STUDY REPORT CONSULTATION

Darrin Johnson

From: Shawn Puzen <Shawn.Puzen@meadhunt.com>
Sent: Monday, March 6, 2023 9:52 AM
To: Darrin Johnson
Subject: Project: White River, Hayward and Trego Relicensi - File Transfer - Hayward and Trego Study Reports

Project: 2400100-192923.01 **White River, Hayward and Trego Relicensi**

Notification about File Transfer **Hayward and Trego Study Reports**

Note: You have been CC'd on this notification.

Remarks

Hi Cheryl,

Per your request.

Thanks,
Shawn Puzen | FERC Licensing & Compliance
Mead & Hunt | 1702 Lawrence Drive | De Pere, WI 54115
Direct: 920-593-6865 | Mobile: 920-639-2480
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File Transfer Info

To: **Cheryl Laatsch (Wisconsin Department of Natural Resources)**
From: **Shawn Puzen (Mead & Hunt, Inc.)**
CC: **Darrin Johnson (Mead & Hunt, Inc.); Matthew Miller (Xcel Energy Corporation)**

Purpose: **For your review and comment**
Expiration Date: **4/5/2023**

Transferred Files

Hayward and Trego WQ Study Report.pdf	2/14/2023	10:22 AM	2,622 KB
Hayward and Trego WQ Study Report_Appendix C_Field Notes_YSI Profile Data.xlsx	2/8/2023	12:33 PM	91 KB
Hayward and Trego WQ Study Report_Appendix D_Analytical Data Summary.xlsx	2/14/2023	10:21 AM	22 KB
HaywardTregoRecRpt.pdf	3/2/2023	7:57 AM	5,390 KB
HaywardTrego_Turtle Study_Report.pdf	1/30/2023	3:41 PM	7,408 KB
Hayward_and_Trego_ATIS_Reduced.pdf	2/8/2023	9:13 AM	67,695 KB
Hayward_Mussel_Report_Study.pdf	1/25/2023	1:17 PM	5,366 KB
Transmittal - 00016.pdf	3/6/2023	9:52 AM	108 KB
Trego_Mussel_Report_Study.pdf	1/25/2023	1:17 PM	6,390 KB

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Darrin Johnson

From: Shawn Puzen <Shawn.Puzen@meadhunt.com>
Sent: Monday, March 6, 2023 9:58 AM
To: Darrin Johnson
Subject: Project: White River, Hayward and Trego Relicensi - File Transfer - Hayward and Trego Study Reports

Project: 2400100-192923.01 **White River, Hayward and Trego Relicensi**

Notification about File Transfer **Hayward and Trego Study Reports**

Note: You have been CC'd on this notification.

A transfer (File Transfer) has arrived on the Mead & Hunt, Inc. Info Exchange Site.

Remarks

We look forward to discussing this on March 29th.

Thanks,
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To: **craig_hansen@nps.gov; jonathan_moore@nps.gov; lisa_yager@nps.gov**
From: **Shawn Puzen (Mead & Hunt, Inc.)**
CC: **Darrin Johnson (Mead & Hunt, Inc.); Matthew Miller (Xcel Energy Corporation)**
Expiration Date: **4/5/2023**

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From: Shawn Puzen
Sent: Monday, March 6, 2023 11:11 AM
To: thomas.h.frost@gmail.com; cjpetersen@msn.com
Cc: Darrin Johnson; Miller, Matthew J; Shawn Puzen
Subject: ATIS Study Report for Hayward and Trego Relicensing.

Categories: Filed by Newforma

Good Morning,

Per your request, I will be sending you a file transfer that contains the study report for the Aquatic and Terrestrial Invasive Species Study. If you recall, the study was requested by the Trego Lake District early on in the relicensing process. It also contains information on substrate and water depth.

Please let me know if you do not receive the report or have trouble downloading it (it is a rather large file that I have not been able to reduce the size of very well).

Thanks,

Shawn Puzen
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ATIS STUDY REPORT

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Hayward and Trego Aquatic and Terrestrial Invasive Species Study Report

Northern States Power Company
Hayward and Trego Hydroelectric Projects
Hayward, Wisconsin
Trego, Wisconsin
GAI Project Number: R220323.02
| FERC Nos. 2417 and 2711
January 2023

Prepared by:
GAI Consultants, Inc.
3313 S Packerland Drive, Suite E
De Pere, Wisconsin 54115

Prepared on behalf of:
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1702 Lawrence Drive
De Pere, Wisconsin 54115

Hayward and Trego Aquatic and Terrestrial Invasive Species Study Report

Northern States Power Company
Hayward and Trego Hydroelectric Projects
Hayward and Trego, Wisconsin

GAI Project Number: R220323.02
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January 2023

Prepared for:
Mead & Hunt
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Table of Contents

1.0 Project Overview

The Hayward and Trego Hydroelectric Projects (Project or Projects), Federal Energy Regulatory Commission (FERC) Nos. 2417 and 2711, are located in the Town of Hayward, Sawyer County, Wisconsin and the Town of Trego, Washburn County, Wisconsin, respectively (Figures 1 and 2). The hydroelectric dams are owned, operated, and maintained by Northern States Power Company, a Wisconsin corporation (Licensee). The current licenses for both Hayward and Trego expire on November 30, 2025. As part of the relicensing process, the Wisconsin Department of Natural Resources (WDNR) requested the Licensee complete invasive species studies for both Projects. GAI is pleased to submit the results of the Aquatic and Terrestrial Invasive Species Studies (Study or Studies) conducted June 7-10, July 20, and August 1-5, 2022, to fulfill this request. This Study report provides baseline data on native species and aquatic and terrestrial invasive species and includes the following for both Projects:

Aquatic plant surveys – two sampling events conducted in June and July/August,

Water tow samples – collected during the July/August surveys,

Sediment samples – collected during the June surveys, and

Terrestrial upland surveys – conducted during the July/August surveys.

2.0 Introduction

Hayward Lake is a 191-acre impoundment located in the Middle Namekagon River Watershed which is primarily forest and wetland.

Trego Lake is a 383-acre impoundment, also located in the Middle Namekagon River Watershed. Being a part of the Namekagon River, a portion of Trego Lake is part of the St. Croix National Scenic Riverway which is federally protected.

Invasive species pose a threat to aquatic ecosystems. They are defined as non-native species that, when introduced, cause, or are likely to cause, harm to the environment, human health, or the economy. Invasive plant species can displace native plant populations, restrict boating, reduce wildlife habitat, and cause nutrient imbalance in a waterbody. Once established, invasive species can be transferred downstream by recreationists and migrating wildlife.

This Study was conducted to assess the presence of known aquatic and terrestrial invasive species and identify any new invasive species in the Project areas. The Studies encompassed the Hayward and Trego Flowages within the Projects' existing and proposed boundaries and included aquatic and terrestrial plants and select aquatic invertebrates. The Study areas also included the reservoir shorelines and upland shorelines owned by the Licensee.

3.0 Methodology

3.1 Upstream and Downstream Inundated Areas

3.1.1 Aquatic Plant Surveys

Aquatic plants were sampled by approximating the WDNR's Point-Intercept protocols as listed in *Recommended Baseline Monitoring of Aquatic Plants in Wisconsin* (WDNR 2019). Two sampling surveys were completed for each Project: the early-season survey was completed at Hayward on June 7-8, and at Trego on June 9-10; and the late-season survey was completed at Hayward on August 2-3, and at Trego July 20 and August 1 and 4, 2022. The WDNR provided a grid of sample points for both lakes to implement during the studies (Figures 3 and 4). The grid for Hayward Lake was comprised of 482 sample points distributed evenly throughout the flowage, and the grid for Trego Lake contained 493 sample points. The WDNR

requested that this Study extend sampling farther upstream on Trego Lake than the grid provided by the WDNR encompassed; therefore, an additional 28 points were added to the grid, east of Hwy 53 (point numbers 494-521), for a total of 521 sampling points. Each sampling point was located using a boat and a Trimble R1 GNSS Receiver and GPS device and was assessed for sample feasibility.

