern fox squirrel	*Sciurus niger*	
Fisher	*Martes pennanti*	
Gray fox	*Urocyon cenereoargenteus*	
Gray wolf	*Canis lupus*	Federally endangered
Hoary bat	*Lasiurus cinereus*	
Least chipmunk	*Eutamias minimus*	
Little brown bat	*Myotis lucifugus*	State endangered
Long-tailed weasel	*Mustela frenata*	
Masked shrew	*Sorex cinerus*	
Meadow jumping mouse	*Zapus hudsonius*	
Meadow vole	*Microtus pennsylvanicus*	
Muskrat	*Ondontra zibethicus*	

Mammal Species	Scientific Name	State/Federal Status
Mink	*Mustela vison*	
Plains pocket gopher	*Geomys bursarius*	
Porcupine	*Erethizon dorsatum*	
Pygmy shrew	*Microsorex hoyi*	
Northern flying squirrel	*Glaucomys sabrinus*	
Northern long-eared bat	*Myotis septentionalis*	Federally endangered
Raccoon	*Procyon lotor*	
Red bat	*Lasiurus borealis*	
Red-backed vole	*Clethrionomys gapperi*	
Red fox	*Vulpes fulva*	
Red squirrel	*Tamiasciurus hudsonicus*	
River otter	*Lutra canadensis*	
Short-tailed weasel	*Mustela erminea*	
Shorttail shrew	*Blarina brevicauda*	
Silver-haired bat	*Lasionycteris noctivagans*	
Snowshoe hare	*Lepus americanus*	
Star-nosed mole	*Condylura cristata*	
Striped skunk	*Mephitis mephitus*	
Southern bog lemming mouse	*Synaptomys cooperi*	
Thirteen-lined ground squirrel	*Citellus tridecemlineatus*	
Water shrew	*Sorex palustris*	
White-footed mouse	*Peromyscus leucopus*	
White-tailed deer	*Odocoileus virginianus*	
Woodland jumping mouse	*Napaeozapus insignis*	
Woodchuck	*Marmota monax*	

Source: (NSPW, 1991a) (NSPW, 1991b) (WI Department of Natural Resources, 2015a)

5.6.1.2.2 Avian Species

Checklists provided by the Cornell eBird website lists 105 avian species that have been identified at two sites near the Trego Project in Washburn County, Wisconsin (eBird, 2023x, eBird, 2023y). The first site is the County Highway K Landing located just downstream of the Trego Dam. The second site is the Trego Nature Trail located upstream of the Project. These two sites comprise the list of avian species in the vicinity of the Trego Project. The checklists are found in **Appendix E-42**. Bird species from the eBird checklists are included in **Table 5.6.1.2.2-1**.

According to eBird, waterfowl, herons, vultures, jays, chickadees, kingfishers, and flycatchers are most often observed at the Project. More specifically, the species include: Canada goose, mallard, blue-winged teal (*Spatula discors*), common merganser, great blue heron, green heron, turkey vulture (*Cathartes aura)*, blue jay (*Cyanocitta cristata*), black-capped chickadee (*Poecile atricapillus*), belted kingfisher (*Megaceryle alcyon*), eastern kingbird (*Tyrannus tyrannus*), and least flycatcher (*Empidonax minimus*) (Cornell eBird, n.d.b) (Cornell eBird, n.d.c).

Raptor species identified at the Project include: bald eagle, broad-winged hawk, sharp-shinned hawk, and osprey (Cornell eBird, n.d.b) (Cornell eBird, n.d.c).

Trego Lake provides summer feeding and breeding habitat for many avian species. Herons, woodpeckers, flycatchers, wood-warblers, and sparrows are among the non-game birds found at or near the lake each year. A diverse array of perching birds are present at the Project as well.

Table 5.6.1.2.2-1 Avian Species in the Vicinity of the Trego Project

Bird Species	Scientific Name	State/Federal Status
Alder flycatcher	*Empidonax alnorum*	
American crow	*Corvus brachyrhynchos*	
American goldfinch	*Spinus tristis*	
American redstart	*Setophaga ruticilla*	
American robin	*Turdus migratorius*	
Bald eagle	*Haliaeetus leucocephalus*	Eagle Act
Baltimore oriole	*Icterus galbula*	
Barn swallow	*Hirundo rustica*	
Bay-breasted warbler	*Setophaga castanea*	
Belted kingfisher	*Megaceryle alcyon*	
Black-and-white warbler	*Mniotilta varia*	
Black-billed cuckoo	*Coccyzus erythropthalmus*	
Blackburnian warbler	*Setophaga fusca*	
Black-capped chickadee	*Poecile atricapillus*	
Blackpoll warbler	*Setophaga striata*	
Black-throated green warbler	*Setophaga virens*	
Blue jay	*Cyanocitta cristata*	
Blue-gray gnatcatcher	*Polioptila caerulea*	
Blue-headed vireo	*Vireo solitarius*	
Blue-winged teal	*Spatula discors*	
Broad-winged hawk	*Buteo platypterus*	
Brown creeper	*Certhia americana*	
Brown thrasher	*Toxostoma rufum*	
Brown-headed cowbird	*Molothrus ater*	
Canada Goose	*Branta canadensis*	
Canada warbler	*Cardellina canadensis*	
Cedar waxwing	*Bombycilla cedrorum*	
Chestnut-sided warbler	*Setophaga pensylvanica*	
Chipping sparrow	*Spizella passerina*	
Common oldeneye	*Bucephala clangula*	
Common grackle	*Quiscalus quiscula*	
Common loon	*Gavia immer*	

Bird Species	Scientific Name	State/Federal Status
Common merganser	*Mergus merganser*	
Common nighthawk	*Chordeiles minor*	
Common raven	*Corvus corax*	
Common redpoll	*Acanthis flammea*	
Common yellowthroat	*Geothlypis trichas*	
Dark-eyed junco	*Junco hyemalis*	
Downy woodpecker	*Dryobates pubescens*	
Eastern bluebird	*Sialia sialis*	
Eastern kingbird	*Tyrannus tyrannus*	
Eastern phoebe	*Sayornis phoebe*	
Eastern towhee	*Pipilo erythrophthalmus*	
Eastern whip-poor-will	*Antrostomus vociferus*	
Eastern wood-pewee	*Contopus virens*	
Fox sparrow	*Passerella iliaca*	
Golden-crowned kinglet	*Regulus satrapa*	
Golden-winged warbler	*Vermivora chrysoptera*	
Gray catbird	*Dumetella carolinensis*	
Gray-cheeked thrush	*Catharus minimus*	
Great blue heron	*Ardea herodias*	
Great crested flycatcher	*Myiarchus crinitus*	
Green heron	*Butorides virescens*	
Hairy woodpecker	*Dryobates villosus*	
Hermit thrush	*Catharus guttatus*	
Hooded merganser	*Lophodytes cucullatus*	
House wren	*Troglodytes aedon*	
Indigo bunting	*Passerina cyanea*	
Killdeer	*Charadrius vociferus*	
Least flycatcher	*Empidonax minimus*	
Magnolia warbler	*Setophaga magnolia*	
Mallard	*Anas platyrhynchos*	
Mourning dove	*Zenaida macroura*	
Nashville warbler	*Leiothlypis ruficapilla*	
Northern cardinal	*Cardinalis cardinalis*	
Northern flicker	*Colaptes auratus*	
Northern parula	*Setophaga americana*	
Northern rough-winged swallow	*Stelgidopteryx serripennis*	
Northern waterthrush	*Parkesia noveboracensis*	
Osprey	*Pandion haliaetus*	
Ovenbird	*Seiurus aurocapilla*	

Bird Species	Scientific Name	State/Federal Status
Pileated woodpecker	*Dryocopus pileatus*	
Pine siskin	*Spinus pinus*	
Pine warbler	*Setophaga pinus*	
Purple finch	*Haemorhous purpureus*	
Red-breasted merganser	*Mergus serrator*	
Red-breasted nuthatch	*Sitta canadensis*	
Red-eyed vireo	*Vireo olivaceus*	
Red-winged blackbird	*Agelaius phoeniceus*	
Rose-breasted grosbeak	*Pheucticus ludovicianus*	
Ruby-crowned kinglet	*Corthylio calendula*	
Ruby-throated hummingbird	*Archilochus colubris*	
Ruffed grouse	*Bonasa umbellus*	
Scarlet tanager	*Piranga olivacea*	
Sedge wren	*Cistothorus stellaris*	
Sharp-shinned hawk	*Accipiter striatus*	
Song sparrow	*Melospiza melodia*	
Sora	*Porzana carolina*	
Spotted sandpiper	*Actitis macularius*	
Swainson's thrush	*Catharus ustulatus*	
Swamp sparrow	*Melospiza georgiana*	
Tennessee warbler	*Leiothlypis peregrina*	
Tree swallow	*Tachycineta bicolor*	
Trumpeter swan	*Cygnus buccinator*	
Turkey vulture	*Cathartes aura*	
Veery	*Catharus fuscescens*	
White-breasted nuthatch	*Sitta carolinensis*	
White-throated sparrow	*Zonotrichia albicollis*	
Wild turkey	*Meleagris gallopavo*	
Wood duck	*Aix sponsa*	
Wood thrush	*Hylocichla mustelina*	
Yellow warbler	*Setophaga petechia*	
Yellow-bellied sapsucker	*Sphyrapicus varius*	
Yellow-rumped warbler	*Setophaga coronata*	
Yellow-throated vireo	*Vireo flavifrons*	

Source: (Cornell eBird, n.d.b) (Cornell eBird, n.d.c)

5.6.1.2.3 Herptile Species

No records of herpetological surveys within the Project boundary were found during a literature review. However, based on the range of herptile species identified on WDNRs *Herps of Wisconsin* website, it is likely that a variety of frogs, snakes, turtles, lizards, and salamanders exist in the area. Reptiles and

amphibians likely to be found in the vicinity of the Trego Project, and for which vouchered collections exist, are listed in **Table 5.6.1.2.3-1** (WI Department of Natural Resources, n.d.h).

The iNaturalist online citizen science platform (iNaturalist.org) contains publicly-sourced observations of flora and fauna throughout the world. Reported herptile observations in the vicinity of theTrego Project include: the American bullfrog (*Lithobates catesbeianus*), green frog (*Lithobates clamitans*), spring peeper (*Pseudacris crucifer*), and gray treefrog (*Hyla versicolor*). Three turtle species were reported observed: spiny softshell (*Alpone spinifera*), common snapping turtle (*Chelydra sepentina*), and wood turtle. There was also one reported observation of a prairie skink (*Plestiodon septentrionalis*) (iNaturalist, n.d.).

Table 5.6.1.2.3-1 Reptile and Amphibian Species Presumed in the Vicinity of the Trego Project

Reptiles and Amphibians	Scientific Name	State/Federal Status
American toad	*Anaxyrus americanus*	
American bullfrog	*Lithobates catesbeianus*	
Blanding's turtle	*Emydoidea blandinii*	
Blue-spotted salamander	*Ambystoma laterale*	
Boreal chorus frog	*Pseudacris triserieta*	
Common gartersnake	*Thamnophis sirtalis*	
Common snapping turtle	*Chelydra sepentina*	
Common watersnake	*Nerodia sipedon*	
Dekay's brownsnake	*Sotreria dekavi*	
Eastern foxsnake (pine)	*Patherophis vulpinus*	
Eastern hognose snake	*Heterodon platirhinos*	
Eastern newt	*Notophthalmus viridescens*	
Eastern red-backed salamander	*Plethodon cinereus*	
Eastern tiger salamander	*Ambystoma tigrinum*	
Four-toed salamander	*Hemidactylylium scutatum*	
Gray treefrog	*Hyla versicolor*	
Green frog	*Lithobates clamitans*	
Mink frog	*Lithobates septentrionalis*	
Mudpuppy	*Necturus maculosus*	
Northern Leopard frog	*Lithobates pipiens*	
Northern ring-necked snake	*Diadophis punctatus edwardsii*	
Painted turtle	*Chysemus picta*	
Prairie skink	*Plestiodon septentrionalis*	
Red-bellied snake	*Storeria occipitomaculata*	
Smooth greensnake	*Opheodrys vernalis*	
Spiny softshell	*Alpone spinifera*	
Spring peeper	*Pseudacris crucifer*	
Wood frog	*Lithobates sylvaticus*	
Wood turtle	*Glyptemys insculpta*	State threatened

Source: (WI Department of Natural Resources, n.d.h)

The wood turtle and Blanding's turtle are known to be present near the Project. A turtle study was conducted on June 6 and 8, 2022 to determine if wood or Blanding's turtles were present in the vicinity of the Project. The study also included an inspection for nesting habitat and evidence of turtle nesting present along the shoreline and within buffered areas of the shoreline. Numerous painted turtles, softshell turtles (*Apalone spp*.), and snapping turtles were observed in the Trego Project area. Overall, high quality and varied turtle habitat is present throughout the vicinity of the Trego Project. It is likely that wood and Blanding's turtles are selectively using the adjacent riverine and wetland habitats (GAI Consultants, Inc., 2023b). The Wood and Blanding's Turtle Nesting Habitat Study results are discussed in more detail in Section 5.7.

5.6.2 Trego Project Environmental Effects

NSPW proposes to continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. NSPW also proposes to continue to maintain a reservoir target elevation of 1,034.9 feet NGVD, with fluctuations limited to 0.3 feet around the target elevation (i.e., between 1,034.6 and 1,035.2 feet NGVD) (Section 3.2.2.1). This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and aquatic resources

5.6.2.1 Botanical Resources

5.6.2.1.1 Terrestrial Shoreline Vegetation

The terrestrial shoreline vegetation present at the Project is common throughout the Project vicinity. NSPW is not proposing any material changes to Project operations. During the current license term, terrestrial botanical resources in the vicinity of the Project have adapted to the Project's operations. No adverse effects to terrestrial botanical resources are anticipated due to continued Project operation.[45]

5.6.2.1.2 Terrestrial Invasive Species

Maintenance of Project facilities and Project works have the potential to increase the risk of spread or transfer of terrestrial invasive species. NSPW has proposed mitigation measures in Section 5.6.3 to address these increased risks.

5.6.2.2 Wildlife Resources

Environmental impacts to threatened and endangered species are discussed in Section 5.7. The wildlife resources in the vicinity of the Project are classified as common for the area. NSPW is not proposing any material changes to Project operations. During the current license term, wildlife species in the Project vicinity have adapted to the Project operations. No effects to terrestrial wildlife resources are anticipated due to the proposed Project operation.[46]

[45] Planned deviations for ice removal are not expected to cause adverse impacts to terrestrial botanical resources due to their short duration and timing outside of the growing season and are therefore, not considered material regarding impact to botanical resources.
[46]Planned deviations for ice removal are not expected to cause adverse impacts to wildlife species due to their short duration and timing during high flow periods, which follows the natural hydrologic cycle and are therefore, not considered material regarding impact to wildlife resources.

5.6.3 Trego Project Proposed Environmental Measures

NSPW will develop a rapid response invasive species plan to monitor for the introduction of new invasive species and limit the dispersal of established species. Within one year of license issuance, NSPW proposes to develop the plan in consultation with the WDNR and NPS prior to filing the plan with the FERC. The plan will incorporate measures for both aquatic and terrestrial invasive species and include a proposal for biennial surveys.

The proposed environmental measures will provide additional benefit for terrestrial resources when compared to the alternative of no-action or denial of the license application. Without issuance of a subsequent license for the Project, the proposed terrestrial resource improvements will not occur.

5.6.4 Trego Project Unavoidable Adverse Impacts

With the implementation of the proposed terrestrial mitigation measures, no unavoidable adverse effects to terrestrial resources are anticipated due to the proposed operation of the Project.