Points that could not be sampled were categorized as follows:

Non-navigable (per density of plant growth, shallow water, dock, swim area, or safety),

Terrestrial (point located in an upland area), or

Too deep (i.e., over 15 feet deep or deeper than depth of plant growth)

Temporary obstacle (i.e., fisherman or other obstacle in water)

Points were sampled using a double-sided rake mounted on a pole. The rake was lowered until it rested gently on the lake bottom, twisted twice, then raised straight up out of the water. At each sampled point, aquatic plant species' presence and density were collected (Figures 5 - 8 and Attachments A - D). Plant density was measured by rake fullness (Figure 9). Areas not captured by the point-intercept grid were monitored for the species listed in the WDNR aquatic invasive rapid response species list (WDNR 2016). No permanent vouchers were collected. Photographs taken during the Study are included in Attachment E.

Additional information regarding bed substrates and depths was collected at points with water depths up to 15 feet in July/August. 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 bottom was also noted. Locations with coarse woody habitat greater than 4 inches in diameter and five feet in length, which were observed in the water at or below the high-water mark, were mapped. In June, the maximum depth of colonization (MDC) was determined by three empty rake retrievals in different areas at the same depth. Once the MDC was determined, points exceeding that depth were not sampled.

3.1.2 Water Samples

To monitor for the presence of zebra mussels (*Dreissena polymorpha*), two mussel veliger samples were collected during the July survey by approximating WDNR monitoring protocol for zebra mussels (WDNR 2020). One sample each was collected in the reservoir and tailwater at both Projects. A 64-micron mesh zooplankton net was used to collect the zebra mussel veliger samples. To monitor for the presence of spiny water flea (*Bythotrephes longimanus*) and fishhook water flea (*Cercopagis pengoi*), one water flea sample was collected in both the reservoir and tailwater for each Project, approximating WDNR monitoring protocol for water flea (WDNR 2021). A 250-micron mesh zooplankton net was used to collect the water flea samples.

For the reservoir samples (Figures 1 and 2), a horizontal tow was conducted by lowering the net into the water so that the top of the net was fully submerged, and the bottom of the net remained above the bottom or hypolimnion. With the net in this position, the boat was driven backwards slowly (about 2 miles per hour) for two minutes.

Shallow water and fast flows at the tailwater locations (Figures 1 and 2) prevented the use of a boat; therefore, the sampling method was adjusted accordingly. The pool below the dam was accessed on foot. The plankton net was then positioned in the current, such that the top of the net was submerged while the bottom of the net remained above the bottom substrate. The net was held in this position, with water flowing through for two minutes, to collect the water sample.

For all eight samples, while raising the zooplankton net from the water, the net was rinsed from the outside so that the entire sample would be washed into the collection cup. For each sample, as much water as possible was decanted from the collection cup. Each final sample was poured into a quart-sized sample bottle and preserved with 95% ethanol at a 4:1 ethanol to sample ratio. The preserved water samples were sent for analysis to the Wisconsin State Laboratory of Hygiene in Madison, Wisconsin on August 11, 2022, as requested by the WDNR invasive species coordinator.

3.1.3 Sediment Samples

To monitor for invasive macroinvertebrates, sediment samples were collected at public boat launch sites at Hayward and Trego lakes (Figures 1 and 2). A trowel was used to scoop approximately six inches of sediment into a 10-inch Tetra Pond Planter Basket, with a 1/32nd inch mesh (Figure 10). Fine sediment was flushed out of the basket and the remaining materials were examined for Asian clam (*Corbicula fluminea*), faucet snail (*Bithynia tentaculate*), New Zealand mud snail (*Potamopyrgus antipodarum*), Malaysian trumpet snail (*Melanoides tuberculata*), rusty crayfish (*Orconectes rusticus*), and other invasive macroinvertebrates. The areas in the vicinity of these access sites were also visually examined for live snails, crayfish, and shells.

3.2 Terrestrial Upland Areas

The upland shorelines adjacent to the reservoirs, and upland areas owned by the Licensee, were surveyed in early-August using the two methods described below.

3.2.1 Upland Survey - Shoreline

The Trego and Hayward upland shoreline areas were studied on August 1 and 2, 2022, respectively (Figures 11A and 12A). The upland shoreline was surveyed by motorboat, canoe, or on foot where the use of a boat was not feasible. Along the shoreline, an overall characterization of the terrestrial plant composition was made using the *Wisconsin Natural Heritage Inventory (NHI) Recognized Natural Communities Working Document* (Epstein et al. 2007). Shoreline plant composition was studied within a 10-meter riparian zone visible from open water.

The reservoir shoreline surveys were divided into segments based on changes in land use or vegetative communities. When plants included in the NR 40 list were observed, the species type, location, and length of infested shoreline were identified and mapped using a Trimble R1 GNSS Receiver and GPS device. Relative abundance of each observed species within each segment was determined using the Daubenmire Classification Scheme Cover Ranking System. This system provides an estimate of the percent foliage cover as would be observed from above the vegetation. This ranking system was used to estimate relative abundance because it reduces the influence of individual bias in estimating foliage cover and can be applied to the relative size and length of a given segment of study (Daubenmire 1959). See Table 1 below for an overview of the Daubenmire Classification Scheme Cover Ranking System.

Table 1

Daubenmire Classification Scheme Cover Ranking System

Foliage Percent Cover	Rank
1-5	1
5-25	2
25-50	3
50-75	4
75-95	5

3.2.2 Upland Survey - Meander of Terrestrial Areas

Upland areas owned by the Licensee within the Hayward and Trego Project boundaries were studied using a meander survey on August 3 and 4, 2022, respectively (Figures 11B and 12B). The routes traveled during the meander surveys were recorded using a Garmin Forerunner 55 Watch. An overall characterization of the terrestrial plant communities was recorded. Whenever plants included in the NR 40 list were observed, the species and location were recorded using a Trimble R1 GNSS Receiver and GPS device. An estimate of relative abundance, using the Daubenmire System, and the extent to which the species was present (areal coverage), were recorded, as was the route of travel during the meander.

4.0 Results and Discussion

4.1 Hayward Lake Aquatic Plant Survey

4.1.1 June Point-Intercept Survey

A total of 352 points were sampled during the point-intercept survey on June 7-8, 2022 (Figure 5, Attachment A). A majority of the points unable to be sampled were the result of either plant density, inaccessibility due to shallow water, or the water was too deep (i.e., >15 feet or MDC). In addition, eight points could not be sampled because they were either terrestrial (5), within an active swim area (1), within the dam buoys (1), or inaccessible due to a temporary obstacle (1).

Among the points sampled, 344 were shallower than the maximum depth of rooting plants (10.5 feet) with 283 (~82% of the littoral points) exhibiting vegetation. Thirty-four native species were found during the survey (Table 2), two of which were observed visually, but not present on the rake/at a sample point (i.e., watershield (*Brasenia schreberi*) and wild calla (*Calla palustris*). Overall, predominant species were flat-stem pondweed (*Potamogeton zosteriformis*), coontail (*Ceratophyllum demersum*), common waterweed (*Elodea canadensis*), forked duckweed (*Lemna trisulca*), and fern pondweed (*Potamogeton robbinsii*). Figure 13 includes the species dominant on each rake sample in June. The average total rake fullness during the study where plants were present was 1.55 (Figure 5).

Two submergent aquatic invasive species were present during the point-intercept survey as well, Eurasian watermilfoil (*Myriophyllum spicatum,* EWM) and curly-leaf pondweed (*Potamogeton crispus,* CLP). These two species will be discussed further in Section 4.1.3. A number of wetland and terrestrial invasive species were also observed, and their occurrences will be discussed in Section 4.2. WDNR Incident Report Forms can be found in Attachment F

4.1.2 August Point-Intercept Survey

The late-season survey on Hayward Lake was completed on August 2-3, 2022. All navigable sample points 15 feet deep or less were sampled to assess sediment types. A total of 394 points were visited during the August survey (Figure 6, Attachment B). The maximum depth of plant growth was 12.2 feet. Of the points visited, 335 were found to be within the littoral zone. Two hundred ninety-five (88% littoral frequency of occurrence) of these sample sites contained vegetation. Thirty-two native species were found on the rake during the late-season survey (Table 2). Common waterweed, coontail, flat-stem pondweed, and forked duckweed were again four of the predominant species; however, the fifth predominant species during the August survey was wild celery (*Vallisneria americana*). Figure 14 depicts the dominant species on each rake sample in August. The average total rake fullness where plants were present was 1.96. EWM and CLP were again both present during the August survey.

Table 2

Hayward Lake Aquatic Plant Species Abundance

Scientific Name	Common Name	Littoral Frequency of Occurrence[a]		Relative Frequency of Occurrence[b]	
		June	August	June	August
Myriophyllum spicatum[c]	Eurasian watermilfoil	13.4	20.0	5.4	7.0
Potamogeton crispus	Curly-leaf pondweed	5.8	0.6	2.4	0.2
Bidens beckii	Water marigold	3.5	7.8	1.4	2.7
Brasenia schreberi	Watershield	Visual	*not observed*	Visual	*not observed*
Ceratophyllum demersum	Coontail	33.4	41.5	13.5	14.6
Chara spp.	Muskgrasses	2.6	1.8	1.1	0.6
Eleocharis acicularis	Needle spikerush	0.3	0.3	0.1	0.1
Elodea canadensis	Common waterweed	33.4	42.7	13.5	15.0
Equisetum spp.	Horsetail species	0.3	*not observed*	0.1	*not observed*
Heteranthera dubia	Water stargrass	8.7	6.6	3.5	2.3
Lemna minor	Small duckweed	1.2	0.9	0.5	0.3
Lemna trisulca	Forked duckweed	29.7	28.7	12.0	10.1
Myriophyllum sibiricum	Northern watermilfoil	1.5	0.3	0.6	0.1
Najas flexilis	Slender naiad	*not observed*	4.8	*not observed*	1.7

Scientific Name	Common Name	Littoral Frequency of Occurrence[a]		Relative Frequency of Occurrence[b]	
		June	August	June	August
Nitella spp.	Stoneworts	8.1	18.5	3.3	6.5
Nuphar variegata	Spatterdock	1.7	1.5	0.7	0.5
Nymphaea odorata	White water lily	3.5	3.0	1.4	1.0
Potamogeton amplifolius	Large-leaf pondweed	2.6	1.2	1.1	0.4
Potamogeton epihydrus	Ribbon-leaf pondweed	0.3	0.6	0.1	0.2
Potamogeton friesii	Fries' pondweed	7.6	0.6	3.1	0.2
Potamogeton gramineus	Variable-leaf pondweed	2.6	1.5	1.1	0.5
Potamogeton illinoensis	Illinois pondweed	*not observed*	0.6	*not observed*	0.2
Potamogeton natans	Floating-leaf pondweed	0.6	0.9	0.2	0.3
Potamogeton praelongus	White-stem pondweed	2.9	5.4	1.2	1.9
Potamogeton pusillus	Small pondweed	0.3	2.4	0.1	0.8
Potamogeton richardsonii	Clasping-leaf pondweed	0.9	3.6	0.4	1.3
Potamogeton robbinsii	Fern pondweed	27.0	16.1	10.9	5.7
Potamogeton strictifolius	Stiff pondweed	*not observed*	0.6	*not observed*	0.2
Potamogeton zosteriformis	Flat-stem pondweed	38.1	34.9	15.4	12.3
Ranunculus aquatilis	White water crowfoot	0.9	0.3	0.4	0.1
Sagittaria latifolia	Common arrowhead	*not observed*	0.6	*not observed*	0.2
Sagittaria spp.	Arrowhead spp.	2.3	2.0	0.9	0.7
Sparganium eurycarpum	Common bur-reed	1.7	1.2	0.7	0.4
Sparganium fluctuans	Floating-leaf bur-reed	0.3	*not observed*	0.1	*not observed*
Spirodela polyrhiza	Large duckweed	0.9	0.3	0.4	0.1

Scientific Name	Common Name	Littoral Frequency of Occurrence[a]		Relative Frequency of Occurrence[b]	
		June	August	June	August
Stuckenia pectinata	Sago pondweed	0.6	0.3	0.2	0.1
Utricularia minor	Small bladderwort	0.6	*not observed*	0.2	*not observed*
Utricularia vulgaris	Common bladderwort	0.3	*not observed*	0.1	*not observed*
Vallisneria americana	Wild celery	9.0	33.1	3.6	11.6
Wolffia spp.	Watermeals	0.9	*not observed*	0.4	*not observed*

[a] The littoral frequency of occurrence refers to the number of times the species was found divided by the total number of sample locations shallower than the MDC.

[b] The relative frequency of occurrence refers to the frequency at which one species was found in comparison to all species found (percentage).

[c] Red font indicates invasive species.

4.1.3 Hayward Lake Submergent Aquatic Invasive Species

As previously mentioned, EWM and CLP were identified during both of the surveys on Hayward Lake. Point-intercept locations which contained one or both of these species during the surveys are shown in Figures 15 and 16. Both of these species were previously known in the system. Curly-leaf pondweed was verified in 2006, Eurasian watermilfoil was verified in 2011, and a hybrid variety (*Myriophyllum spicatum x M. sibiricum*, HWM) of watermilfoil was verified in 2012. Because verification of hybridity requires genetic testing, occurrences in Hayward Lake can be referred to as EWM or HWM interchangeably.

CLP prefers cooler water and starts growing earlier in the growing season which allows it to establish before many native plants begin to grow. It also senesces earlier in the season, as can be seen in Table 2 and when comparing Figures 15 and 16. The littoral frequency of occurrence of CLP in June was 5.8 as opposed to only 0.6 in August. Although classified as an invasive species, CLP does not always grow aggressively and in some systems can blend with native plant populations, causing no issues. CLP also produces turions which are very hardy and can remain viable at the lake bottom for extended periods of time before sprouting new plants. Hybrid varieties of CLP have been reported as well. As with EWM, hybridity verification requires lab testing to definitively classify parent plants (WDNR 2009). Overall, the frequency of CLP in Hayward Lake is relatively low, and no areas were observed that contained monotypic stands or impeded navigability any more than native plants.

EWM does not begin growing as early in the year as CLP, but it does also typically die back earlier in the growing season than native species, as can also be seen in Table 2. In June, the littoral frequency of occurrence for EWM was 13.4 and in August was 5.4. Similar to CLP, overall frequency of EWM/HWM in Hayward Lake is relatively low, and no surface-matted areas of EWM were observed. When growing aggressively, hybrid watermilfoil has been shown to be more difficult to manage than pure-strain EWM, as it appears to be more resistant to herbicides, and control measures do not typically last for extended periods of time.