5.7 Trego Project Threatened and Endangered Resources

5.7.1 Trego Project Affected Environment

5.7.1.1 Federally Listed Species

The IPaC website was accessed on March 21, 2023 to develop an Official Species List for the Trego Project. The list identified the potential presence of three federally listed species, one proposed species, and one candidate species in the Project vicinity. In addition to the threatened, endangered, proposed, and candidate species, the Official Species List also identified the potential presence of the bald eagle within the Project vicinity. The IPaC Official Species List is included in **Table 5.7.1.1-1** and detailed in the following sections. The Official Species List is included in **Appendix E-43**.

Table 5.7.1.1-1 Threatened, Endangered, Candidate, and Proposed Species Identified in the Trego Project IPaC Official Species Lists

Common Name	Scientific Name	Group	Status
Canada Lynx	*Lynx canadensis*	Mammal	Threatened
Gray wolf	*Canis lupus*	Mammal	Endangered
Northern long-eared bat	*Myotis septentrionalis*	Mammal	Endangered
Tricolored bat	*Perimyotis subflavus*	Mammal	Proposed Endangered
Monarch butterfly	*Danaus plexippus*	Insect	Candidate

Source: (US Fish and Wildlife Service, 2023b)

5.7.1.1.1 Canada Lynx

The Canada lynx is a federally endangered mammal species associated with moist, cool, boreal spruce-fir forests, with rolling terrain. They are dependent upon snowshoe hare populations and need persistent deep powdery snow, which limits competition from other predators (US Fish and Wildlife Service, n.d.a). There is no designated critical habitat for the species in Wisconsin.

A breeding population has never been discovered in Wisconsin and it is believed that most occurrences are travelling through the state from Michigan or Minnesota. In 1997, the species was removed from the State's endangered species list due to the lack of breeding within the state (UW Stevens Point, n.d.). While it is possible that Canada lynx may travel through the Project area, it is unlikely.

5.7.1.1.2 Gray Wolf

The gray wolf was removed from the Wisconsin state endangered species list in 2004. In 2007, the USFWS delisted the Western Great Lakes wolf population (including Wisconsin). The delisting rule was challenged in federal court and vacated in 2008 resulting in the gray wolf being relisted as federally endangered in Wisconsin and Michigan. In 2009, the USFWS again delisted the Western Great Lakes wolf population. Due to the failure to hold public hearings on the delisting, the rule was vacated via a federal court order in 2009 and relisted as endangered in Wisconsin and Michigan. Wolves retained this status until 2011 when the USFWS issued a new delisting rule. The rule was vacated by a federal court and wolves reverted back to a federally endangered status in 2014. In 2020, the gray wolf was again delisted by a USFWS delisting rule. On February 10, 2022, the order was again vacated by a federal court restoring the endangered status for wolves in Wisconsin and Michigan which is still in effect (WI Department of Natural Resources, 2022c).

The gray wolf is a federally endangered mammal that lives in family groups or packs. The wolf is a habitat generalist. In Wisconsin during the winter of 2020-2021, there were an estimated 292 wolf packs with an average territory size of 63.4 square miles (WI Department of Natural Resources, 2022c). Wolves prefer areas which consist mainly of forestland and other wildland areas. They are common in northern Wisconsin, and although they were not identified in Wisconsin's Natural Heritage Inventory review for the Project vicinity, they may occasionally pass through the Project.

5.7.1.1.3 Northern Long-Eared Bat

The NLEB is a federally and state threatened mammal. The species was reclassified from a federally threatened status to federally endangered status on November 30, 2022 (US Fish and Wildlife Service, 2022). The NLEB roosts during the summer months underneath loose bark or in cavities or crevices of both live and dead trees. Non-reproducing females and males may also roost in cool places such as caves or mines. The NLEB feeds in the forest interior and hibernates in caves and mines during the months of October through April. Iron County, Wisconsin is within the NLEB range. The location of hibernacula and maternity roost trees are tracked in Wisconsin's NHI. However, there are no known hibernacula or roost trees in the Project vicinity (WI Department of Natural Resources, 2023). Project operations that involve tree removal activities may impact unknown maternity roosts.

5.7.1.1.4 Tricolored Bat

On September 13, 2022, the USFWS proposed to list the tricolored bat as an endangered species under the Endangered Species Act. The bat faces extinction due to the impacts of white-nose syndrome, a deadly disease affecting cave-dwelling bats across the country (US Fish and Wildlife Service, n.d.b). The bat is active from spring to fall, primarily roosting among live and dead leaf clusters of live or recently dead hardwood trees. This bat has also been known to roost among pine needles, eastern red cedar, and within artificial roosts like barns, bridges, concrete bunkers, and rarely within caves. Female bats return to

the same summer roosting locations year after year. Tricolored bats typically hibernates in caves and mines during the winter. Where caves are not common, it often hibernates in road culverts and sometimes in tree cavities and abandoned wells. The tricolored bat typically returns to the same hibernaculum each year (US Fish and Wildlife Service, n.d.b).

The tricolored bat is also a state threatened species whose location is tracked in Wisconsin's NHI database. However, there are no known element occurrences of the species within the Project vicinity (WI Department of Natural Resources, 2023). Project operations that involve tree removal may impact unknown roost trees.

5.7.1.1.5 Monarch Butterfly

On December 17, 2020, the USFWS announced that the listing of the monarch butterfly as endangered or threatened was warranted but was precluded by higher priority listing actions. The decision was the result of an extensive species status review that compiled and assessed the monarch's current and future status. The monarch is now a candidate species under the ESA. As a candidate species, its status will be reviewed annually until a listing decision is made (US Fish and Wildlife Service, n.d.c).

The monarch butterfly is one of the most recognized North American butterflies with its 3.5- to 4-inch-long striking orange and black wings. Wisconsin monarchs are migratory, journeying to central Mexico for the winter each year. Adults feed on nectar collected from flowers (WI Department of Natural Resources, n.d.i).

5.7.1.2 State Listed Species

A WDNR endangered resources review, originally conducted on February 17, 2020, was renewed on January 10, 2023. The review identified that one endangered and three threatened species are likely to be found in the vicinity of the Trego Project. It also noted several bald eagle nests located within the Project vicinity (WI Department of Natural Resources, 2023). The threatened and endangered species likely to occur in the vicinity of the Project are shown in **Table 5.7.1.2-1** and the NHI review is included in **Appendix E-44** (privileged document).

Table 5.7.1.2-1 Threatened and Endangered Species Likely to Occur in the Trego Project Vicinity

Common Name	Scientific Name	Group	State Status
Bald eagle	*Haliaeetus leucocephalus*	Bird	Eagle Act
Gilt darter	*Percina evides*	Fish	Threatened
River redhorse	*Moxostoma carinatum*	Fish	Threatened
Purple wartyback	*Cyclonaias tuberculata*	Mussel	Endangered
Wood turtle	*Glyptemys insculpta*	Herptile	Threatened

Source: (WI Department of Natural Resources, 2023)

5.7.1.2.1 Bald Eagle

The bald eagle lives near rivers, lakes, and marshes. During winter, birds congregate near open water in tall trees to locate prey and roost at night for sheltering. The bird mates for life and chooses the tops of large trees to build nests, which they typically use and enlarge each year. They may have one or more alternate nests within their breeding territory. Bald eagles typically return to breeding grounds within 100

miles of where they were raised. Project activities (e.g., maintenance, construction, etc.) that involve disturbance within 660 feet of a nest during the nesting season may cause impacts to the species (US Fish and Wildlife Service, 2021).

Several bald eagle nests have been recorded within the Project vicinity. Vegetation management and construction activities that may occur between January 15 and July 30 within 660 feet of an active bald eagle nest may impact the species.

5.7.1.2.2 Gilt Darter

The gilt darter is a state threatened fish species. It prefers strong currents, deep riffles, and pools in clear, medium to large streams that have clean, silt free bottoms of cobble and small boulders. Spawning occurs from late May to late June (WI Department of Natural Resources, n.d.j).

The presence of the species has been previously confirmed in the vicinity of the Project via WDNR fisheries surveys. WDNR indicated in the NHI review that suitable habitat for the species may be present in the Namekagon River downstream of the Trego Dam. It also noted that the area between the intake and the end of the tailrace, and areas with unnatural (i.e., concrete) river bed, do not provide suitable spawning habitat (WI Department of Natural Resources, 2023). Project operations that involve ground disturbing activities adjacent to the Namekagon River, or work on the bed of the river downstream of the Trego Dam, have the potential to impact the species.

5.7.1.2.3 River Redhorse

The river redhorse is a state threatened fish species. It prefers moderate to swift currents in large river systems, including impoundments and pools. River bottoms of clean gravel are preferred. Spawning typically occurs from mid-May through June when water temperatures reach 68 to 74°F (WI Department of Natural Resources, n.d.k).

The presence of this species has been previously confirmed in the vicinity of the Project via WDNR fisheries surveys. WDNR indicated in the NHI review that suitable habitat for the species may be present in the Namekagon River downstream of the Trego Dam. It also noted that the area between the intake and the end of the tailrace, and areas with unnatural (i.e., concrete) river bed, do not provide suitable spawning habitat (WI Department of Natural Resources, 2023). Project operations that involve ground disturbing activities adjacent to the Namekagon River, or work on the bed of the river downstream of the Trego Dam, have the potential to impact the species.

5.7.1.2.4 Purple Wartyback

The purple wartyback is a state endangered mussel. It is found in large rivers in the western and southern portions of Wisconsin. It prefers a stable substrate containing rock, gravel, and sand in swift current. Known fish hosts include yellow bullhead (*Ameiurus natalis*) and channel catfish (*Ictalurus punctatus*) (WI Department of Natural Resources, n.d.l). The species presence downstream of the Trego Dam was confirmed during the 2022 mussel study. WDNR indicated in the NHI review that suitable habitat for the species is present throughout the Namekagon River and the Trego reservoir. It also noted that the area between the intake and the end of the tailrace, as well as areas with unnatural (i.e., concrete) river bed,

do not provide suitable habitat. Project operations that involve ground disturbing activities adjacent to the reservoir or river that could cause erosion or sedimentation, as well as work on the bed of the reservoir or river, have the potential to impact the species.

5.7.1.2.5 Wood Turtle

The wood turtle is a state threatened reptile species that prefers rivers and streams with adjacent riparian wetlands and upland deciduous forests. The species often forages in open wet meadows or shrub-carr habitats dominated by speckled alder. They overwinter in streams and rivers in deep holes or undercut banks where there is enough water flow to prevent freezing. The species typically remains within 300 meters of rivers and streams. The species nests in open or semi-open canopy areas containing gravel or sandy soils, typically within 60 meters (200 feet) of the water (WI Department of Natural Resources, n.d.m).

Wood Turtle Study

A Wood Turtle Study was completed at the Trego Project on June 6 and 8, 2022, to provide additional information regarding the presence or absence of wood turtles and nesting habitat within the Project boundary. The objective of the study was to determine if wood turtles, nesting habitat, or evidence of nesting was present within the Project vicinity. The report, including maps showing areas of suitable nesting habitat, is included in **Appendix E-23**.

Prior to performing the fieldwork, NSPW mapped buffer areas within 200 feet of the shoreline. Topographic and parcel ownership maps were also reviewed to determine the feasibility of access across land.

Trego Lake was surveyed for the presence of wood turtles and nesting habitat by boat while moving slowly along and parallel to the shoreline. Binoculars were used to provide a good view into the adjacent riparian and upland areas. The Namekagon River downstream of the Trego Dam was surveyed on foot, as were the upland areas owned by NSPW. Shoreline areas accessible to the public were also surveyed. Field surveyors drove along public roads within the buffer areas to identify suitable nesting habitat in upland areas such as road shoulders, roads, driveways, and on private property that could be observed from the road.

Suitable nesting habitat was mapped using a Trimble R1 GNSS Receiver with a GPS device. Areas within the buffer zone not visible from locations accessible to the public were assessed via a desktop review using aerial photography. The desktop effort was combined with the information collected in the field to identify the approximate extent of suitable nesting habitat. Visual encounter surveys, which searched for the presence or absence of basking and nesting wood turtles, were completed concurrently with the shoreline and terrestrial nesting habitat surveys.

No wood turtles or evidence of wood turtle nesting were noted during the visual encounter surveys. However, many basking painted turtles, softshell turtles (*Apalone spp*.), and snapping turtles (*Chelydra serpentina*) were observed. The presence of basking logs along the reservoir shoreline was significantly higher than at the Hayward Project. Fewer basking logs and turtles were observed in the more riverine areas on the upstream end of the reservoir (GAI Consultants, Inc., 2023b).

A total of 4.8 acres of suitable wood turtle nesting habitat was identified within 200 feet of the shoreline. Similar to the Hayward Project, most of the suitable nesting habitat was located within areas of human disturbance, including gravel roads, road shoulders, driveways, parking lots and single-track off-road routes. However, the amount of residential development within the Trego Project buffer zone was much lower. There were also several natural sandy areas along the shoreline that provide suitable nesting habitat, including one beach area where basking softshell turtles were observed (GAI Consultants, Inc., 2023b).

The study report concluded that, while nesting habitat for wood turtles was observed and of high quality, the majority of the habitat mapped was the result of human disturbance (e.g., roads, road shoulders, parking areas, etc.) where disturbance of nests is more likely versus those nest sites occurring natural areas (GAI Consultants, Inc., 2023b).

5.7.2 Trego Project Environmental Effects

5.7.2.1 Effects of Proposed Project Operations on Federally Listed Species

5.7.2.1.1 Canada Lynx

In the NHI review, there were no Canada lynx occurrences identified within a one-mile buffer of the Project boundary and any lynx in the Project vicinity would likely be considered as travelling through the area rather than being full-time residents. Therefore, there will be no impacts to the species from proposed Project operations.

5.7.2.1.2 Gray Wolf

Since no gray wolf occurrences were identified within a 1-mile buffer of the Project boundary during the NHI review, any wolves in the Project vicinity would likely be considered as travelling through the area rather than full time residents. Therefore, there will be no impacts to the species from proposed Project operations.

5.7.2.1.3 Northern Long-Eared Bat

NSPW has not proposed any specific activities in this application that could have an adverse effect upon the species. However, day-to-day operational activities, such as removal of a hazard tree at a recreation site, could cause an impact on NLEB, if occupying said hazard tree. Therefore, NSPW has proposed mitigation measures in Section 5.7.3 to address these types of potential impacts.

5.7.2.1.4 Tricolored Bat

NSPW has not proposed any specific activities in this application that could have an adverse effect upon the species. However, day-to-day operational activities, such as removal of a hazard tree at a recreation site, could cause an impact on the species, if occupying said hazard tree. Therefore, NSPW has proposed mitigation measures in Section 5.7.3 to address these types of potential impacts.

5.7.2.1.5 Monarch Butterfly

Habitat for the monarch butterfly is located within the Project vicinity. The proposed operation is not expected to result in the direct take of the monarch butterfly during any life stage. Nor is the proposed operation of the Project expected to result in any loss of habitat. Therefore, the proposed operation is not expected to have an adverse impact upon the monarch butterfly.

5.7.2.2 Effects of Proposed Project Operations on State-Listed Species

5.7.2.2.1 Bald Eagle

NSPW has not identified any specific activities in this application that involve vegetation management or construction activities within 660 feet of any active eagle nest which could result in adverse impacts to the species.[47]

5.7.2.2.2 Gilt Darter

Suitable habitat for the gilt darter may be present in the Namekagon River downstream of the Trego Dam. NSPW has not proposed any specific activities in this application that involve ground disturbing activities adjacent to or on the bed or banks of the reservoir or river that could adversely impact the species.