4.1.4 Overall Aquatic Plant Survey Analysis and Observations

A total of 38 native aquatic plant species were identified in Hayward Lake during the 2022 point-intercept surveys. Table 3 shows a summary of statistics for each survey. The native species richness values shown are for plants located on the rake only (excludes visual-only occurrences) and includes only plants identified to species (except for the muskgrasses and stoneworts, which are not typically identified to species during PI surveys, and are thus included in the analysis), so they may differ from values given above. Conservatism (C) values range from 1-10. Higher species conservatism values indicate the presence of plants which are sensitive to environmental degradation, while lower C-values indicate plants that are not sensitive and can survive in lower quality systems. The mean C values in June and August were 6.3 and 6.0, respectively, indicating that the system is generally healthy from an aquatic plant perspective.

During the June survey, two species were located with the highest C-value of 10: Floating-leaf bur-reed (*Sparganium fluctuans*) and small bladderwort (*Utricularia minor*). Bladderworts generally favor shallow areas with slow-moving or standing water, often being found alongside water lilies. In August, these types of areas were no longer navigable on Hayward Lake due to excessive plant growth, so while not recorded on the rake during the late-season survey, it was likely still present in the lake.

Hayward Lake was surveyed for wild rice, but none was observed.

Overall littoral frequency of occurrence of plants in June was 82.3% and in August was 88%. With generally shallow depths throughout much of the flowage (Figure 17), aside from the bay where the dam is located, higher overall littoral frequency values were expected. Maximum depth of plant growth being over 10 feet during both of the surveys indicates good water clarity.

Substrate type also directly affects the species type and abundance of plants that can be supported in a waterbody. The majority of substrate samples collected in August (88.6%), at points having depths of less than 15 feet, were classified as organic, which is the most conducive for aquatic plant growth. The remaining locations consisted of 10.5% sand, 0.5% wood, and 0.3% gravel (Figure 18).

During the June point-intercept survey, 42 (11.9%) of the sampling points contained woody debris. Larger coarse woody habitat (CWH; over 4 inches in diameter and 5 feet in length) observed in the water was mapped during the August point-intercept survey (Figure 19). Twenty-nine pieces of CWH were mapped primarily in near-shore and island areas around the lake. In addition, wood pilings which were part of the historic railroad bridge are also present extending into the lake. This location can be seen as a line near the center of the lake on the corresponding map rather than as individual points.

Table 3

Hayward Lake Overall Submergent Plants Summary

Statistic	June 2022	August 2022
Littoral Frequency of Occurrence	82.3	88.0
Maximum Depth of Plants	10.5 feet	12.2 feet
Native Species Richness	30	31
Mean Conservatism (C)	6.3	6.0
FQI	34.7	33.4

4.2 Hayward Terrestrial Upland Areas

Terrestrial invasive species surveys were conducted on August 2 and 5 along the shoreline and upland areas included within the study area. The majority of the shoreline was comprised of residential properties with manicured vegetation; the remainder was comprised of short sections of naturally vegetated and forested areas. The shoreline was inspected by boat or canoe, where feasible, or by walking where navigability was limited. A small area, east of Duffy Road (see Figure 11A), was not accessible either by foot or by boat. This area was comprised of dense emergent vegetation, precluding canoe access, and an unconsolidated bottom which impeded access on foot. Upland shoreline areas generally consisted of manicured turfgrass and landscaped areas on residential properties, punctuated by occasional roadways and emergent wetland and scrub/shrub areas. Terrestrial invasive meander surveys were conducted in three distinct areas, including the Hayward Lake Boat Landing and Hayward City Beach, an area owned by the Licensee located east and south of the dam, and an area owned by the Licensee located west and south of the dam. These areas comprised a mix of mowed vegetation, trees, shrubs, and herbaceous vegetation and contained sizeable populations of invasive species.

4.2.1 Upland Survey - Shoreline

The upland survey was separated into only 2 segments, as the terrain was fairly consistent and dominated by residential land use, with some short sections of naturally forested or vegetated areas interspersed (Figure 11A, Attachment G). For the purposes of this report, Segment 1 is classified as “Developed – Residential”, while Segment 2 is classified as a mix of “Developed – Residential” and “Northern Mesic Forest”. Emergent wetlands, scrub-shrub communities, and roadways were occasionally encountered but were sparsely represented along the shoreline (Table 4).

Table 4

Hayward Terrestrial Shoreline Community Types Summary

Terrestrial Shoreline Community	Mileage of Meander	Percentage of Meander
Developed – Residential	0.32	3.57
Developed – Residential / Northern Mesic Forest	8.65	96.43
Total	8.97	100

The following list summarizes the most commonly encountered herbaceous and woody vegetation species observed within each terrestrial shoreline community:

Developed – Residential

Manicured turf grasses, horticultural plants, occasional trees

Northern Mesic Forest

Overstory: Eastern white pine (*Pinus strobus*), basswood (*Tilia americana*), paper birch (*Betula papyrifera*), white spruce (*Picea glauca*), red pine (*Pinus resinosa*), sugar maple (*acer saccharum*)

Understory: fern species (polypodiophytes)

Invasive species comprised 2.6 miles of shoreline during the terrestrial survey and included glossy buckthorn (*Frangula alnus*), common buckthorn (*Rhamnus cathartica*), Eurasian bush

honeysuckle (*Lonicera spp.*), spotted knapweed (*Centaurea stoebe*), tansy (*Tanacetum vulgare*), yellow iris (*Iris pseudacorus*), aquatic forget-me-not (*Myosotis scorpioides*), purple loosestrife (*Lythrum salicaria*), and suspected narrow-leaf hybrid cattail (*Typha angustifolia x T. latifolia*; Table 5). 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.

Table 5

Hayward Shoreline and Terrestrial Invasive Species Summary

Species	Common Name	Mileage of Meander	Percentage of Meander
Centaurea stoebe	Spotted knapweed	0.12	1.36%
Lythrum salicaria	Purple loosestrife	0.34	3.79%
Typha spp.	Cattail spp. (suspected to be invasive or hybrid)	0.01	0.17%
Tanacetum vulgare	Tansy	0.02	0.19%
Iris pseudacorus	Yellow iris	0.07	0.73%
Frangula alnus	Glossy buckthorn	0.31	3.44%
Rhamnus cathartica	Common buckthorn	0.47	5.29%
Myosotis scorpioides	Aquatic forget-me-not	0.42	4.65%
Lonicera spp.	Eurasian bush honeysuckle	0.85	9.44%

4.2.2 Upland Survey - Meander of Terrestrial Areas

Two areas owned by the Licensee and one are not owned by the Licensee were included in the upland terrestrial meander survey (Figure 11B); the Hayward Lake Boat Landing and City Beach area (not owned by the Licensee) and the area around the Dam (owned by the Licensee). Because the Namekagon River bisected the area around the Dam, each shoreline is reported separately below.

1. **Hayward Lake Boat Landing and City Beach**: This area was characterized by a mixture of maintained turfgrass, a public beach and playground, paved and gravel surfaces, and natural herbaceous and woody vegetation. Invasive plant species observed within this area included:
    a. Eurasian bush honeysuckle
    b. Spotted knapweed
    c. Tansy
    d. Common buckthorn
    e. Glossy buckthorn
2. **East and South of Dam**: This portion of the Dam area owned by the Licensee, was characterized by a mixture of gravel surfaces, road right-of-way, trails leading to river access points, and natural herbaceous and woody vegetation adjacent to the dam. Invasive plant species observed within this area included:
    a. Purple loosestrife
    b. Tansy
    c. Aquatic forget-me-not

d. Spotted knapweed
e. Glossy buckthorn
f. Common buckthorn
g. Eurasian honeysuckle

3. **West and South of Dam**: This portion of the survey, owned by the Licensee, was characterized by a mixture of gravel surfaces, road right-of-way, trails leading to river access points, and natural herbaceous and woody vegetation. Invasive plant species observed within this area included:

    a. Eurasian honeysuckle
    b. Common buckthorn
    c. Glossy buckthorn
    d. Tansy
    e. Purple loosestrife

4.2.3 Upland Survey - Overall Observations

The results of the survey revealed the presence of well-established populations of numerous invasive species on the shoreline of Hayward Lake and in adjacent areas owned by the Licensee. Common and glossy buckthorn, Eurasian bush honeysuckle, purple loosestrife and yellow iris were commonly encountered and even dominant in some areas, while other invasives were well represented but less frequently encountered. The invasives species found in these areas is unsurprising, given the long history of residential and recreational use of the waterbody and surrounding areas. Outdoor recreation clubs, natural areas, and state departments of natural resources have increased efforts toward public education and involvement to help reduce the spread of such species.

4.3 Trego Lake Aquatic Plant Survey

4.3.1 June Point-Intercept Survey

A total of 272 points were sampled during the Trego Lake point-intercept survey on June 9-10, 2022 (Figure 7, Attachment C). A majority of the points unable to be sampled were the result of the water either being too deep (exceeding the MDC), or unnavigable due to excessive plant growth or shallow water. In addition, eight of the sample points were considered terrestrial, one was within dam buoy barrier, one was under a dock, and one was a temporary obstacle. Among the points sampled, 263 were shallower than the maximum depth of rooting plants (10.3 feet) and 144 (54.8% of the littoral points) exhibited vegetation. Twenty-seven native aquatic species were found during the survey (Table 6), seven of which were observed visually, but not present on the rake at a sample point. Those species include spatterdock (*Nuphar variegata*), large-leaf pondweed (*Potamogeton amplifolius*), floating-leaf pondweed (*Potamogeton natans*), white-stem pondweed (*Potamogeton praelongus*), common bladderwort (*Utricularia vulgaris*), wild calla (*Calla palustris*), and marsh cinquefoil (*Comarum palustre*). Overall, predominant species were coontail (*Ceratophyllum demersum*), flat-stem pondweed (*Potamogeton zosteriformis*), common waterweed (*Elodea canadensis*), wild rice (*Zizania* spp.), and wild celery (*Vallisneria americana*). Figure 20 includes the species most dominant on each rake sample in June. The average total rake fullness during the study, where plants were present, was 1.3.

Two submergent aquatic invasive species were present during the point-intercept survey as well: Eurasian watermilfoil (*Myriophyllum spicatum,* EWM) and curly-leaf pondweed (*Potamogeton crispus,* CLP). The June CLP littoral frequency of occurrence in Table 6 is underestimated due to surface-matted areas of it growing in parts of the lake that were unnavigable because of its density. EWM and CLP will be discussed further in Section 4.3.3. A

cattail species (*Typha* spp.), observed in June, was not yet able to be identified as native or non-native. However, during the late-season survey, several populations were confirmed as narrow-leaf cattail, or a hybrid variety of non-native cattail. Native cattail was also observed; therefore, it is possible the species are hybridizing. A number of other wetland and terrestrial invasive species were also observed, and their occurrences will be discussed in Section 4.6. WDNR Incident Report Forms can be found in Attachment H

4.3.2 July/August Point-Intercept Survey

The late-season survey on Trego Lake was completed on July 20, August 1 and 4, 2022. All navigable sample points 15 feet deep or less were sampled to assess sediment types. A total of 301 points were visited (Figure 8, Attachment D). Of the points visited, 258 were found to be within the littoral zone (points within the MDC), and 149 (57.8% littoral frequency of occurrence) of these contained vegetation. The maximum depth of plant growth was 11.0 feet.

Twenty-eight native species were found during the late-season survey (Table 6), four of which were observed visually, but not present on the rake at a sampling point. Those four species were: common arrowhead (*Sagittaria latifolia*), crested arrowhead (*Sagittaria cristata*), creeping spikerush (*Eleocharis palustris*), and grass-leaved arrowhead (*Sagittaria graminea*). Coontail, wild celery, common waterweed, and flat-stem pondweed were again four of the predominant species; however, wild rice had grown to a point that where present, these areas were no longer navigable, so littoral frequencies are underestimated. Wild rice locations are illustrated in Figure 8. The fifth species that took its place during this late-season survey was stoneworts (*Nitella* spp.) Figure 21 depicts the predominant species for each rake sample in July/August. The overall average total rake fullness, where plants were present, was 1.6.

During the late-season survey, one occurrence of spiny hornwort was confirmed (*Ceratophyllum echinatum).* Spiny hornwort is found only in North America, and inhabits lakes and slow-moving streams, but is less frequently observed than its sister species, coontail. Spiny hornwort typically grows in clearer, more acidic waters and is distinguished from coontail by having limp, barely toothed leaves that fork 3-4 times.

EWM and CLP were again both present during this survey, however, with less frequency than in June, as expected. Narrow-leaf cattail was also confirmed, and is discussed in further detail in Section 4.6

Table 6

Trego Lake Aquatic Plant Species Abundance

Scientific Name	Common Name	Littoral Frequency of Occurrence[a]		Relative Frequency of Occurrence[b]	
		June	July/Aug	June	July/Aug
Myriophyllum spicatum[c]	Eurasian watermilfoil	5.7	3.9	4.7	2.6
Potamogeton crispus	Curly-leaf pondweed	6.5	1.6	5.3	1.0
Bidens beckii	Water marigold	0.4	*not observed*	0.3	*not observed*
Calla palustris	Wild calla	Visual	*not observed*	Visual	*not observed*
Ceratophyllum demersum	Coontail	24.3	26.4	20.1	17.5

Scientific Name	Common Name	Littoral Frequency of Occurrence[a]		Relative Frequency of Occurrence[b]	
		June	July/Aug	June	July/Aug
Ceratophyllum echinatum	Spiny hornwort	*Not noted*	0.4	*Not noted*	0.3
Chara spp.	Muskgrasses	1.1	1.9	0.9	1.3
Comarum palustre	Marsh cinquefoil	Visual	*not observed*	Visual	*not observed*
Eleocharis palustris	Creeping spikerush	*not observed*	Visual	*not observed*	Visual
Elodea canadensis	Common waterweed	19.4	22.9	16.0	15.2
Heteranthera dubia	Water stargrass	2.3	1.9	1.9	1.3
Lemna minor	Small duckweed	1.1	3.5	0.9	2.3
Lemna trisulca	Forked duckweed	6.5	11.2	5.3	7.5
Myriophyllum sibiricum	Northern watermilfoil	0.8	0.4	0.6	0.3
Najas flexilis	Slender naiad	*not observed*	0.4	*not observed*	0.3
Nitella spp.	Stoneworts	6.8	17.8	5.6	11.8
Nuphar variegata	Spatterdock	Visual	0.4	Visual	0.3
Nymphaea odorata	White water lily	1.1	0.8	0.9	0.5
Potamogeton amplifolius	Large-leaf pondweed	Visual	*not observed*	Visual	*not observed*
Potamogeton friesii	Fries' pondweed	0.4	1.9	0.3	1.3
Potamogeton natans	Floating-leaf pondweed	Visual	*not observed*	Visual	*not observed*
Potamogeton praelongus	White-stem pondweed	Visual	1.2	Visual	0.8
Potamogeton richardsonii	Clasping-leaf pondweed	0.8	0.8	0.6	0.5
Potamogeton robbinsii	Fern pondweed	3.8	3.5	3.1	2.3
Potamogeton zosteriformis	Flat-stem pondweed	20.2	14.7	16.6	9.8
Ranunculus aquatilis	White water crowfoot	0.8	0.4	0.6	0.3