5.7.2.2.3 River Redhorse

NSPW has not proposed any specific activities in this application that involve ground disturbing activities adjacent to or on the bed or banks of the reservoir or river that could adversely impact the species.

5.7.2.2.4 Purple Wartyback

NSPW has not proposed any specific activities in this application that involve ground disturbing activities adjacent to or on the bed or banks of the reservoir or river that could adversely impact the species.

5.7.2.2.5 Wood Turtle

As noted in the Wood Turtle Study Report, no evidence of wood turtles or active wood turtle nesting sites were identified during the 2022 survey. However, a total of 4.8 acres of suitable wood turtle nesting habitat was identified.

NSPW has not proposed any specific activities in this application that could have an adverse effect upon the species. However, day-to-day operational activities, such as routine maintenance at a recreation site, could have an impact on any specific wood turtle nesting at the site. Therefore, NSPW has proposed mitigation measures in Section 5.7.3 to address these potential effects. The measures would remain in effect as long as wood turtles remain a state-listed species.

[47] Since routine maintenance of recreation sites has been occurring over the term of the existing license, eagles with existing nests located within a 660-foot buffer of the recreation sites are accustomed to the activities and will not be adversely affected. Likewise, new nests established within a 660-foot buffer of the recreation sites are not likely to be adversely affected, because eagles are establishing a new nest despite the presence of the recreation site and its routine maintenance activities.

5.7.3 Trego Project Proposed Environmental Measures

The environmental measures discussed below are being proposed by NSPW to address potential adverse impacts to threatened, endangered, and candidate species caused by current and proposed Project operations.

The proposed environmental measures discussed below for the NLEB, tricolored bat, bald eagle, gilt darter, river redhorse, purple wartyback, and wood turtle are a significant advancement for threatened and endangered resources. Without the issuance of a subsequent license for the Project, the threatened and endangered resource improvements will not occur.

5.7.3.1 Northern Long-Eared Bat

Wisconsin implements the requirements of a Broad Incidental Take Permit and Broad Incidental Take Authorization for Wisconsin Cave Bats, last updated in November 2022, which are included herein as **Appendix E-24**. NSPW will follow these requirements to provide protection to any NLEB within the Project vicinity during routine recreation site maintenance. NSPW proposes to follow the applicable mitigation measures outlined in the Cave Bat BITP/A. Under the Cave Bat BITP/A, Project activities (e.g., maintenance, construction, etc.) are not likely to jeopardize the continued existence and recovery of the state population of the species or the whole plant-animal community to which they belong.

5.7.3.2 Tricolored Bat

Wisconsin implements the requirements of the Cave Bat BITP/A, last updated in November 2022, which is included in **Appendix E-24**. NSPW will follow these requirements to provide protection to any tricolored bat within the Project vicinity during routine recreation site maintenance. Therefore, the Applicant proposes to follow the applicable mitigation measures outlined in the Cave Bat BITP/A. Under the Cave Bat BITP/A, Project activities (e.g., maintenance, construction, etc.) are not likely to jeopardize the continued existence and recovery of the state population of the species or the whole plant-animal community to which they belong.

5.7.3.3 Wood Turtle

NSPW is not proposing any ground disturbing activities within 200 feet of Trego Lake or the Namekagon River as part of this relicensing proceeding.[48]

The WDNR has implemented an Incidental Take Permit/Authorization for Common Activities for the Wood Turtle dated April 2016. To mitigate the impacts of any recreation site maintenance within 200 feet of the reservoir or river, NSPW is proposing to follow the terms of the Wood Turtle BITP/A as long as the turtle remains a state-threatened or endangered species. Under the Wood Turtle BITP/A, Project activities are not likely to jeopardize the continued existence and recovery of the state population of the protected turtle or the whole plant community to which they belong. The Wood Turtle BITP/A is in **Appendix E-25**.

5.7.4 Trego Project Unavoidable Adverse Impacts

With the implementation of the proposed environmental measures, the proposed operation of the Project is not expected to result in unavoidable adverse effects to threatened, endangered, or candidate listed species.

[48] Grading of existing gravel parking areas, trail maintenance involving trimming of brush, and removal of hazard trees at recreation sites are not considered ground disturbing activities.

5.8 Trego Project Recreation Resources

5.8.1 Trego Project Affected Environment

5.8.1.1 Existing Recreational Resources

NSPW operates and maintains two FERC-Approved recreation sites at the Trego Project. Two additional non-project recreation sites are located in the vicinity of the Project; however, they are not owned or operated by NSPW. The FERC-Approved recreation sites within the Project boundary are listed in **Table 5.8.1.1-1** and the non-project recreation sites in the Project vicinity are listed in **Table 5.8.1.1-2**. The locations of all four sites are depicted in **Figure 5.8.1.1-1**.

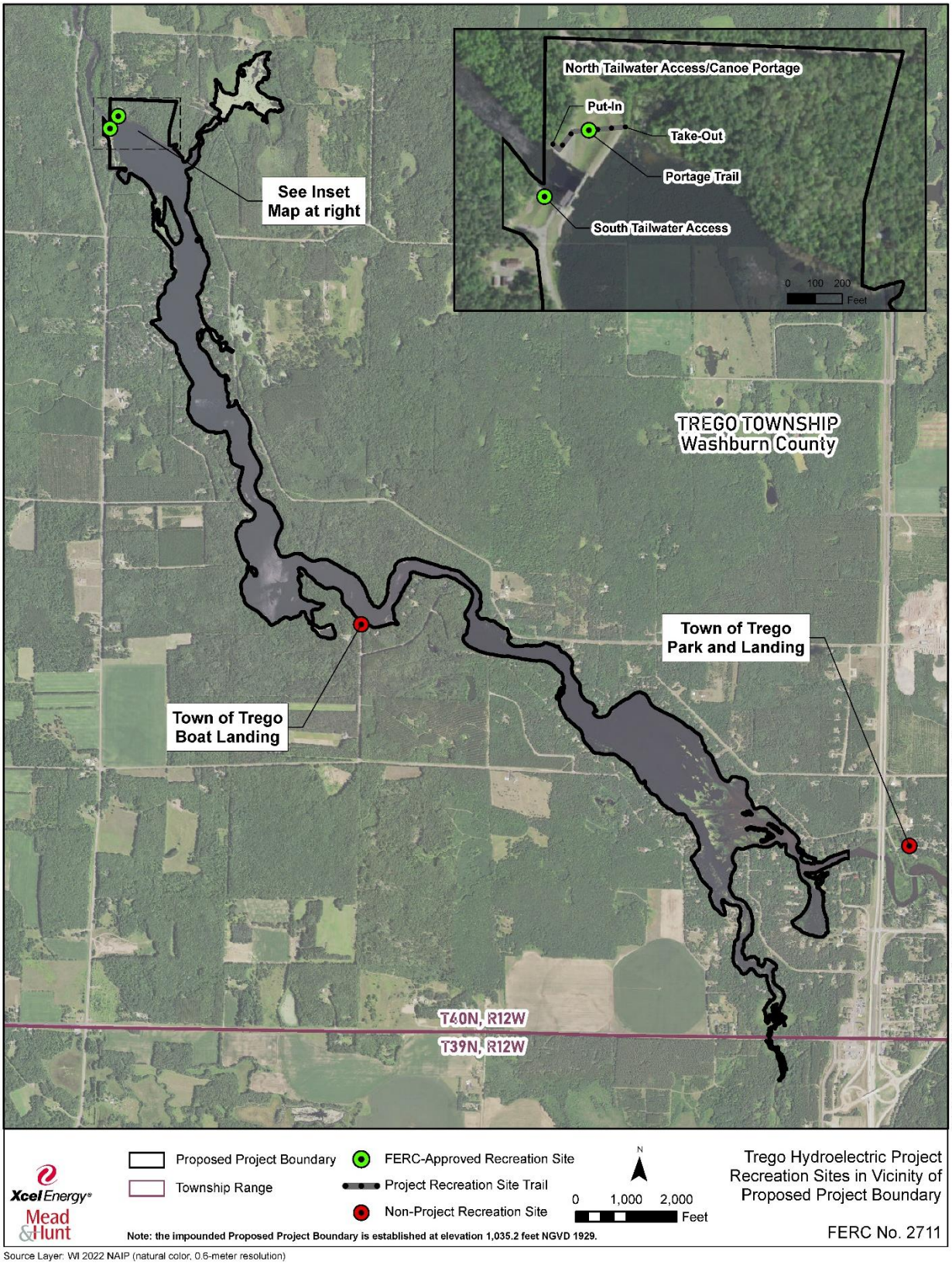
Table 5.8.1.1-1 FERC-Approved Recreation Sites within the Trego Project Boundary

Recreation Site	Site Type	County	Owner	Operator
North Tailwater Access/ Canoe Portage	FERC-Approved	Washburn	NSPW	NSPW
South Tailwater Access	FERC-Approved	Washburn	NSPW	NSPW

Table 5.8.1.1-2 Project Recreation Sites in the Trego Project Vicinity

Recreation Site	Site Type	County	Owner	Operator
Town of Trego Park Boat Landing	Non-Project	Washburn	Town of Trego	Town of Trego
Town of Trego Boat Landing	Non-Project	Washburn	Town of Trego	Town of Trego

Figure 5.8.1.1-1 Recreation Sites in the Trego Project Vicinity



5.8.1.2 Recreation Plans

5.8.1.2.1 License Article 408 Monitoring

While there is no approved recreation Plan for the Trego Project, Article 408 of the current license directs NSPW to monitor recreation use in the Project area every six years to determine whether the existing recreation facilities are meeting recreation needs. Results from monitoring are then summarized in a report that includes annual recreation use figures, discussion of the adequacy of the facilities to meet recreation demand, methodology used, and documentation of consultation with the NPS, USFWS, and WDNR.

Recreation monitoring was last conducted in 2020 and the report was filed with FERC on February 26, 2021. The report concluded that the recreational facilities were in good condition and were sufficient to accommodate the current use on all but the busiest of days. Recreation use was described as stable or slightly higher since the previous report and was concentrated primarily during the day and on weekends. Only one recommended action was identified in the report for the NSPW-owned facilities. That recommendation was for a trash receptacle to be added or emptied more frequently at the North Tailwater Access and Canoe Portage site.[49] The 2021 Recreation Report for the Trego Project is included in **Appendix E-45**.

5.8.1.2.2 Wisconsin Statewide Comprehensive Outdoor Recreation Plan

Wisconsin regularly publishes a SCORP as required by the Federal Land and Water Conservation Fund Act of 1965. The SCORP is used to help allocate federal funds among local communities and focuses on preserving and improving recreation opportunities in Wisconsin while targeting relationships such as public health and wellness, urban access to outdoor recreation, and public-private partnerships. The latest SCORP covering the period 2019-2023 recognizes one of the top-priority needs is to provide more recreation places near urban centers, trails, and water access to support a variety of nature-based recreation (WI Department of Natural Resources, 2019). A copy of the SCORP was provided in the PAD as Appendix 4.8.3.1-1.

5.8.1.2.3 Washburn County

The Washburn County Forest Comprehensive Land Use Plan guides recreation, including but not limited to, activities on County Forest land such as ATV/snowmobile use. Several of these recreation trails are located within the vicinity of the Trego Project. No specific recommended recreational improvements in the vicinity of the Project were identified in the plan (Washburn County, 2021). A copy of Chapter 900 of the Washburn County Forest Comprehensive Land Use Plan is provided in **Appendix E-46**.

5.8.1.2.4 St. Croix National Scenic Riverway

As previously noted, the entire mainstem of the Namekagon River is included in the Wild and Scenic Rivers System as part of the St. Croix National Scenic Riverway. While the Trego Project is located within the boundaries of the scenic riverway, there are no NPS or other federal lands within the Project boundary. The NPS maintains several recreation sites on the Namekagon River, as well as a visitor center in the Town of Trego. The NPS developed a series of maps depicting NPS and other recreation access sites along the Namekagon River. These maps include general use regulations within the scenic riverway (**Appendix E-28**).

[49] There are no trash receptables at any of NSPW's recreation sites in the Project vicinity.

5.8.1.3 Recreation Study

Pursuant to the final Recreation Study Plan filed with FERC on April 21, 2022, NSPW conducted a Recreation Study at the Trego Project. The purpose of the study was to provide a subjective assessment of recreation facility conditions and needed enhancements. The study was also to determine if the capacity of existing facilities is sufficient to meet current and future demand, as well as provide sufficient information for making recommendations regarding recreation enhancements. The study is described in the sections below and consisted of the following study protocols:

- Recreation Site Inventory
- Facility Condition Assessment
- Recreation Use Survey
- Recreation Spot Counts
- Future and Potential Recreation Questionnaires

5.8.1.3.1 Recreation Inventory

Each of the recreation sites shown in **Figures 5.8.1.3.1-1 through 5.8.1.3.1-4** were inventoried in May 2022 during the primary open water recreation season. Recreation amenities identified at each site are included below in **Table 5.8.1.3.1-1**.

Table 5.8.1.3.1-1 Recreation Site Inventory for the Trego Project

Recreation Site	Parking Spaces	Boat Launch / Carry-In	Picnic Facilities	Bank Fishing	Part 8 Sign	Rest Rooms	Other Signage
FERC-Approved Recreation Sites							
North Tailwater Access/Canoe Portage	Vehicle (8)	Canoe Portage	No	Fishing platform	No	Portable Toilet (1)	Directional (1) Informative (1)
South Tailwater Access	Vehicle (4)	No	No	Fishing platform	Yes	No	Regulatory (1) Directional (2)
Non-Project Recreation Sites							
Town of Trego Boat Landing	Vehicle (8) or Trailer (2) Barrier-free (1)	1-lane (concrete)	No	Dock/pier	No	No	Regulatory (6) Informative (1)
Town of Trego Park Boat Landing	Vehicle (20) Trailer (6)	1-lane (concrete)	No	Informal	No	No	Regulatory (2) Directional (2)

Source: (EA Engineering, Science, and Technology, Inc., 2023)
(P)= Project Site, (NP) = Non-Project Site

The completed Recreation Facility Inventory and Condition forms, and more detailed descriptions of the amenities found at each recreation site, are in the Recreation Study Report included in **Appendix E-29**. A summary of the amenities for each of the recreation sites is provided in the following paragraphs.

Trego North Tailwater Access/Canoe Portage

This Project recreation site is owned and operated by NSPW and provides access to the north side of the Trego Dam. More specifically, the site provides access to the tailwater for fishing and also features the canoe portage. The canoe portage take-out is located at the north end of the safety buoys. The portage trail extends approximately 325 feet to the downstream put-in, which is adjacent to the tailwater fishing access. The tailwater fishing access consists of a concrete retaining wall with safety rail along the river that serves as a fishing platform. Parking is available for approximately 8 vehicles along the gravel access road and along the shoulder of River Road. There is also a portable toilet at the site. The site is shown in **Figure 5.8.1.3.1-1**. Additional photographs taken during the study are included in Appendix 3 of the Recreation Study Report.

Figure 5.8.1.3.1-1 North Tailwater Access Canoe Portage Take-Out and Trail at the Trego Project

South Tailwater Access

This Project recreation site on the south side of the Trego Dam provides fishing access to the tailwater area. There are two metal staircases leading to a concrete retaining wall with safety rails that serve as a fishing platform. A paved parking area is located at the end of Ricci Road that can accommodate up to four vehicles. The site is shown in **Figure 5.8.1.3.1-2**. Additional photographs taken during the study are included in Appendix 3 of the Recreation Study Report.