Scientific Name	Common Name	Littoral Frequency of Occurrence[a]		Relative Frequency of Occurrence[b]	
		June	July/Aug	June	July/Aug
Sagittaria cristata	Crested arrowhead	*not observed*	Visual	*not observed*	Visual
Sagittaria graminea	Grass-leaved arrowhead	*not observed*	Visual	*not observed*	Visual
Sagittaria latifolia	Common arrowhead	*not observed*	Visual	*not observed*	Visual
Sparganium eurycarpum	Common bur-reed	1.5	0.8	1.3	0.5
Spirodela polyrhiza	Large duckweed	0.4	5.4	0.3	3.6
Stuckenia pectinata	Sago pondweed	0.4	*not observed*	0.3	*not observed*
Tolypella intricata	Tassel stonewort	*not observed*	1.2	*not observed*	0.8
Typha spp.	Non-native cattail	Visual	Visual	Visual	Visual
Utricularia vulgaris	Common bladderwort	Visual	*not observed*	Visual	*not observed*
Vallisneria americana	Wild celery	7.6	25.6	6.3	17.0
Wolffia spp.	Watermeal species	*not observed*	0.8	*not observed*	0.5
Zizania spp.	Wild rice	9.5	1.2	7.8	0.8

[a]The littoral frequency of occurrence refers to the number of times the species was found divided by the total number of sample locations shallower than the MDC.

[b]The relative frequency of occurrence refers to the frequency at which one species was found in comparison to all species found (percentage).

[c]Red font indicates invasive species.

4.3.3 Trego Lake Submergent Aquatic Invasive Species

As previously mentioned, EWM and CLP are both present in Trego Lake. Figures 22 and 23 display the point-intercept locations where these invasive species were found during the surveys. These species were previously known to occur in the system. Curly-leaf pondweed was verified in 2011 and Eurasian/hybrid watermilfoil was verified more recently in 2019. Because verification of hybridity requires genetic testing and cannot be field identified with certainty, occurrences in Trego Lake can be referred to as EWM or HWM interchangeably. No samples of milfoil were sent for hybridity testing as a part of this Study.

CLP starts growing early in the growing season which allows it to establish before many native plants begin to grow. It also senesces earlier in the season, as evidenced in Table 6. The littoral frequency of occurrence of CLP in June was 6.5 as opposed to only 1.6 in the July/August survey. Although an invasive species, CLP does not always grow aggressively and

in some systems can blend with native plant populations, causing no issues. However, in the large bay at the southern end of Trego Lake, CLP was observed growing in a large, dense, surface-matted area which impeded navigation, making some areas impossible to navigate. CLP produces turions which are very hardy and can remain viable at lake bottom for extended periods of time before sprouting new plants. Because of this, when warranted, management of this species should occur for more than just one growing season, and during consecutive years.

While EWM does not start growing as early as CLP, it also typically dies back earlier in the growing season, as depicted in Table 6. In June, the littoral frequency of occurrence for EWM was 5.7 and in July/August was 3.9. The overall frequency of EWM/HWM in Trego Lake is relatively low, and no monotypic areas of EWM were observed.

4.3.4 Trego Lake Overall Aquatic Plant Survey Analysis and Observations

A total of 35 native aquatic plant species were identified in Trego Lake during the 2022 point-intercept surveys. Table 7 shows a summary of statistics for each of the surveys. The native species richness values shown are for plants located on the rake only (excludes visual-only occurrences) and also includes only those plants identified to species (except for muskgrasses and stoneworts which are not typically identified to species during PI surveys, and are included in the analysis), so they may differ from values given in previous sections. Conservatism (C) values range from 1-10 and indicate a plant's sensitivity to anthropogenic disturbance. Higher species conservatism values indicate the presence of plants which are sensitive to environmental degradation, while lower C-values indicate plants that are not sensitive and can survive in lower quality systems. The mean C values in June and August were 5.9 and 6.2, respectively, indicating that the system is generally healthy from an aquatic plant perspective.

Overall littoral frequency of occurrence of plants in June was 54.8% and in August was 57.8%. As mentioned above, two of the species' frequencies are thought to be under-represented in the surveys. During the early-season survey in June, CLP was likely close to its peak biomass, and areas at the southern end of the flowage contained point-intercept locations which were unnavigable due to surface-matted CLP, mixed with some other species. This results in the littoral frequency of CLP to appear less than what it would have been had all of those areas been surveyed. It also decreases the overall littoral frequency of plants in the lake, and likely the overall average total rake fullness.

The other species believed to be under-represented in the Trego Lake survey is wild rice. During the June survey, most of the wild rice was in its early, floating-leaf stage and was able to be floated through in a canoe, making more points able to be sampled. When the later-season survey was completed, the wild rice had grown into its emergent stage and could no longer be navigated, thereby making many of these points unable to be surveyed. This resulted in the underreporting of the littoral frequency of wild rice as well as contributing to a lower overall frequency of plants in the lake. However, all occurrences of wild rice were mapped in the field and are accounted for in Figure 8.

The Trego Project area demonstrated a variety of habitat types. The upstream portion of the Project reservoir was riverine with steady flow and a sandy bottom. Vegetation in this area was limited to the protected bays adjacent to the main river channel. Further downstream, the lake opens into a wider area at the confluence of Little Mackay Creek and the Namekagon River. At this location, the water is shallow and many aquatic and emergent plants are well established. Moving downstream toward the dam, the lower (northern) portion of the lake narrows and becomes deeper. While the southern end of Trego Lake is primarily shallow with high plant biomass, several portions farther north are more riverine, having a steep underwater slope with depths exceeding what is necessary for plant growth, except near shore (Figure 24).

Substrate type also directly affects the species type and abundance of plants that can be supported in a waterbody. The majority of substrate samples collected in August (68.4%), at points having depths of less than 15 feet, were classified as organic, which is the most conducive substrate for aquatic plant growth. The remaining locations consisted of 24.6% sand, 4.3% gravel, and 1.7% cobble, 0.7% boulder, and 0.3% silt (Figure 25).

Woody debris was mapped within Trego Flowage during the June point-intercept survey. Forty-four (16.2%) of the sampling points contained woody debris. Larger coarse woody habitat (CWH; over 4 inches in diameter and 5 feet in length) observed in the water was mapped during the August point-intercept survey (Figure 26). One hundred forty-eight pieces of CWH were located in near-shore and shallow areas of Trego Lake.

Table 7

Trego Lake Overall Submergent Plants Summary

Statistic	June 2022	July/Aug 2022
Littoral Frequency of Occurrence	54.8	57.8
Maximum Depth of Plants	10.3	11.0
Native Species Richness	20	22
Mean Conservatism (C)	5.9	6.2
FQI	26.4	29.2

4.4 Trego Terrestrial Upland Areas

Terrestrial invasive species surveys were conducted on August 1, 4, and 5, 2022, along the shoreline and upland areas included within the study area. Land use along the shoreline was mixed, with light to moderate residential development among an otherwise wooded terrain. 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. Terrestrial invasive meander surveys were also conducted near the dam and at 2 boat landings.

4.4.1 Upland Survey – Shoreline

The upland survey was separated into 5 segments based on survey logistics rather than on land use or vegetative communities because the shoreline was a fairly consistent mix of residential properties and forested areas (Figure 12A, Attachment I). All 5 segments are classified as a mix of “Developed – Residential” and “Northern Mesic Forest”. Emergent wetlands, scrub-shrub communities, and roadways were occasionally encountered but were sparsely represented along the shoreline (Table 8).