Figure 5.8.1.3.1-2 South Tailwater Access Stair and Fishing Area at the Trego Project

Town of Trego Boat Landing (Trego Landing Road)

This non-Project site is owned and operated by the Town of Trego and is located at the end of Trego Landing Road. The site has a single lane boat ramp consisting of concrete-planks, a dock, regulatory signage, and parking along the side of Trego Landing Road that can accommodate eight vehicles or two vehicles with trailers. One of the parking sites is designated as barrier-free. The site is shown in **Figure 5.8.1.3.1-3**. Additional photographs taken during the study are included in Appendix 3 of the Recreation Study Report.

Figure 5.8.1.3.1-3 Town of Trego Boat Landing and Dock (Trego Landing Road) at the Trego Project

Town of Trego Park Boat Landing (Cash Road)

This non-project recreation site is owned by the Town of Trego and is located on the Namekagon River just upstream of the US Highway 53 Bridge at the end of Cash Road. The site has a single lane boat ramp consisting of concrete planks, regulatory signage and a gravel parking area that can accommodate a total of 20 vehicles or six vehicles with trailers. The site is shown in **Figure 5.8.1.3.1-4**. Additional photographs taken during the study are included in Appendix 3 of the Recreation Study Report.

Figure 5.8.1.3.1-4 Town of Trego Park Boat Landing (Cash Road)

5.8.1.3.2 Recreation Facility Condition Assessment

An assessment of recreation facilities was completed to determine if their amenities were in good condition or required maintenance, repair, or replacement. The only deficiency noted during the assessment was regarding signage at the Town of Trego Park boat ramp. There were no deficiencies identified at NSPW's facilities. A summary of recommended site improvements is listed in **Table 5.8.1.3.2-1**. Complete results from the condition assessments are found in Appendix 4 of the recreation study report.

Table 5.8.1.3.2-1 Recommended Recreation Facility Improvements Identified at the Trego Project

Recreation Site	Recommended Improvements
North Tailwater Access/Canoe Portage	No recommended improvements
South Tailwater Access	No recommended improvements
Town of Trego Boat Landing (Trego Landing Rd)	No recommended improvements
Town of Trego Park Boat Landing (Cash Rd)	Replacement of wooden “No Camping” sign

Source: (EA Engineering, Science, and Technology, Inc., 2023)

5.8.1.3.3 Recreation Use Survey

Pursuant to the final study plan, NSPW developed a recreation use survey form to collect visitor information on the following items:

- Number of people in party.
- Primary reason for visiting the site.
- Perception of level of use.
- Opinions regarding amount, type, and condition of recreation facilities.

Recreation use surveys were conducted on 16 randomly selected weekdays, weekends, and holiday weekend days between January and September. The survey schedule is shown below in **Table 5.8.1.3.3-1**. Surveyors remained at each site for at least one hour between the hours of 7:00 am and 7:00 pm. Surveys were completed on a rotating schedule to avoid repeatedly conducting surveys at the same time of day and to account for time-of-day use patterns. Upon arriving at the site, the surveyor conducted a spot count of recreation users. The results of the spot counts are discussed in Section 5.8.1.3.4.

Table 5.8.1.3.3-1 2022 Recreation Use Survey Dates at the Trego Project

Survey Date	Type of Day	Survey Date	Type of Day
January 22	Weekend	June 20	Weekday
January 27	Weekday	June 25	Weekend
February 9	Weekday	July 4	Holiday Weekend
February 19	Weekend	July 5	Weekday
April 10	Weekend	August 6	Weekend
May 1	Weekend	August 13	Weekend
May 28	Holiday Weekend	August 19	Weekday
June 12	Weekend	September 11	Weekend

The recreation use survey resulted in 29 user interviews among the four sites. The majority of interviews were completed at the South Tailwater Access (12), followed by North Tailwater Access/Canoe Portage (8), the Town of Trego Park Boat Landing (6), and the Town of Trego Boat Landing (3). Of the 29 interviews, 13 were conducted in spring (April to June), 16 in Summer (July to September) and none during the winter (January through February).

Visitors were asked which of the nine activities listed in **Table 5.8.1.3.3-2** they participated in during their visit. Only five of the nine activities were identified by visitors as the primary recreation activity and several

visitors participated in more than one of the recreation activities. A summary of recreational activities each visitor participated in is also shown in the table below. The most popular activities at the Trego Project were shoreline/tailwater fishing (69%), motorized boating (28%), and paddling (21%). Hiking was the most common "other" activity.

Table 5.8.1.3.3-2 Recreational Activities Listed for Current Visit at the Trego Project

Recreation Site	Shore Fishing	Boat Fishing	Motorized Boating	Paddling	Swimming	Picnicking	Wildlife Viewing	Ice Fishing	Other
North Tailwater Access/Canoe Portage	7	0	0	0	0	0	0	0	1
South Tailwater Access	9	0	2	2	0	0	0	0	1
Town of Trego Boat Landing (Trego Landing Rd)	0	1	2	1	0	0	0	0	0
Town of Trego Park Boat Landing (Cash Rd)	4	0	4	3	0	0	0	0	0
Totals	**20**	**1**	**8**	**6**	**0**	**0**	**0**	**0**	**2**

Source: (EA Engineering, Science, and Technology, Inc., 2023)

Visitors were asked if they were prevented from participating in an activity of their choice. If so, they were asked to provide the reason(s) why. None of the 29 respondents indicated that they were unable to participate in their preferred activity. Nobody indicated that physical condition or personal limitation prevented them from participating in an activity.

Users were asked several questions about resource crowding at the recreation sites. The results are shown in **Table 5.8.1.3.3-3**. Eighty-eight percent of the respondents stated that the resources were not crowded. Only three respondents indicated that at least some of the resources were moderately to extremely crowded. When asked if crowding caused them to change their plans, only one respondent replied affirmatively. In that case, the individual moved to avoid crowding.

Table 5.8.1.3.3-3 Crowding Perception During Visit to Trego Project

Resource	Not Crowded	Slightly Crowded	Moderately Crowded	Very Crowded	Extremely Crowded
Parking	25	2	0	0	0
Trails	13	2	0	0	0
Campground	2	0	0	2	0
Boat-in Campsite	0	0	0	0	0
Shore Fishing	17	2	1	0	0
Boating	7	0	0	0	0
Total Each Response	**64**	**6**	**1**	**2**	**0**
Total Number of Responses	**73**				

Source: (EA Engineering, Science, and Technology, Inc., 2023)

Visitors were also asked to rate their satisfaction with recreation amenities according to the following scale:

1- very satisfied,
2- somewhat satisfied,
3- neither,
4- dissatisfied, or
5- very dissatisfied.

The average rating of all facilities was 2.1 (between satisfied and neutral). Visitors were asked to comment on the amenities, needs or concerns with the facilities near the Project. Recommended improvements were divided into two categories: maintenance and new amenities. The recommendations are summarized in **Table 5.8.1.3.3-4**.

Table 5.8.1.3.3-4 Recreation Site Maintenance and New Amenity Recommendations at the Trego Project

Location	Maintenance Recommendations	New Amenity Recommendations
North Tailwater Access/Canoe Portage	None	Trash receptacles (1)
		Expand fishing area (1)
		Add rod holders on railings (1)
South Tailwater Access	Replace signage (1)	Trash receptacles (2)
		New signage (1)
		Expand fishing area (3)
		Lighted stairway (1)
Town of Trego Boat Landing (Trego Landing Rd)	Replace signage (1)	Install portable toilet (1)
	Remove rocks at end of Landing and by dock (1)	Add marker sign at CTH K (1)
Town of Trego Park Boat Landing (Cash Rd)	None	New better signage (2)

Source: (EA Engineering, Science, and Technology, Inc., 2023)

5.8.1.3.4 Recreation Spot Counts

The 16 recreational surveys conducted between January and September resulted in a total of 84 spot counts. A total of 34 users were observed during the spot counts. The average spot count was 2.13 users per location. The Town of Trego Boat Landing (Trego Landing Rd) and Town of Trego Park Boat Landing (Cash Rd) showed the most use with 62% of the total users observed (EA Engineering, Science, and Technology, Inc., 2023). The spot count numbers were similar among all months and seasons with the exception of August, which was substantially higher.

Winter activities at the Trego Project were minimal. Summer activities were largely split between power boating and shoreline/tailwater fishing. The spot count results are summarized in **Table 5.8.1.3.4-1**. A more detailed description of the results from the recreation survey, including the completed survey forms, is available in the Recreation Study Report in **Appendix E-29**.

Table 5.8.1.3.4-1 Recreation Use Based on Recreation Survey Spot Counts at the Trego Project

Recreation Site	January	February	April	May	June	July	August	September	Total
North Tailwater Access/Canoe Portage	0	0	0	2	1	0	3	2	**8**
South Tailwater Access	0	0	1	0	0	1	2	1	**5**
Town of Trego Boat Landing (Trego Landing Rd)	2	0	0	0	1	0	9	0	**12**
Town of Trego Park Boat Landing (Cash Rd)	0	0	1	1	0	3	3	1	**9**
Totals	**2**	**0**	**2**	**3**	**2**	**4**	**17**	**5**	**34**

Source: (EA Engineering, Science, and Technology, Inc., 2023)

5.8.1.3.5 Future and Potential Recreation Surveys

Future and potential recreation use questionnaires were mailed to representatives from the Town of Trego, TLD, Washburn County and NPS on July 14, 2022. Stakeholders were asked about their interest in recreation sites in the vicinity of the Trego Project as well as their primary function and responsibilities in regard to the sites. NPS and TLD were the only entities that responded.

National Park Service

The NPS responded that the Namekagon River is protected as part of the Wild and Scenic Rivers system and the National Park system. The river is managed by the St. Croix National Scenic Riverway for the "preservation and protection of the aquatic, cultural, recreational, scenic-aesthetic, water quality, and free-flowing condition values." The NPS does not manage sites near the Project, but has "an interest in providing safe, high-quality, recreational opportunities to the public as part of the NPS experience."

NPS owns and manages the County K Landing, which is approximately 0.4 miles downstream of the Trego Dam. This site includes a gravel access to the river, picnic tables, interpretive and informational signage, a paved parking lot, and a vault toilet. NPS also maintains the Namekagon Visitor Center in the Town of Trego and the Earl Landing located on the Namekagon River approximately midway between the Hayward and Trego Projects. This landing includes a gravel parking area, concrete boat ramp, vault toilet, primitive camping, potable water, and picnic tables.

NPS noted that two river access points near their visitor center were recently removed due to the redevelopment of the US Highway 63 and US Highway 53 interchange project. One access site was on the north shoreline and one was on the south shoreline. The interchange project also resulted in the removal of Lakeside Road Bridge. No recreational facilities remain in these areas. The removal of the facilities has reduced river access and has resulted in the Earl Landing frequently exceeding its parking capacity. NPS is considering constructing a new access point near the Highway 63 Bridge east of the Namekagon River Visitor Center and is currently in the design stage to make improvements to the Earl Landing.

Trego Lake District

The TLD is "a specialized unit of government created to manage Trego Lake with a legal responsibility to support and encourage the preservation of the natural beauty, peacefulness, safety, and recreational value of the shoreline and waters of Trego Lake, and to coordinate with the various public and private organizations in these efforts". The district encompasses the water and shoreline from the Trego Dam to the State Highway 53 Bridge and is managed by those owning land within the district boundary. There are approximately 275 landowners within the district.

TLD works with the WDNR to analyze water quality, protect the fishery, and coordinate control of aquatic invasive species in the lake. They also work cooperatively to maintain and mark navigation channels. TLD noted that recreational activities on the lake are impacted by sedimentation build up and aquatic invasive species. The TLD, in conjunction with the Town of Trego, operates and maintains the Town of Trego Boat Landing. There is also a private resort and campground on the lake known as Bay Park Resort and Campground. TLD indicated that these sites have not exceeded capacity or experienced insufficient parking.

TLD also expressed concern with the closure of the recreation sites that resulted from the State Highways 63 and 53 interchange project and believes the former sites need to be replaced. TLD also foresees the need to expand aquatic invasive species management and sedimentation management to improve recreational opportunities within the lake.

5.8.1.4 Adequacy of Recreation Facilities to Address Current and Future Demand

The Recreation Study spot counts resulted in 32 users over 12 observations during the open water recreation season for an average of 2.7 users per day. During the winter survey period, 2 users were counted over 4 observations for an average of 0.3 users per day. Assuming each observation accounted for an entire recreation day, the total recreation days as surveyed during the 2022 primary open water recreation season was 578 (214 days at 2.7 users per day). The total recreation days as surveyed during the 2022 winter recreation season was 45 (151 days at 0.3 users per day). This calculates to an annual total of 623 recreation days in 2022.

As stated in the Recreation Study Report, recreationists traveled an average of 52 miles to reach the Trego Project. Therefore, it is appropriate to utilize projected population growth from Washburn County, Wisconsin to address current and future demand. As outlined in Section 5.12.1.1 of this application, the population of Washburn County is projected to increase by 8.3% between 2020 and 2040. Therefore, the number of recreation days for recreation facilities is expected to increase at the same rate to by 2040 to 674.8 recreation days.

5.8.2 Trego Project Environmental Effects

5.8.2.1 Adequacy of Recreation Facilities

Information provided in Section 5.8.1 indicates that the Trego Project's recreation facilities are adequate for the Project vicinity and can accommodate the existing and projected recreation use during the term of the pending subsequent license. While the recreation survey showed most recreationists were satisfied

with the existing facilities, several respondents made recommendations for maintenance and/or new amenities. These recommendations are shown above in **Table 5.8.1.3.3-4**.

At the NSPW owned recreation sites, recommendations included the addition of trash receptacles, expansion of the fishing area, adding stairway lights, and addition of rod holders to the railings. NSPW does not provide waste receptacles or rod holders at any of its recreational facilities. The sites are typically used during daylight hours; therefore, no additional lighting is being proposed. The current and projected future recreation use does not justify the expansion of the existing fishing areas. However, NSPW is proposing signage improvements as discussed below in Section 5.8.3.

At the Town of Trego's facilities, several maintenance and new amenity recommendations were also made (**Table 5.8.1.3.3-4**). The Recreation Study Report (**Appendix E-29**) outlines the recommended improvements for the owners of these non-project sites to consider.

In their Future and Potential Recreational Use Survey response, the TLD expressed concern with the impacts of sedimentation and aquatic invasive species on recreation within the Project and indicated that expanded sedimentation and aquatic invasive species management was needed.

As noted in Section 5.3.1.5, the source of sediment within the upper reservoir of Trego Lake is the result of erosion occurring upstream of the project boundary rather than from reservoir fluctuations or erosion within the reservoir. That upstream sediment is then deposited when river flow slows as it enters the reservoir. Therefore, the sediment load in the upper reservoir of Trego Lake is not the result of Project operations.

NSPW has proposed the development of an Aquatic and Terrestrial Invasive Species Plan and a Vegetation Management Plan in Section 5.5.3. These plans will address recreational navigation impacts from aquatic invasive species over the term of the subsequent license.

5.8.2.2 Effects of Project Operations on Recreation

NSPW proposes to continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. NSPW will maintain a target elevation of 1,034.9 feet NGVD, with fluctuations limited to 0.3 feet around the target elevation (i.e., between 1,034.6 and 1,035.2 feet NGVD) (Section 3.2.2.1). This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and aquatic resources

The information included in Section 5.8.1 did not identify any adverse impacts from Project operations (e.g., reservoir elevation fluctuation) on existing recreation facilities. Therefore, the proposed operation of the Project is not expected to adversely affect recreational resources.