Table 8

Trego Terrestrial Shoreline Community Types Summary

Terrestrial Shoreline Community	Mileage of Meander	Percentage of Meander
Northern Mesic Forest / Developed - Residential	17.81	100
Total	17.81	100

The following list summarizes the most commonly encountered herbaceous and woody vegetation species observed within each terrestrial shoreline community:

Developed - Residential

Manicured turf grasses, horticultural plants, occasional trees

Northern Mesic Forest

Overstory: Eastern white pine (*Pinus strobus*), red maple (*acer rubrum*), white cedar (*Thuja occidentalis*) paper birch (*Betula papyrifera*), white spruce (*Picea glauca*), red pine (*Pinus resinosa*), white oak (*Quercus alba*)

Understory: fern species (polypodiophytes), common milkweed (*Asclepias syriaca*)

Invasive species comprised approximately 2 miles of shoreline during the terrestrial survey and included spotted knapweed (*Centaurea stoebe*), purple loosestrife (*Lythrum salicaria*), yellow iris (*Iris pseudacorus*), Japanese knotweed (*Fallopia japonica*), aquatic forget-me-not (*Myosotis scorpioides*), and suspected narrow-leaf hybrid cattail (*Typha angustifolia x T. latifolia*; Table 9). 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. One isolated, dense population of Japanese knotweed was observed and that occurred in Segment 2.

Table 9

Trego Shoreline and Terrestrial Invasive Species Summary

Species	Common Name	Mileage of Meander	Percentage of Meander
Centaurea stoebe	Spotted knapweed	0.18	1.01%
Lythrum salicaria	Purple loosestrife	0.86	4.83%
Typha spp.	Non-native cattail spp.	0.92	5.17%
Iris pseudacorus	Yellow iris	0.04	0.22%
Fallopia japonica	Japanese knotweed	0.01	0.06%
Myosotis scorpioides	Aquatic forget-me-not	0.002	0.01%

4.4.2 Upland Survey - Meander of Terrestrial Areas

Meander surveys were conducted in four locations Two of the areas owned by the Licensee were included in the upland terrestrial meander survey (Sheet 1 of Figure 12B):

1. **Town of Trego Boat Landing**: This boat landing, not owned by the Licensee, is primarily comprised of a paved road with sand and gravel parking spaces bordered by trees. Little to no vegetation was present within this area. Invasive plant species observed within this area included:
    a. Spotted knapweed
2. **Trego Town Park Boat Landing**: This boat landing, not owned by the Licensee, is comprised of a gravel parking area bordered by trees. Invasive plant species observed within this area included:
    a. Eurasian honeysuckle

3. **North Side of Dam**: This portion of the survey, owned by the Licensee, was characterized by a large, forested area, road-ROW, a gravel parking area, a large, mowed area adjacent to the dam, and areas of natural herbaceous and woody vegetation. Invasive plant species observed within this area included:
    a. Eurasian honeysuckle
    b. Common buckthorn
    c. Spotted knapweed
4. **South Side of Dam:** This portion of the survey, owned by the Licensee, is characterized by a steep forested area near the river, road-ROW, a gravel parking area, a mowed area adjacent to the dam and powerhouse, and areas of natural herbaceous and woody vegetation. Invasive plant species observed within this area included:
    a. Eurasian honeysuckle
    b. Spotted knapweed

4.4.3 Upland Survey - Overall Observations

Overall, invasive species populations were light to moderate throughout the Project, with the exceptions of narrow-leaf cattail, which was occasionally observed in high densities, and purple loosestrife, which has heavily infested the pond area north of River Road. Yellow iris was identified along the water's edge quite frequently, but typically not in high densities. Only one population of Japanese knotweed was observed and that was at a private residence. Likewise, aquatic forget-me-not was only identified in one location.

4.5 Water Samples

The samples for zebra mussel veligers and water fleas collected from Hayward and Trego lakes were dropped off for analysis at the Wisconsin State Lab of Hygiene on August 11, 2022. All results were reported as "absent" of zebra mussel veligers and water fleas. The results from the lab can be found in Attachments J and K.

4.6 Sediment Samples

Boat launches are an ideal location to sample for aquatic invasive species because of the high traffic associated with boat anglers, recreational watercraft and shoreline fishing. Public access locations can be a conduit for the introduction of aquatic invasive species through the emptying of bait buckets, boat bilges, live wells, or hulls which may be holding water from other infested waterbodies.

At Hayward Lake, sediment samples were collected from the public boat launch off of South Second Street (Figure 1). Chinese mystery snails were previously verified in Hayward Lake. While no additional invasive invertebrates were observed in the sediment samples collected, Japanese mystery snails were observed in some of the shallow sandy areas in the lake during surveys. While this was not a previously listed aquatic invasive species in Hayward Lake, it is not unexpected since they are present upstream in Smith Lake and downstream in Trego Lake.

At Trego Lake, sediment samples were collected from the public boat launches on Trego Landing Road, and Cash Road (Figure 2). Chinese mystery snails and Japanese mystery snails were previously known in the system (both verified in 2007), and were also observed during the 2022 surveys, along with native snails. No additional invasive invertebrates were found.

5.0 Conclusion

Lake Hayward and Trego Lake are quite different from one another. Lake Hayward is more developed and has a higher incidence of invasive species, which is expected as these two factors typically coincide with one another. Trego Lake is less developed and has a lower incidence of shoreline invasive species. It is also more riverine than Lake Hayward. Undeveloped watersheds and waterbodies have historically been correlated with higher quality systems (Sass et al. 2010).

During the 2022 surveys, Trego Lake was found to have higher frequencies of curly-leaf pondweed than Lake Hayward. With Trego Lake being a high-quality system and considering its protected status, its higher incidence of invasive species was unexpected. This is likely due in part to the level of use it gets from recreationists, who unknowingly assist in the spread of invasive species. However, areas of Trego Flowage also support large, dense populations of wild rice, whereas none was found in Lake Hayward. The dense beds of wild rice are located within the same general area of Trego Lake as where the surface-matted CLP grows.