5.8.3 Trego Project Proposed Environmental Measures

NSPW proposes the following environmental measures be implemented during the term of the subsequent license in regard to recreation. The proposed environmental measures are an advancement for recreation at the Project compared to the alternative of no-action or denial of the license application. Without the issuance of a subsequent license, the improvements would not occur.

5.8.3.1 North Tailwater Access/ Canoe Portage

- Review and maintain or improve signage, including Part 8 signage that meets current FERC standards.
- Conduct routine maintenance of site, including signage, during term of the subsequent license.[50]
- Continue to maintain portable restroom facilities during open water season during the term of the subsequent license.
- Implement the Cave Bat BITP/A for any routine vegetation management activities.
- Implement the Wood Turtle BITP/A as long as the turtle remains a state-listed species.

5.8.3.2 South Tailwater Access

- Review and maintain or improve signage, including Part 8 signage that meets current FERC standards.
- Conduct routine maintenance of site, including signage, during term of subsequent license.
- Implement the Cave Bat BITP/A for any routine vegetation management activities.
- Implement the Wood Turtle BITP/A as long as the turtle remains a state-listed species.

5.8.4 Trego Project Unavoidable Adverse Impacts

With the implementation of the proposed environmental measures, the proposed operation of the Trego Project is not expected to result in any unavoidable adverse impacts to recreation resources.

5.9 Trego Project Land Use

5.9.1 Trego Project Affected Environment

5.9.1.1 Existing Land Use

Based on the USGS National Land Cover Database, major land uses within the vicinity of the Project include deciduous forest, mixed forest, developed/open space, and wooded wetlands. A map illustrating the major land uses in the Trego Project vicinity is included as **Appendix E-48**.

In Wisconsin, development is vested with the counties and municipalities. As such, the Washburn County shoreland and floodplain zoning regulations apply to the Trego Project. According to the Washburn County Comprehensive Plan 2025, major land uses within the county consist of 46.0% forestry, 32.2% agricultural, 9.5% residential recreational, 6.8% agricultural recreational, 2.2% resource conservation, 2.2% residential, 0.5% commercial and industrial, and 0.6% other (Washburn County, 2004).

[50] Routine maintenance includes mowing lawn areas, trail maintenance, trimming of woody vegetation, grading of existing gravel parking areas, and removal of hazard trees.

The NPS developed the General Management Plan for the Upper St. Croix and Namekagon Rivers in 1998 to guide future development and management of federally owned lands within the riverway. The lands adjacent to Trego Lake were designated as Developed Recreation Areas where high density, clustered, and sensitively placed planned developments that blend with the Northwoods ecosystem are permitted. This classification can accommodate a moderate to high level of recreation or development (National Park Service, 1998). On non-federal lands, NPS encourages tribal, state, county, municipal, and private landowners within the riverway boundary to manage their lands in a manner consistent with the NPS.

5.9.2 Trego Project Environmental Effects

NSPW proposes to continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. NSPW will maintain a reservoir target elevation of 1,034.9 feet NGVD, with fluctuations limited to 0.3 feet around the target elevation (i.e., between 1,034.6 and 1,035.2 feet NGVD) (Section 3.2.2.1). This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and aquatic resources

Since no material changes to Project operations are being proposed[51], the proposed operation of the Project is not expected to cause any adverse impacts to land use.

5.9.3 Trego Project Proposed Environmental Measures

No environmental measures for land use have been proposed in this application.

5.9.4 Trego Project Unavoidable Adverse Impacts

The proposed Project operation is not expected to cause unavoidable adverse impacts to land use.

5.10 Trego Project Aesthetic Resources

5.10.1 Affected Environment

The Trego Dam impounds the Namekagon River creating the 435 acre Trego Lake. The Project has been operating in its current configuration since 1928 when the original powerhouse in the middle embankment was abandoned and a new powerhouse was built. From its original construction to the present, the Project has become integral with the local environment. The Trego Dam and powerhouse are shown in **Figures 5.10.1-1** and **5.10.1-2**. Trego Lake is shown in **Figure 5.10.1-3**. The Namekagon River downstream of the Project is shown in **Figure 5.10.1-4**.

[51] The planned deviations for ice removal purposes are not expected to cause adverse effects to land use due to their short duration and timing during high flow periods, which matches the natural hydrologic cycle. Therefore, the planned deviation is not considered a material change regarding impacts to the land use resource.

Figure 5.10.1-1 View of Trego Dam and Powerhouse (looking northeast).

Figure 5.10.1-2 View of Trego Dam and Powerhouse from Canoe Portage Put-In (looking upstream)

Figure 5.10.1-3 View of Trego Lake (looking upstream)

Figure 5.10.1-4 Downstream View of the Namekagon River from South Tailwater Fishing Area at the Trego Project

5.10.2 Trego Project Environmental Effects

The Trego Project provides for an aesthetically pleasing lake setting which is not expected to be adversely impacted by the proposed operation of the Project.

5.10.3 Trego Project Proposed Environmental Measures

NSPW proposes to continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. NSPW also proposes to continue to maintain a target reservoir elevation of 1,034.9 feet NGVD, with fluctuations limited to 0.3 feet around the target (i.e., between 1,034.6 and 1,035.2 feet NGVD) (Section 3.2.2.1). This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resources.

No other environmental measures for aesthetics are being proposed.

5.10.4 Trego Project Unavoidable Adverse Impacts

With the implementation of the mitigation measures described above, the proposed operation of the Project will not result in unavoidable adverse impacts to aesthetics.

5.11 Trego Project Cultural Resources

Section 106 of the NHPA directs federal agencies to consider the effects of their undertakings on historic properties within the APE and to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment. The regulations implementing Section 106 define “historic properties” as any pre-contact or historic period district, site, building, structure, or individual object included in or eligible for inclusion in the NRHP. This term includes artifacts, records, and remains related to and located within historic properties, as well as Traditional Cultural Properties that meet the NRHP criteria.

To meet the interests and requirements of all consulting parties, NSPW identified historic and archaeological properties within the Project’s APE in accordance with Section 106 of the NHPA and 36 CFR 800 - Protection of Historic Properties. In Wisconsin, the specific monitoring requirements are outlined in the December 30, 1993, Programmatic Agreement (Section 1.3.4).

The Programmatic Agreement defines the APE as:

- Lands enclosed by the Project boundary as delineated in the existing license.
- Attached or associated buildings and structures extending beyond the Project boundary which contribute to the NRHP eligibility of the hydroelectric generating facility.
- Lands or properties outside the Project boundary where the Project may cause changes in the character or use of historic properties, if any historic properties exist.

The Cultural Resources Study is composed of two efforts, an Architecture/History Investigation and Archaeological Shoreline Monitoring.

5.11.1 Trego Project Affected Environment

5.11.1.1 Area of Potential Effect

The APE for the Trego Project as defined in the Programmatic Agreement is coincident with the proposed Project boundary. More specifically, the APE encompasses land up to elevation 1,035.2 feet NGVD and the lands immediately surrounding the Trego Dam and its appurtenant facilities. The Project boundary is depicted in Exhibit G of this application.

5.11.1.2 Historical Properties

Per the requirements of the Programmatic Agreement, in 2022 an investigation of the Project's historical properties was conducted. A review of the Architectural and Historic Inventory revealed one historic district and one historic structure within the current Project boundary. The Trego Historic District, which includes the Trego Dam and powerplant, was evaluated for eligibility with the NRHP on July 11, 1991 and determined eligible (WI Historical Society, n.d.). The Old Highway 53 Bridge is a historic structure that is located in a river reach not impounded by the Trego Dam at the reservoir's full pool elevation of 1,035.2 feet NGVD. Therefore, no further evaluation of the structure was completed.

5.11.1.3 Archaeological Properties

Per the requirements of the Programmatic Agreement, in 2022 an investigation of archaeological properties at the Trego Project was conducted. The literature review identified seven archaeological sites mapped adjacent to the current Project boundary. A 1991 archaeological survey report noted that five of the sites were adjacent to the shoreline. The Cultural Resources Study included an inspection of the entire shoreline by boat for areas of erosion where artifacts may be exposed, as well as a review of each of the seven previously identified sites whose boundaries overlapped or were mapped close to the shoreline. For the previously mapped areas, a boat was used to access the site followed by an on-foot inspection. The field survey did not identify any archaeological properties impacted by Project operations. Two of the previously identified sites, WB-0110 and WB-0039, are located in a river reach upstream of the area impounded by the Project Dam at the full pool elevation of 1,035.2 feet NGVD. The Cultural Resource Study Report is in **Appendix E-32**.

5.11.1.4 Historic Properties Management Plan

A HPMP is a compliance and management plan that integrates the entirety of federal and state cultural resources program requirements with ongoing practices, such as water level changes, allowing for the identification of potential compliance and preservation actions that may occur over the course of the upcoming license period. The intent is to ensure historic properties, as defined under federal law, and which may be affected by Project operation, are appropriately managed for future generations. The HPMP is designed to comply with the requirements of applicable federal and state laws and regulations, including the NHPA, Native American Graves Protection and Repatriation Act of 1990, Archaeological Resources Protection Act of 1979, the Commission guidelines for development of the HPMP, and the Programmatic Agreement.

Per the requirements of the Programmatic Agreement, NSPW will develop a HPMP in consultation with the Wisconsin SHPO and interested Native American Nations. The plan will be developed within one year of license issuance.

5.11.2 Trego Project Environmental Effects

5.11.2.1 Effects of Project on Historic and Archaeological Resources

The Cultural Resource Study Report noted that no areas of erosion were identified during the survey and that little erosion is expected in the future due to the run-of-river operation and lack of erosion noted in previous surveys. The archaeologist recommended that future shoreline monitoring adhere to the schedule outlined in the future HPMP. As previously noted, the proposed Project boundary shown in Exhibit G includes only those areas inundated at the full pool elevation of 1,035.2 feet NGVD and the lands owned by NSPW near the dam. Since archaeological sites WB-0110 and WB-0039 are upstream of the impounding effects of the Trego Dam, they are not impacted by Project operations and thus excluded from the Project boundary.

The Cultural Resource Study findings and recommendations were provided to the Wisconsin SHPO for their review and comment on February 1, 2023. Wisconsin SHPO concurred with the Cultural Resources Report findings via email on March 28, 2023 (Howe, Tyler, 2023b). There are currently no adverse effects on cultural resources from Project operations.

5.11.3 Trego Project Proposed Environmental Measures

Per the requirements of the Programmatic Agreement, NSPW proposes to develop a HPMP in consultation with the Wisconsin SHPO and interested Native American Nations within one year of license issuance. The HPMP will include a requirement to revisit previously mapped archaeological sites, and monitor the entire shoreline for the occurrence of any substantial shoreline erosion not previously documented, within five years of license issuance. The HPMP will also include measures to protect, mitigate, or enhance cultural, historical, and archaeological resources such that the proposed Project operation does not adversely impact properties currently identified and properties that may be identified in the future.

The proposed environmental measure is a significant advancement for cultural resources when compared to the alternative of no-action or denial of the license application. Without the issuance of an original license for the Project, the development of a new HPMP will not occur.

5.11.4 Trego Project Unavoidable Adverse Impacts

With the implementation of the proposed environmental measures, the proposed operation of the Project is not expected to result in unavoidable adverse impacts to cultural resources.

5.12 Trego Project Socioeconomic Resources

5.12.1 Trego Project Affected Environment

5.12.1.1 Population Size and Density

The largest city in the vicinity of the Trego Project is the City of Spooner, which is located approximately 8 miles southwest of the Project. According to data from the 2020 census, the population of the City of Spooner was 2,477, which is a decrease of 7.6% from the 2010 census (US Census Bureau, n.d.a) (US Census Bureau, n.d.b).

The 2020 population of Washburn County was 16,623, which is an increase of 4.5% from the 2010 census. This results in an average population density of 20.9 persons per square mile. From 2017 to 2021, there were an estimated 7,084 households in Washburn County with an average of 2.31 persons per household (US Census Bureau, n.d.c).

Table 5.12.1.1-1 lists the City of Spooner and Washburn County population changes between 1980 and 2020. Between 1980 and 2020, Spooner's population increased by 4.7%. During the same period, the Town of Trego's population increased by 30.3% and Washburn County's population increased by 26.2%.

Table 5.12.1.1-1 City of Spooner, Town of Trego, and Washburn County Historic Populations

Municipality	1980	1990	2000	2010	2020
City of Spooner	2,365	2,464	2,653	2,682	2,477
Town of Trego	697	709	885	932	908
Washburn County	13,174	13,722	16,036	15,911	16,623

Source: (WI Department of Administration, n.d.a) (WI Department of Adminsitration, n.d.b)

Population projections from the Demographic Services Center of the Wisconsin Department of Administration for the City of Spooner, Town of Trego, and Washburn County from 2020 to 2040 are shown in **Table 5.12.1.1-2**.

Table 5.12.1.1-2 City of Spooner, Town of Trego, and Washburn County Population Projections

Municipality	Population				
	2020 Census	2025	2030	2035	2040
City of Spooner	2,477	2,890	2,970	2,945	2,835
Town of Trego	908	1,100	1,155	1,175	1,165
Washburn County	16,623	17,775	18,460	18,500	18,010

Source: (WI Department of Administration, 2013b) (WI Department of Administration, 2013a)

5.12.1.2 Labor Force and Employment

The largest employment sectors for the City of Spooner, as shown in **Table 5.12.1.2-1**, include the following in order from most to least prevalent: educational services, health care and social assistance; manufacturing; retail trade; and arts, entertainment, recreation, accommodation, and food services.

The largest employment sectors for Sawyer County, as shown in **Table 5.12.1.2-2**, include the following in order from most to least prevalent: educational services, health care, and social assistance; manufacturing; retail trade; and construction.

Table 5.12.1.2-1 Employment Status, City of Spooner

Industry	Estimate	% Jobs*
Civilian employed population 16 years and over	1,010	-
Agriculture, forestry, fishing, hunting, and mining	0	0.0
Construction	33	3.3
Manufacturing	216	21.4
Wholesale trade	4	0.4
Retail trade	124	12.3
Transportation, warehousing, and utilities	32	3.2
Information	25	2.5
Finance and insurance, real estate, rental, and leasing	12	1.2
Professional, scientific, and management; administrative; and waste management services	23	2.3
Educational services, health care, and social assistance	355	35.1
Arts, entertainment, recreation, accommodation, and food services	111	11.0
Other services, except public administration	25	2.5
Public administration	50	5.0

**Does not add to 100% due to rounding; Source:* (US Census Bureau, 2020a)

Table 5.12.1.2-2 Employment Status, Washburn County

Industry	Estimate	% Jobs*
Civilian employed population 16 years and over	6,886	-
Agriculture, forestry, fishing, hunting, and mining	253	3.7
Construction	583	8.5
Manufacturing	1,164	16.9
Wholesale trade	134	1.9
Retail trade	828	12.0
Transportation, warehousing, and utilities	338	4.9
Information	102	1.5
Finance and insurance, real estate, rental, and leasing	254	3.7
Professional, scientific, and management; administrative; and waste management services	369	5.4
Educational services, health care, and social assistance	1,719	25.0
Arts, entertainment, recreation, accommodation, and food services	529	7.7
Other services, except public administration	274	4.0
Public administration	339	4.9

**Does not add to 100% due to rounding; Source:* (US Census Bureau, 2020a)

5.12.2 Trego Project Environmental Effects

The Trego Project has a beneficial effect to the regional socioeconomic resources by providing outdoor recreational opportunities. These recreational opportunities contribute to the local economy.

5.12.3 Trego Project Proposed Environmental Measures

The proposed environmental measures described in Section 5.8.3 are an improvement for recreation, and consequently socioeconomic resources in the vicinity of the Project when compared to the alternative of no-action or denial of the license application. Without the issuance of a subsequent license for the Project, the recreation and socioeconomic resource enhancements would not occur.

5.12.4 Trego Project Unavoidable Adverse Impacts

The proposed operation of the Trego Project will not result in unavoidable adverse impacts to socioeconomic resources.

5.13 Trego Project Environmental Justice

5.13.1 Trego Project Affected Environment

Environmental Justice (EJ) communities are communities composed of a substantial proportion of people of minority heritage or a substantial proportion of people living below the poverty level. The following sections provide information on EJ communities within the geographic scope of the proposed Trego Project boundary, which includes areas within the Town of Trego in Washburn County, Wisconsin.[52]

5.13.1.1 Race, Ethnicity and Low-Income Data

The US Census Bureau's 2020 five-year estimates were reviewed for race, ethnicity, and low-income data within the geographic scope of the Project. The state, county, census block group, and census tract data are summarized in **Table 5.13.1.1-1**.

[52]The area within one mile of the both the current and proposed Project boundaries is known as the geographic scope in regard to EJ communities.

Table 5.13.1.1-1 Environmental Justice Community Information for the Trego Project

Data within the Project Geographic Scope										
RACE AND ETHNICITY										LOW INCOME
Total Population (count)	White Alone Not Hispanic (count)	African American (count)	Native American/ Alaska Native (count)	Asian (count)	Native Hawaiian & Other Pacific Islander (count)	Some Other Race (count)	Two or More Races (count)	Hispanic or Latino (count)	Total Minority (%)	Households Below Poverty Level (%)
State of Wisconsin										
5,806,975	4,681,072	360,526	43,830	162,010	2,174	14,407	134,689	408,267	19.4	10.7
Washburn County										
15,726	14,775	44	136	84	32	34	331	290	6.0	12.2
Block Group 1, Census Tract 9502										
708	658	0	23	0	0	0	23	4	7.1	7.1
Block Group 2, Census Tract 9502										
853	827	3	5	3	0	0	14	1	3.0	5.2

Source: (US Census Bureau, 2020e) (US Census Bureau, 2020f)

5.13.1.2 Environmental Justice Communities

NSPW evaluated the census block groups and tracts within the Project's geographic scope to determine if any EJ communities are present. Three evaluation methods were used to make this determination, which include the 50% analysis method, meaningful greater analysis method, and low-income threshold method. To qualify as an EJ community under the 50% analysis method, the total percentage of the minority population must exceed 50% of the total population. To qualify as an EJ community under the meaningful greater analysis method, the block group minority population must exceed 6.6%.[53] To qualify as an EJ community under the low-income threshold method, the percent of the population below the poverty level must equal or exceed the poverty level in Washburn County of 12.2%.

The analysis identified one EJ community within the Project's geographic scope, which is indicated with a "Yes" in **Table 5.13.1.2-1**.

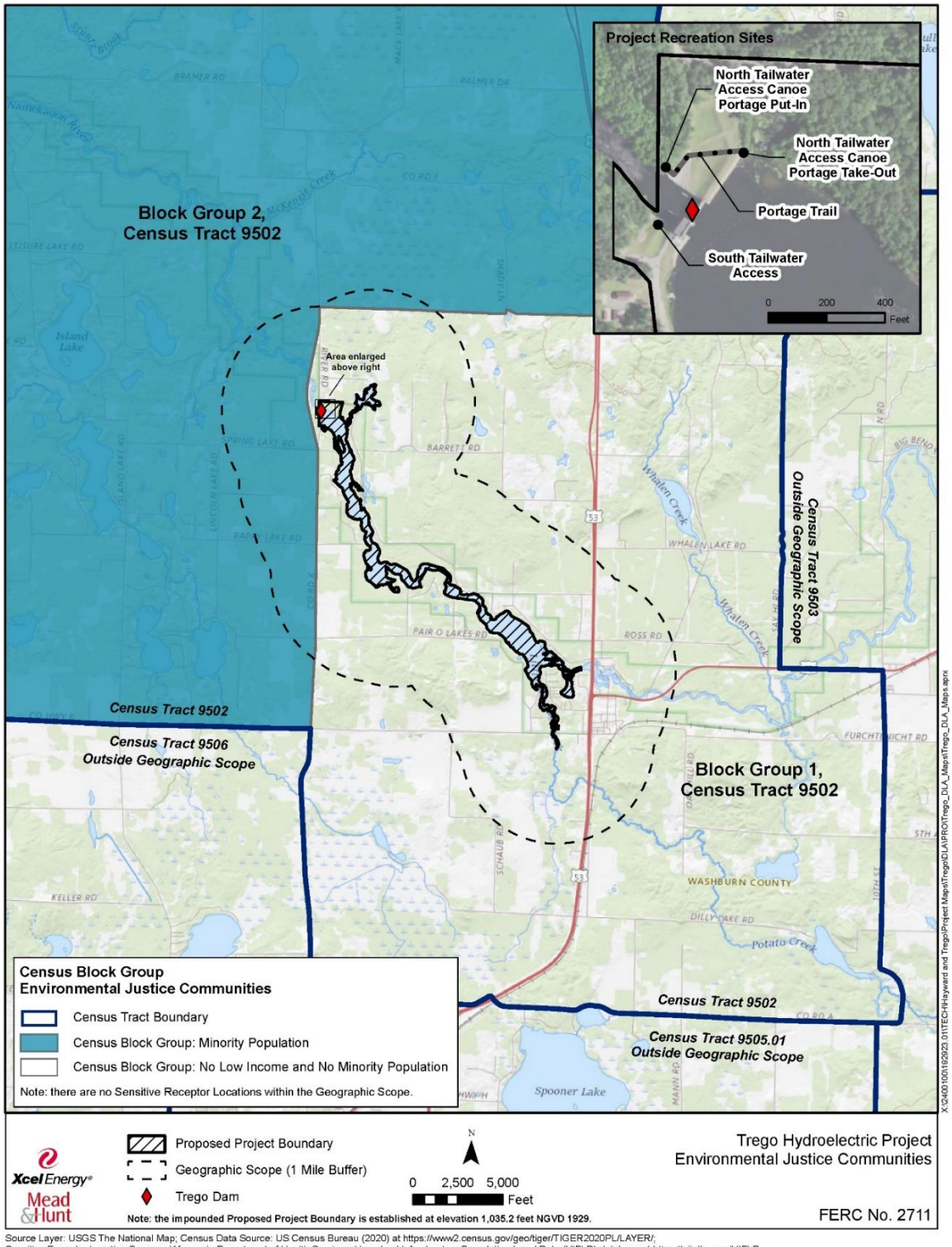
Table 5.13.1.2-1 Environmental Justice Communities within the Geographic Scope of the Trego Project

Block Group and Census Tract Number	50% Analysis Method (Yes/No)	Meaningful Analysis Method (Yes/No)	Low Income Threshold Method (Yes/No)
Block Group 1, Tract 9502	No	**Yes**	No
Block Group 2, Tract 9502	No	No	No

[53] Meaningful greater analysis: Washburn County minority population 6.0% X 1.1 = 6.6%.

A map showing the Project boundary in relation to all identified EJ communities within the Project's geographic scope is shown in **Figure 5.13.1.2-1**. This area was reviewed for the presence of sensitive receptor locations, including childcare centers, fire departments, hospitals, nursing homes, police stations, and schools. This review did not identify any sensitive receptor locations within the geographic scope of the Project.

Figure 5.13.1.2-1 Environmental Justice Communities within the Geographic Scope of the Trego Project



5.13.1.3 Project Related Impacts to EJ Communities and Sensitive Receptor Locations

NSPW does not believe there are any adverse Project-related impacts on EJ communities from the current operation of the Trego Project.

NSPW proposes to operate the Project according to the following protocol (Section 3.2.2.1):

- Operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir.
- Maintain a target reservoir elevation of 1,034.9 feet NGVD, with fluctuations limited to 0.3 feet around the target elevation (i.e., 1,034.6 and 1,035.2 feet NGVD).

NSPW has not proposed any construction as part of this application. However, several recreational enhancements have been proposed and are expected to have a positive impact on recreation. Since there are no material operational changes being proposed,[54] and no construction activities, no adverse impacts to EJ communities are anticipated from the proposed operation of the Trego Project.

The proposed environmental measures are an advancement for recreation resources, and consequently EJ communities in the Project vicinity, when compared to the alternative of no-action or denial of the license application. Without the issuance of a subsequent license for the Project, the EJ community improvements will not occur.

5.13.1.4 Public Outreach

NSPW conducted numerous public outreach activities as outlined in Section 1.4. In order to determine if additional outreach was needed for non-English speaking communities, NSPW reviewed the 2020 American Community Survey Table S1601 Language Spoken At Home data. The review indicated 99.3% of the population of Washburn County speaks English only or speaks English "very well" (US Census Bureau, 2020c). Based on this data, language does not appear to be a major barrier in the Project vicinity. Therefore, no mitigation measures for non-English-speaking communities or EJ communities have been proposed in this application. Information regarding languages spoken in the Project vicinity is shown in **Table 5.13.1.4-1**.

Table 5.13.1.4-1 Languages Spoken in the vicinity of the Trego Project

Location	Speak Only English (%)	Speak English only or Speak English "Very Well" (%)	Speak Language Other Than English (%)	Other Languages Spoken (%)			
				Spanish	Asian and Pacific Islander	Indo-European	Other Languages
Washburn County	98.2	99.3	1.8	0.5	0.3	0.8	0.2

Source: (US Census Bureau, 2020g)

[54] The planned deviations for ice removal purposes are not expected to cause adverse effects to EJ communities due to their short duration and timing during high flow periods, which matches the natural hydrologic cycle. Therefore, the planned deviation is not considered a material change regarding impacts to the EJ community.

5.13.2 Trego Project Environmental Effects

Based upon NSPW's review of EJ communities, and the fact that there are no sensitive receptor locations within the Project's geographic scope, no adverse impacts to EJ communities have been identified.

5.13.3 Trego Project Proposed Environmental Measures

NSPW is not proposing any new environmental measures related to EJ communities at the Trego Project.

5.13.4 Trego Project Unavoidable Adverse Impacts

The proposed operation of the Trego Project is not expected to result in unavoidable adverse impacts to EJ communities.

5.14 Trego Project Tribal Resources

5.14.1 Trego Project Affected Environment

There are 11 federally recognized tribes in Wisconsin. They include: the Forest County Potawatomi, Ho-Chunk Nation, Menominee Indian Tribe of Wisconsin, Oneida Nation of Wisconsin, Stockbridge-Munsee Band of Mohican Indians, and six Ojibwe (Chippewa) tribes. The Ojibwe tribes include the Bad River Band of Lake Superior Chippewa, Lac Courte Oreilles Band of Lake Superior Chippewa, Lac du Flambeau Band of Lake Superior Chippewa, Red Cliff Band of Lake Superior Chippewa, St. Croix Band of Chippewa Indians of Wisconsin, and Sokaogon Chippewa (Mole Lake) Community (WI Department of Public Instruction, n.d.). There are no Tribal lands within the Project boundary.

The Commission initiated Tribal consultation via letter on July 22, 2020, and again by telephone and email on September 11, 22, and 28, 2020 (Federal Energy Regulatory Commission, 2020c) (Federal Energy Regulatory Commission, 2020d). The Commission reached out to the Bad River Band of Lake Superior Chippewa, Fond du Lac Band of Lake Superior Chippewa, Fort Belknap Indian Community, Grand Portage Band of Chippewa Indians, Keweenaw Bay Indian Community, Lac Courte Oreilles Band of Lake Superior Chippewa Indians, Lac du Flambeau Band of Lake Superior Chippewa Indians, Lac Vieux Desert Band of Lake Superior Chippewa Indians of Michigan, Leech Lake Band of Chippewa Indians, Menominee Indian Tribe of Wisconsin, Miami Tribe of Oklahoma, Mille Lacs Band of Ojibwe, Minnesota Chippewa Tribe, Red Cliff Band of Lake Superior Chippewa Indians, Sokaogon Chippewa Community/Mole Lake Band, St. Croix Chippewa Indians of Wisconsin, and the White Earth Band of the Minnesota.

5.14.1.1 Forest County Potawatomi

Potawatomi oral tradition speaks of three brothers, the Ojibwe (kept the faith), Odawa (handled trade), and Bodewadmi (kept the fires lit). Today, the three brothers are known as Ojibwe, Ottawa, and Potawatomi. Within a century of their migration back to the Great Lakes region, the three brothers had evolved into separate, but closely aligned nations. The Potawatomi still refer to themselves as the "keepers of the Fire" and arrived in Wisconsin in the mid-17th century from Canada and the western United States. In the early 1800s, the government took away Potawatomi land rights. In 1913, the Forest County Potawatomi bought back approximately 12,000 acres located in northern Wisconsin (Loew, 2001).

5.14.1.2 Ho-Chunk Nation

The Ho-Chunk people, who were driven from Wisconsin to the west, have gradually returned to reclaim their ancestral lands. No treaty lands have been reserved, so present Ho-Chunk lands are tribal lands that have been re-purchased. Today, 4,700 members of the Wisconsin Ho-Chunk hold title to 2,000 acres of land in Wisconsin (Loew, 2001).

5.14.1.3 Menominee Indian Tribe of Wisconsin

The Menominee people are believed to have occupied Wisconsin for more than 5,000 years. As Europeans arrived, the Menominee lost most of their lands, but maintained a significant presence in the state. Menominee County was created from part of Shawano County in 1959 in anticipation of the Menominee Indian Reservation termination in 1961. Reservation status was restored in 1973. Today, most land within Menominee County is designated as tribal trust lands by the U.S. Bureau of Indian Affairs; non-tribal regulations do not apply. The Menominee Tribe also holds a small amount of land within the Town of Red Springs, Shawano County (Loew, 2001).

5.14.1.4 Oneida Nation of Wisconsin

The Oneida people were part of the New York Iroquois League prior to the Revolutionary War. In 1822, the Oneida purchased land in a territory that would later become the State of Wisconsin. Much of these lands were taken away by the 1900s, but 1,270 acres were repurchased in 1937 (Loew, 2001).

5.14.1.5 Stockbridge Munsee Band of Mohican Indians

The Stockbridge-Munsee are a blend of Mohican Tribes from Massachusetts and Delaware who moved west, settling near Lake Winnebago. In 1856, they obtained their present treaty lands from neighboring Menominee Native Americans. Tribal fee lands are owned by the Stockbridge-Munsee and remain subject to non-tribal regulations. As such, lands held in fee title are subject to County zoning and subdivision regulation. The Stockbridge-Munsee population was estimated at 1,527 in 2000, which represents a 163% increase from 1990 (Loew, 2001).

5.14.1.6 Ojibwe (Chippewa) Tribes

The Ojibwe (Chippewa) people originally from the Great Lakes had moved east near the Atlantic Ocean. Over 1,000 years ago, the Tribe returned to the Great Lakes Region, settling amidst fertile wild rice beds. Their final resting stop was Madeline Island in Wisconsin. The Ojibwe had a close relationship with the French, but the effort to convert the Ojibwe people to Christianity divided their belief systems into various bands of Ojibwe who established themselves in other locations.

As the pursuit of furs for trade progressed inland, conflicts with other Tribes, including the Dakotas, culminated with a Treaty assembled by the U.S. Government in 1825. The Treaty forced the Ojibwe to cede their territory to the U.S. under negotiations in 1837 and 1842. The Project is located within the territory ceded in 1837 (Loew, 2001).

Certain areas within the ceded territory have cultural significance; however, these areas are not publicly documented or recorded. If these areas are expected to be impacted by Project operation, this information will need to be disclosed through consultation with the individual Tribal representatives who consider the lands contained within the Project home territories.

5.14.2 Trego Project Environmental Effects

NSPW is not proposing any material changes[55] to the Project's to run-of-river operations or reservoir elevation operating range. Therefore, the proposed operation of the Project is not expected to adversely impact Tribal resources in the area.

5.14.3 Trego Project Environmental Measures

As noted in Section 5.11.3, NSPW has proposed to develop a new HPMP as an environmental measure to protect known cultural resources.[56] The HPMP will include a requirement to revisit previously mapped archaeological sites, and monitor the entire reservoir shoreline for the occurrence of any substantial shoreline erosion not previously documented, within ten years of license issuance. The HPMP will also include measures to protect, mitigate, or enhance cultural, tribal, historical, and archaeological resources such that the proposed Project operation does not adversely impact currently identified properties and properties that may be identified in the future.

The proposed environmental measure is a significant advancement for cultural and tribal resources when compared to the alternative of no-action or denial of the license application. Without the issuance of a subsequent license for the Project, the development of a new HPMP will not occur.

5.14.4 Trego Project Unavoidable Adverse Impacts

With the implementation of the proposed environmental measures, the proposed operation of the Project will not result in any unavoidable impacts.

[55] The planned deviations for ice removal purposes are not expected to cause adverse effects to Tribal resources due to their short duration and timing during high flow periods, which coincides with the natural hydrologic cycle. Therefore, the planned deviation is not considered a material operating change regarding impacts to the Tribal resources.
[56] Cultural resources include tribal resources.

6. Hayward Project Developmental Analysis

This section analyzes the cost of continued operation and maintenance of the Hayward Project under the No Action and Proposed Operation Alternatives. Costs are associated with the operation and maintenance of the Project facilities, as well as the cost of providing proposed environmental mitigation measures.

6.1 Power and Economic Benefits of the Project

The current operation provided an average of 6,867 megawatt hours (MWh) of energy per year for the five-year period between 2018 and 2022.

6.1.1 Current Annual Value of Developmental Resources

Based on an average energy value of $xx per MWh, the average annual gross revenue from 2018-2022 was $xx.[57] As noted in Exhibit A, the proposed operation of the Hayward Project, along with the proposed environmental mitigation and enhancement measures, is not expected to result in any adverse impacts to generation.

6.1.2 Current Annual Cost of Project Operations, Maintenance, Repairs, and Administration

The estimated annual cost of Project operations, including costs of operation and maintenance expenses, FERC fees, depreciation, and administrative and general expenses, will be provided in the FLA.

6.2 Comparison of Alternatives

6.2.1 No Action

Under the No Action Alternative, NSPW would continue to operate the Hayward Project under the existing license according to the following protocol:

- Continue to operate in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resources.
- At all times, NSPW will act to minimize the fluctuation of the Project reservoir and maintain the elevation between 1,187.0 and 1,187.5 feet NGVD, while targeting elevation 1,187.4 feet NGVD.
- NSPW will not operate the Project between the low and high reservoir elevations on a daily basis for peaking purposes.
- A minimum flow of 8 cfs or inflow, whichever is less, will be released into the bypass reach for the protection of fish and wildlife resources and water quality.
- Continue to implement the existing HRMP.

Under the No Action Alternative, no new environmental mitigation or enhancement measures would be implemented.

[57] Figures to be provided in FLA.

6.2.2 Proposed Operation Alternative

Under the Proposed Operation Alternative, NSPW will:

- Continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resource values.
- At all times, NSPW will act to minimize the fluctuation of the Project reservoir and maintain the elevation between 1,187.0 and 1,187.5 feet NGVD, while targeting 1,187.4 feet.
- NSPW will not operate the Project between the low elevation and high elevation on a daily basis for peaking purposes.
- A minimum flow of 8 cfs or inflow, whichever is less, will be released into the bypass reach for the protection of fish and wildlife resources and water quality.
- Just prior to spring runoff, or for emergency purposes, NSPW may deviate from the maximum reservoir elevation by no more than 0.5 feet to remove ice from the spillway for dam safety purposes. The duration of the deviation shall be no longer than necessary, typically less than a few days, to remove the ice and will be considered a planned deviation under the requirements outlined in Section 4.5.3.

Under the Proposed Operation Alternative, NSPW will implement the following environmental measures:

- Develop an Aquatic and Terrestrial Invasive Species Plan and conduct biennial invasive species surveys.
- Conduct shoreline erosion surveys every 10 years.
- Develop a HPMP in consultation with the Wisconsin SHPO and interested Native American Nations per the requirements outlined in the Programmatic Agreement.
- Develop an Operations Management Plan including deviation reporting and agency consultation requirements.

NSPW is also proposing the following environmental measures regarding recreation resources:

- Review and maintain or improve signage, including Part 8 signage, at the Canoe Portage Take-Out and Carry-In Access site to meet current standards.
- Coordinate with WDNR to obtain current invasive species signage for installation at the Canoe Portage Put-In.
- Review and maintain or improve signage, including Part 8 signage, at the Canoe Portage Trail and Put-In site.
- Conduct routine maintenance of NSPW's FERC-Approved recreation sites, including signage, over the term of the subsequent license.
- Implement the Cave Bat BITP/A for any routine vegetation maintenance activities at NSPW's FERC-Approved recreation sites.
- Implement the Wood Turtle BITP/A for maintenance work at NSPW's FERC-Approved recreation sites, as long as the turtle remains a state-listed species.

NSPW is also proposing to implement several environmental measures for yet to be fully defined in-kind maintenance work that may occur during the term of the subsequent license.

The following environmental measures are being proposed to avoid any potential adverse impacts from any yet to be fully defined in-kind maintenance activities that could occur during the subsequent license:

- Implement the Cave Bat BITP/A.
- Implement the Wood Turtle BITP/A, as long as wood turtles remain a state threatened or endangered species.
- Implement the Mussel Relocation BITP/A for any activities conducted in areas of suitable habitat below the ordinary high-water mark.
- Annually review the Wisconsin NHI to determine the location of bald eagle nests and provide a 660-foot buffer between any vegetation management or construction activities and identified nests during the nesting season.

These activities are further described in Section 9.0.

6.3 Cost of Environmental Measures

The cost of environmental measures is provided in **Table 6.3-1**.

Table 6.3-1 Estimated Capital and Additional O&M Costs for Proposed Environmental Measures at the Hayward Project

Environmental Measure		**Capital Cost**	**O&M Cost***
Develop Aquatic and Terrestrial Species Plan and conduct biennial invasive surveys.		$40,000	$30,000[58]
Conduct shoreline erosion surveys every 10 years.		$0	N/A[59]
Develop Historic Properties Management Plan in consultation with the Wisconsin SHPO and interested Native American Nations to follow requirements outlined in the Programmatic Agreement.		$20,000	$25,000[60]
Develop an Operation Monitoring Plan including deviation reporting and agency consultation requirements.		$30,000	$5,000
Recreational Measures	Review and maintain or improve signage, including Part 8 signage, at the Canoe Portage Take-Out and Carry-In Access site to meet current standards.	$5,000	$0
	Coordinate with WDNR to obtain current invasive species sign for installation at the Canoe Portage Put-In site	$0	$0
	Review and maintain or improve signage, including Part 8 signage, at the Canoe Portage Trail and Put-In site.	$5,000	$0
	Conduct routine maintenance of NSPW's FERC-Approved recreation sites over term of license.	$0	$2,000
	Implement the Cave Bat BITP/A for any routine vegetation maintenance at NSPW's FERC-Approved recreation sites.	$0	$1,000
	Implement Wood Turtle BITP/A for maintenance work at NSPW's FERC-Approved recreation sites, as long as the turtle remains a listed species.	$0	$1,000
Total Cost		**$100,000**	**$N/A**[61]

* O&M – Operations and Maintenance

[58] $30,000 is the additional cost per survey event, every other year.
[59] Cost for shoreline erosion survey is listed with the cost for the HPMP survey every 10 years.
[60] $20,000 is the additional cost per survey event every 10 years and $5,000 is the annual cost to implement the HPMP.
[61] The total O&M costs are not listed here because not all the costs are incurred annually.

7. Trego Project Developmental Analysis

This section analyzes the cost of continued operation and maintenance of the Trego Project under the No Action and Proposed Operation Alternatives. Costs are associated with the operation and maintenance of the Project facilities, as well as the cost of providing proposed environmental mitigation measures.

7.1 Power and Economic Benefits of the Project

The current operation provided an average of 826.4 MWh of energy per year for the five-year period between 2018 and 2022.[62]

7.1.1 Current Annual Value of Developmental Resources

Based on an average energy value of $xx per MWh, the average annual gross revenue from 2018-2022 was $X.[63] As noted in Exhibit A, the proposed operation of the Trego Project, along with the proposed environmental mitigation and enhancement measures, is not expected to result in any adverse impacts to generation.

7.1.2 Current Annual Cost of Project Operations, Maintenance, Repairs, and Administration

Estimated annual cost of Project operations, including the costs of operation and maintenance expenses, FERC fees, depreciation, and administrative and general expenses will be provided in the FLA

7.2 Comparison of Alternatives

7.2.1 No Action

Under the No Action Alternative, NSPW would continue to operate the Trego Project under the existing license according to the following protocol:

- Continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation minimizes impacts on water quality, aquatic habitat, and other aquatic resource values.
- Maintain a target reservoir elevation of 1,034.9 feet NGVD, with fluctuations limited to 0.3 feet around the target elevation (i.e., between 1,034.6 and 1,035.2 feet NGVD).
- Continue to implement the existing CRMP.
- Continue to implement the existing Vegetation Management Plan.

Under the No Action Alternative, no new environmental mitigation or enhancement measures would be implemented.

[62] There was no generation 2018. In 2019, no generation occurred during the period January through October. In 2021, no generation occurred in July and October.
[63] Figures to be provided in FLA.

7.2.2 Proposed Operation Alternative

Under the Proposed Operation Alternative, NSPW will:

- Continue to operate the Project in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation minimizes impacts on water quality, aquatic habitat, and other aquatic resource values.
- Maintain a target reservoir elevation of 1,034.9 feet NGVD, with fluctuations limited to 0.3 feet around the target elevation (i.e., between 1,034.6 and 1,035.2 feet NGVD).
- Just prior to spring runoff, or for emergency purposes, NSPW may deviate from the maximum reservoir elevation by no more than 0.5 feet to remove ice from the spillway for dam safety purposes. The duration of the deviation will be no longer than necessary, typically less than a few days, to remove the ice and will be considered a planned deviation under the requirements outlined in Section 5.5.3.

Under the Proposed Operation Alternative, NSPW will implement the following environmental measures:

- Develop an Aquatic and Terrestrial Invasive Species Plan and conduct biennial invasive species surveys.
- Conduct shoreline erosion surveys every 10 years.
- Develop a new HPMP in consultation with the Wisconsin SHPO and interested Native American Nations to follow the requirements outlined in the Programmatic Agreement.
- Develop an Operations Management Plan including deviation reporting and agency consultation requirements.
- Provide a one-time payment not to exceed $75,000 to the TLD to cost-share up to 75% of the total cost towards the purchase of a weed harvester. This one-time commitment would be in lieu of the annual reimbursement NSPW currently provides TLD for aquatic vegetation harvesting.
- Develop a compliance monitoring plan in consultation with the WDNR to document how it will comply with the operating requirements of the license, including reservoir elevation and minimum flow requirements.

NSPW is also proposing the following environmental measures regarding recreation resources:

- Review and maintain or improve signage, including Part 8 signage, at the South Tailwater Access site to meet current standards.
- Review and maintain or improve signage, including Part 8 signage, at the North Tailwater Access/Canoe Portage site during the open water recreation season during the term of the subsequent license.
- Continue to maintain existing portable restroom facilities during the open water recreation season at the North Tailwater Access and Canoe Portage site during the term of the subsequent license.
- Conduct routine maintenance of NSPW's FERC-Approved recreation sites, including signage, over the term of the subsequent license.
- Implement the Cave Bat BITP/A for any routine vegetation maintenance activities at NSPW's FERC-Approved recreation sites.
- Implement the Wood Turtle BITP/A for maintenance work at NSPW's FERC-Approved recreation sites, as long as the turtle remains a state-listed species.

The following environmental measures are being proposed to avoid any potential adverse impacts from any yet to be fully defined in-kind maintenance activities that could occur during the subsequent license:

- Implement the Cave Bat BITP/A.
- Implement the Wood Turtle BITP/A, as long as wood turtles remain a state threatened or endangered species.
- Implement the Mussel Relocation BITP/A for any activities conducted in areas of suitable habitat below the ordinary high-water mark.
- Annually review the Wisconsin NHI to determine the location of bald eagle nests and provide a 660-foot buffer between any vegetation management or construction activities and identified nests during the nesting season.

These activities are further described in Section 9.0.

7.3 Cost of Environmental Measures

The cost of environmental measures is provided in **Table 7.3-1**.

Table 7.3-1 Estimated Capital and Additional O&M Costs for Proposed Environmental Measures at the Trego Project

Environmental Measure		**Capital Cost**	**O&M Cost***
Develop Aquatic and Terrestrial Species Plan and conduct biennial invasive surveys.		$40,000	$35,000[64]
Conduct shoreline erosion surveys every 10 years.		$0	N/A[65]
Develop Historic Properties Management Plan in consultation with the Wisconsin SHPO and interested Native American Nations to follow requirements outlined in the Programmatic Agreement.		$20,000	$25,000[66]
Provide a one-time payment not to exceed $75,000 to the TLD to cost-share up to 75% of the total cost towards the purchase of a weed harvester. This one-time commitment would be in lieu of the annual reimbursement NSPW currently provides TLD for aquatic vegetation harvesting.		$75,000	$0
Develop a Compliance Monitoring Plan including deviation reporting and agency consultation requirements.		$30,000	$5,000
Recreational Measures	Review and maintain or improve signage, including Part 8 signage, at the South Tailwater Access site to meet current FERC standards.	$5,000	$0
	Review and maintain or improve signage, including Part 8 signage, at the North Tailwater Access/Canoe Portage site.	$5,000	$0
	Continue to maintain the existing portable restroom at the North Tailwater Access/Canoe Portage site during the open water recreation season during the term of the license.	$0	$0
	Conduct routine maintenance of NSPW's FERC-Approved Recreation Sites over term of license.	$0	$2,000
	Implement the Cave Bat BITP/A for any routine vegetation maintenance at NSPW's FERC-Approved recreation sites.	$0	$1,000
	Implement Wood Turtle BITP/A for maintenance work at NSPW's FERC-Approved recreation sites, as long as the turtle remains a listed species.	$0	$1,000
Total Cost		**$175,000**	**$N/A**[67]

[64] $35,000 is the cost per survey event every other year.
[65] Cost for shoreline erosion survey is listed with the cost for the HPMP survey every 10 years.
[66] $20,000 is the additional cost per survey event every 10 years and $5,000 is the annual cost to implement the HPMP.
[67] The total O&M costs are not listed here because not all the costs are incurred annually.

8. Conclusions and Recommendations

8.1 Comprehensive Development and Recommended Alternative

This section is completed by the FERC in the NEPA document.

8.2 Unavoidable Adverse Effects

With the implementation of the environmental measures proposed in this application, continued operation of the Projects is not expected to adversely affect geology and soils, water resources, fish and aquatic resources, terrestrial resources, TE resources, recreation resources, land use and shoreline management, aesthetic resources, cultural resources, socioeconomic resources, or EJ communities in the vicinity of either Project.

8.3 Recommendations of Fish and Wildlife Agencies

Recommendations received from the fish and wildlife agencies will be addressed by the FERC in the NEPA document.

8.4 Consistency with Comprehensive Plans

Section 10(a)(2) of the FPA requires the FERC to consider the extent to which a proposed project is consistent with existing federal and state comprehensive plans, as defined in Section 2.19 under Part 2 of Chapter 1, Title 18, CFR.

The sections below include a list of FERC-Approved comprehensive plans that may be applicable to the licensing of the Projects. This application was prepared in consultation with various resource agencies, including those who prepared the comprehensive plans outlined in the following sections.

When the resource agencies identified any operational concerns that required mitigation, appropriate mitigation has been proposed herein. As such, continued operation of either Project with the proposed mitigation measures is not expected to adversely impact resources.

8.4.1 National Park Service Plans

8.4.1.1 The Nationwide Rivers Inventory (1993)

The Nationwide Rivers Inventory is a listing of more than 3,200 free-flowing river segments in the United States that are believed to possess one or more “outstandingly remarkable” values. The Namekagon River in the vicinity of both Projects is included as part of the St. Croix National Scenic Riverway (National Park Service, n.d.b). Both Projects have been in place in their current configurations since the 1920s, prior to the establishment of the scenic riverway.

Since the Projects are operated in a run-of-river mode with minimal reservoir fluctuations, and no operational changes are being proposed, their continued operation is not expected to affect the recreational or scenic values of the Namekagon River.

8.4.1.2 St. Croix National Scenic Riverway Final Master Plan (1976)

The original St. Croix National Scenic Riverway Master Plan was developed in 1976 for the Upper St. Croix Riverway and served as the foundation for management of the river. The plan focused primarily on land acquisition and providing adequate visitor facilities. The plan has since been updated with management recommendations for the river included in the General Management Plan for the Upper Sr. Croix and Namekagon Rivers and is described in the following section.

Continued operation of the Projects is consistent with this plan.

8.4.1.3 General Management Plan-Upper St. Croix and Namekagon Rivers (1998)

This plan defines different management areas and identifies how different portions of the riverway are managed to achieve the desired resource conditions and visitor experiences. The majority of the river is managed under the near-primitive northland recreations area. Lake Hayward is managed as an Urban Recreation Area and the Trego Lake is managed as a Developed Recreation Area.

Continued operation of the Projects is consistent with this plan.

8.4.1.4 Upper St. Croix Management Commission, Upper St. Croix Management Policy Resolution (1993)

This resolution established a commission that defined its objectives as providing a forum for discussion of mutual problems, activities, and programs on the upper St. Croix River and Namekagon River. The commission included the Minnesota Department of Natural Resources, NPS, WDNR, and Xcel Energy (National Park Service, n.d.c).

8.4.2 US Fish and Wildlife Service Plans

8.4.2.1 North American Waterfowl Management Plan (2012)

This plan is general in nature regarding outlining specific plan policies, goals, and recommendations and does not establish goals or recommendations specific to either Project. However, this plan does stress the importance of resource conservation, management, and enhancement (US Fish and Wildlife Service, 1986).

This DLA has been developed to analyze impacts based upon resource conservation, management, and enhancement. There are no conflicts between this plan and continued operation of either Project.

8.4.2.2 Upper Mississippi River & Great Lakes Region Joint Venture Implementation Plan (1993)

This plan is a partnership of resource agencies, Native American Nations, corporations, individuals, and organizations that have accepted the responsibility of implementing conservation plans within this geographic region. The Joint Venture conducts activities to support bird conservation goals and are the standard for effective, science-based delivery of bird conservation through partnerships (US Fish and Wildlife Service, 1993).

This DLA has been developed to evaluate impacts based upon resource conservation, management, and enhancement. There are no conflicts between this plan and continued operation of either Project.

8.4.2.3 Fisheries USA: Recreational Fisheries Policy of the US Fish and Wildlife Service (1989)

The plan unites all USFWS recreational fisheries capabilities under a single policy to focus the organization's entire capability on enhancing the Nation's recreational fisheries. The plan is general in nature and outlines specific policies, goals, and recommendations. The plan does not establish goals or recommendations specific to either Project; however, it does stress the importance of resource conservation, management, and enhancement (US Fish and Wildlife Service, 1989).

The Projects provide recreational fishing opportunities for the public. There are no conflicts between this plan and continued operation of either Project.

8.4.3 State of Wisconsin Plans

8.4.3.1 An evaluation of the sedimentation process and management alternatives for the Trego Flowage, Washburn County, Wisconsin (1989)

While identified by the FERC as a comprehensive plan, this document is a report that summarized previous aquatic plant and sediment studies on the Trego Flowage and evaluated the amount and source of sediment reaching the flowage. The report indicated sediment typically originated from upstream of the Project and is accumulating at the head of the reservoir where water velocities decrease. The report identified potential alternatives to address sedimentation issues but did not recommend any specific alternative (WI Department of Natural Resources, 1989). The report is included in **Appendix E-33**.

Sediment loading in the upper reservoir is a result of upstream sediment being deposited into Trego Lake. More specifically, as the velocity of the river slows as it enters the upper reservoir, upstream sediment carried within the water column is allowed to settle out. A similar process takes place where a river enters a natural lake. Therefore, continued operation of the Project will have no effect on the total amount of upstream sediment being naturally deposited in the upper reservoir of Trego Lake.

8.4.3.2 Statewide WDNR Comprehensive Outdoor Recreation Plan for 2019-2023 (2019)

The SCORP is discussed in Section 4.8.1.2.2 and Section 5.8.1.2.2 and was included in the PAD.

There are no conflicts between this plan and continued operation of either Project.

8.4.3.3 Wisconsin's Water Quality Report to Congress (2022)

This report details water quality assessment findings in the state and describes specific state programs that control, manage, and prevent water quality degradation. This report indicates that the Hayward Project (Lake Hayward) meets State water quality standards while the Trego Project (Trego Lake) is listed as an impaired water due to the presence of excess algal growth (WI Department of Natural Resources, 2022a).

With the implementation of the proposed environmental measures, continued operation of both Projects is not expected to adversely impact the water quality.

8.4.3.4 Wisconsin's Biodiversity as a Management Issue (1995)

This document provides a strategy for the conservation of biological diversity and presents general strategic recommendations and possible actions for specific biological community types (WI Department of Natural Resources, 1995).

This DLA has been developed to analyze biodiversity and resource conservation, management, and proposed enhancements. There are no conflicts between this plan and continued operation of either Project.

8.4.3.5 Wisconsin's Forestry Best Management Practices for Water Quality (2010)

This document provides cost-effective methods to protect water quality in lakes, streams, and wetlands before, during, and after forest management activities. While no forest management practices are proposed as part of this DLA, any tree removal activities during the term of either license will follow the Forestry Best Management Practices for Water Quality (WI Department of Natural Resources, 2010d).

8.4.3.6 Wisconsin's Wildlife Action Plan (2015)

This plan focuses on conservation of rare and declining species and their habitats. The plan is used as a platform to help partners, organizations, and individuals identify and implement important conservation actions to keep Wisconsin's natural resources healthy (WI Department of Natural Resources, 2015b).

This DLA evaluated the potential adverse impacts to rare species from the continued operation of both Projects. Therefore, with the implementation of the proposed environmental mitigation measures, there are no conflicts between this plan and continued operation of either Project.

9. Maintenance Work-Yet to Be Fully Defined

In this DLA, NSPW provided analyses of the potential effects of the proposed operation of the Projects regarding reasonably foreseeable future actions required under each subsequent license for the operation and maintenance of the Projects. However, in the future, certain activities may become necessary for day-to-day operation of the Projects for which the schedule and full scope of environmental effects cannot be fully defined at this time. Some of these activities will require separate approval from the Commission prior to implementation. However, many activities can be considered in-kind replacements which would not require prior authorization from the resource agencies or Commission.

Examples of such yet to be fully defined maintenance work that may occur during the term of each Project's license include, but are not limited to, the following:

- Replacement of gate seals, gate repairs, concrete repairs, etc. that do not require a drawdown.
- Replacement of boat launch hard surfaces (in-kind).
- Grading of existing roads and parking areas.
- Replacement of existing signs or placement of new signs.
- Mowing and vegetation management at recreation sites and other Project facilities.
- Removal of hazardous trees from recreation sites or Project facilities.
- Replacement of turbine runners that do not result in a significant increase in authorized or hydraulic capacity.
- Any other maintenance to existing facilities that occurs above or below the ordinary high-water mark that does not result in a required change to the approved exhibits or plans, provided all local, state, and federal permits are obtained prior to construction.

Impacts from yet to be fully defined, in-kind maintenance work can generally be separated into categories based on areas of impact or a combination thereof where specific mitigation measures can be implemented to avoid adverse impacts to the resources. The three general areas of impact are as follows:

- Structure or facility impacts such as concrete replacement, equipment replacement, or equipment resurfacing.
- Terrestrial impacts.
- Aquatic impacts.

The Commission is aware of the need for yet to be fully defined in-kind maintenance work over the course of the new license and has previously established requirements that allow such activities to currently occur under each license in Article 3 of the L-Form Articles for each license issued without prior Commission approval. The licenses for the Projects fall into L-Form Category 9 of which Article 3 states the following (**emphasis added**):

> *The project area and project works shall be in substantial conformity with the approved exhibits referred to in Article 2 herein or as changed in accordance with the provisions of said article. Except when emergency shall require for the protection of navigation, life, health, or property, there shall not be made without prior approval of the Commission any substantial alteration or addition not in conformity with the approved plans to any dam or other project works under the license or any substantial use of project lands and waters not authorized herein; and any emergency alteration, addition, or use so made shall thereafter be subject to such modification and change as the Commission may direct.* ***Minor changes***

> ***in project works, or in uses of project lands and waters, or divergence from such approved exhibits may be made if such changes will not result in a decrease in efficiency, in a material increase in cost, in an adverse environmental impact, or in impairment of the general scheme of development;*** *but any of such minor changes made without the prior approval of the Commission, which in its judgment have produced or will produce any of such results, shall be subject to such alteration as the Commission may direct.*

NSPW proposes that the conditions described in Section 9.1 be included in each new license for yet to be fully defined in-kind maintenance activities that may occur during the term of the subsequent licenses. NSPW proposes to complete yet to be fully defined, in-kind maintenance activities under L-Form Article 3 as minor changes in project works or in uses of Project lands or waters without prior Commission approval because the activity will not and cannot be considered to "result in an adverse environmental impact or an impairment of the general scheme of development within the judgment of the Commission."

The conditions described in Section 9.1 shall be implemented by NSPW in the planning and/or execution of any yet to be fully defined in-kind maintenance activities that will occur during the term of the subsequent license for each Project, where applicable. If the activity is unable to meet the requirements, there may be adverse environmental impacts and the activity cannot proceed without prior Commission approval and cannot be considered a minor change as defined in the L-Form Article 3.

9.1 Conditions for implementation of Minor Changes in Project Works or Uses Without Prior Commission Approval

The following requirements and/or conditions shall be implemented by NSPW in the planning and/or execution of any yet to be fully defined future in-kind maintenance activities that will occur during the term of the new licenses, where applicable. If the activity is unable to follow the requirements/conditions, there may be adverse environmental impacts and the activity cannot proceed as a minor change without prior Commission approval as defined in the L-Form Article 3.

9.1.1 Structures or Facilities

Yet to be fully defined in-kind future maintenance activities could produce adverse impacts to the structures or facilities which would be contrary to the conditions and intent of the requirements of the subsequent licenses. Adverse impacts can be avoided if the following conditions/requirements are followed:

- No changes shall be made to the structure without following the requirements outlined in the Programmatic Agreement or HPMP (Section 4.11.3 for Hayward or Section 5.11.3 for Trego);
- No changes shall be made to the structure or facilities such that they no longer substantially conform to the approved Exhibits in the applicable subsequent licenses; and
- No changes shall be made to the structure or the facilities such that they no longer comply with the requirements of compliance plans developed as a result of the applicable subsequent licenses.

9.1.2 Terrestrial Areas

Yet to be fully defined future in-kind maintenance activities could result in adverse impacts to the terrestrial areas of each Project which would be contrary to the conditions and intent of the requirements of the subsequent licenses. Adverse impacts can be avoided if the following requirements are followed:

- No ground-disturbing activities can occur without following the requirements outlined in the Programmatic Agreement or HPMP (Section 4.11.3 for Hayward or Section 5.11.3 for Trego);
- Prior to the activity, all applicable local, state, and federal permits will be obtained prior to construction and will be complied with during construction;
- For ground-disturbing activities, appropriate erosion and sediment control BMPs from the current Wisconsin Construction Site Erosion Control Field Guide (NASECA, 2019) will be implemented (**Appendix E-49**);
- Prior to the activity, NSPW will review the Wisconsin NHI database to determine the location of bald eagle nests and provide a 660-foot buffer between any vegetation management or construction activities and identified nests during the nesting season.
- Prior to the activity, NSPW will complete a search of the IPaC database and review the current Wisconsin NHI Endangered Resource Review for the applicable Project and follow any required conditions to avoid adverse impacts to any listed species.
- For activities involving the removal of any trees greater than 3 inches in diameter, the current USFWS NLEB guidance and Wisconsin's BITP/A for Cave Bats (**Appendix E-24**) will be followed for said tree removal activities;
- NSPW proposes to follow the terms of the current Wood Turtle BITP/A (**Appendix E-25**), as long as the wood turtle remains a state-listed species; and
- NSPW will follow the current terrestrial invasive species BMPs identified in the Invasive Species Monitoring and Control Plan, to be developed under each subsequent license, for ground disturbing or vegetation maintenance activities that have the potential to spread existing or introduce new terrestrial invasive species.

9.1.3 Aquatic Areas

Yet to be fully defined future in-kind maintenance activities can produce adverse impacts to the aquatic areas of the Project which would be contrary to the conditions and intent of the requirements of the subsequent licenses. Adverse impacts can be avoided if the following requirements are followed:

- Prior to the activity, NSPW will obtain all applicable local, state, and federal permits prior to construction and will comply with said permits during construction;
- For any change in flow or water level not exceeding three weeks,[68] NSPW will proceed with the planned deviation reporting process as outlined in Section 4.5.3 for the Hayward Project and Section 5.5.3 for the Trego Project.
- Prior to the activity, NSPW will review the Wisconsin NHI to determine the location of bald eagle nests and provide a 660-foot buffer between any vegetation management or construction activities and identified nests during the nesting season;

[68] Any planned change exceeding three weeks required independent Commission approval prior to implementation.

- Prior to the activity, NSPW will complete a search of the IPaC database and review the current Wisconsin NHI Endangered Resource Review for the applicable Project and follow any protected conditions to avoid adverse impacts to any listed species;
- Prior to the activity, NSPW will implement the Mussel Relocation BITP/A for any activities conducted in areas of suitable habitat below the ordinary high-water mark;
- For equipment used for in-water work, the current WDNR Manual Code # 9183.1 Boat, Gear, and Equipment Decontamination and Disinfection Protocol (WI Department of Natural Resources, 2016) or equivalent, will be followed (**Appendix E-50**); and
- NSPW proposes to follow the terms of the current Wood Turtle BITP/A (**Appendix E-25**), as long as the wood turtle remains a state-listed species.

10. Consultation Documentation

Appendix E-1, *Documentation of Consultation* of this Exhibit details all phases of consultation between the Applicant and the resource agencies, Native American Nations, and public during the development of this application.

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