6.0 References

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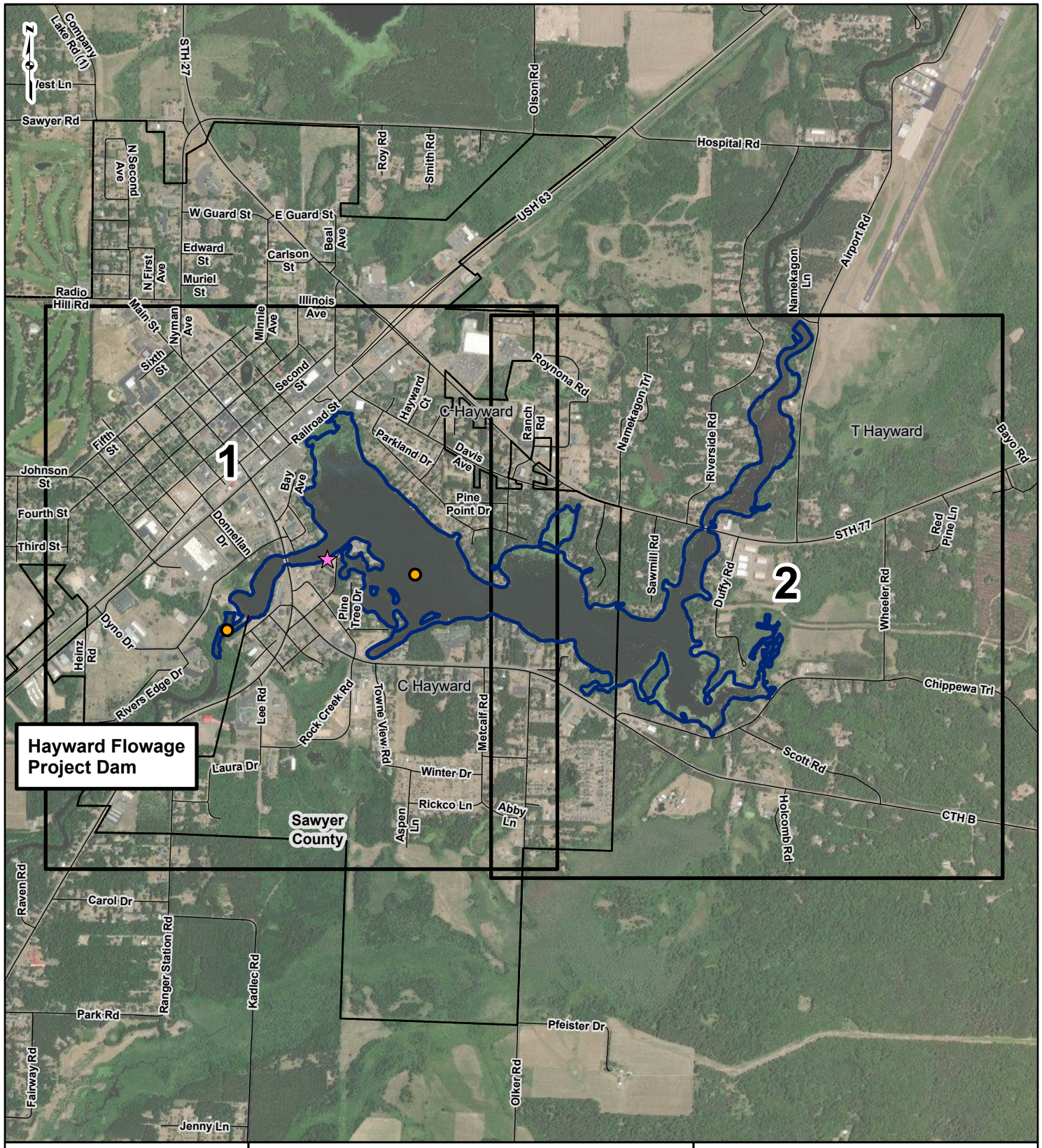
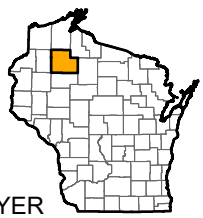
FIGURE 1
Hayward Project Location and Overview Map



PROJECT LOCATION



SAWYER COUNTY, WISCONSIN

LEGEND

- Water Tow Location
- Sediment Sample Location
- Project Boundary
- Map Index
- Road Centerline
- Community Boundary
- County Boundary

0 1,000 2,000 4,000 Feet

Figure 1
Hayward Project Location and Overview Map

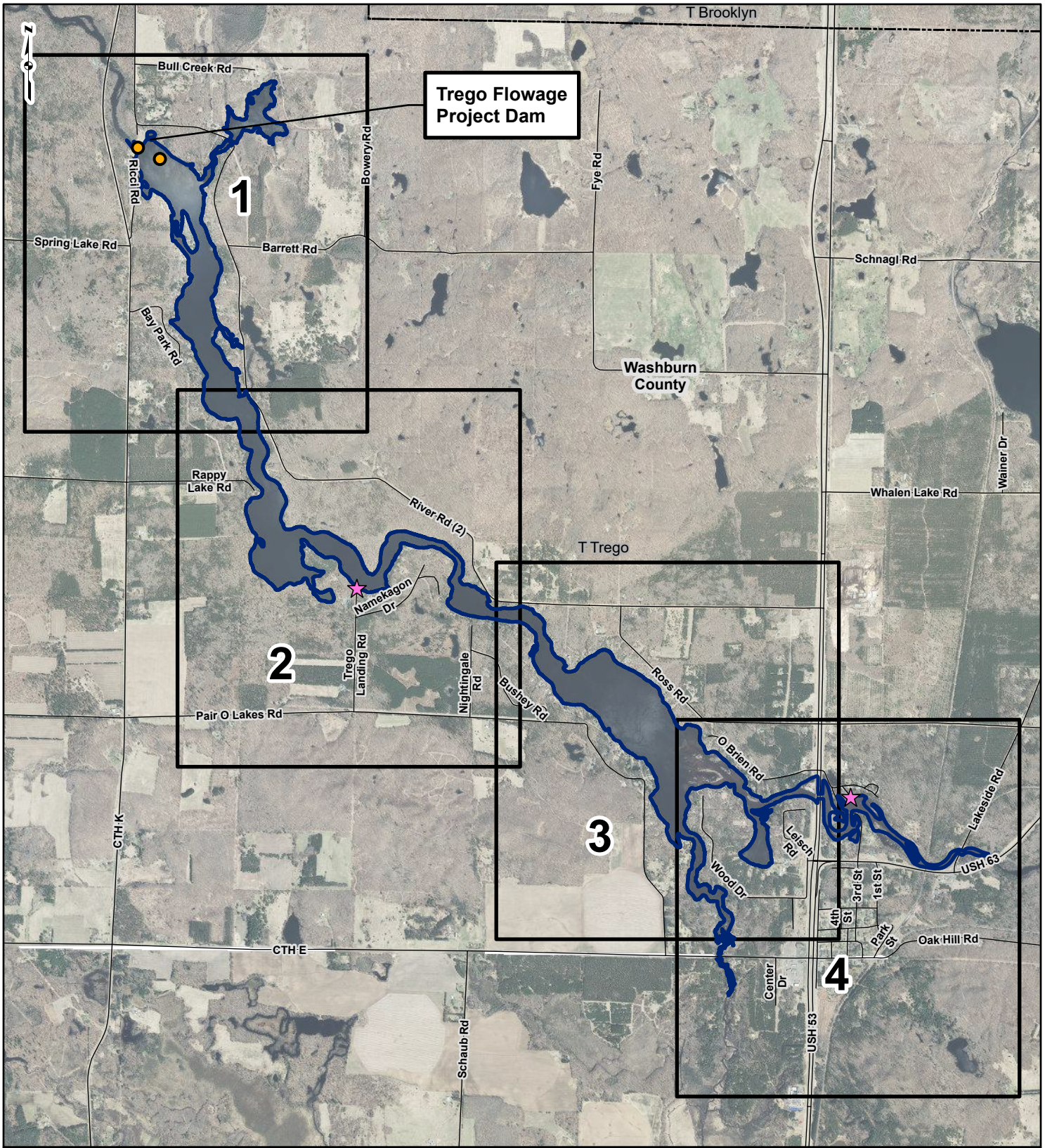
Hayward Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

DRAWN BY: EMW DATE: 10/31/2022
CHECKED: TDB APPROVED: LLS

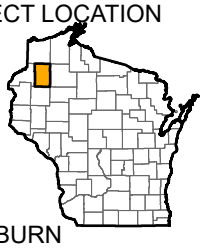
REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/31/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Hayward\R220323_00_Hayward_Invasive_Mapping\R220323_00_Hayward_Invasive_Mapping.aprx

FIGURE 2
Trego Project Location and Overview Map



PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

- Water Tow Location
- Sediment Sample Location
- Project Boundary
- Map Index
- Road Centerline
- Community Boundary
- County Boundary

0 1,500 3,000 6,000 Feet

Figure 2
Trego Project Location and Overview Map

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

Mead & Hunt

DRAWN BY: EMW
CHECKED: TDB
DATE: 10/31/2022
APPROVED: LLS

REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/31/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Trego\R220323_00_Trego_Inv_Mapping\VOID\R220323_00_Trego_Inv_Mapping_2022_10_30.aprx

FIGURE 3
Hayward Point-Intercept Grid Provided by the WDNR

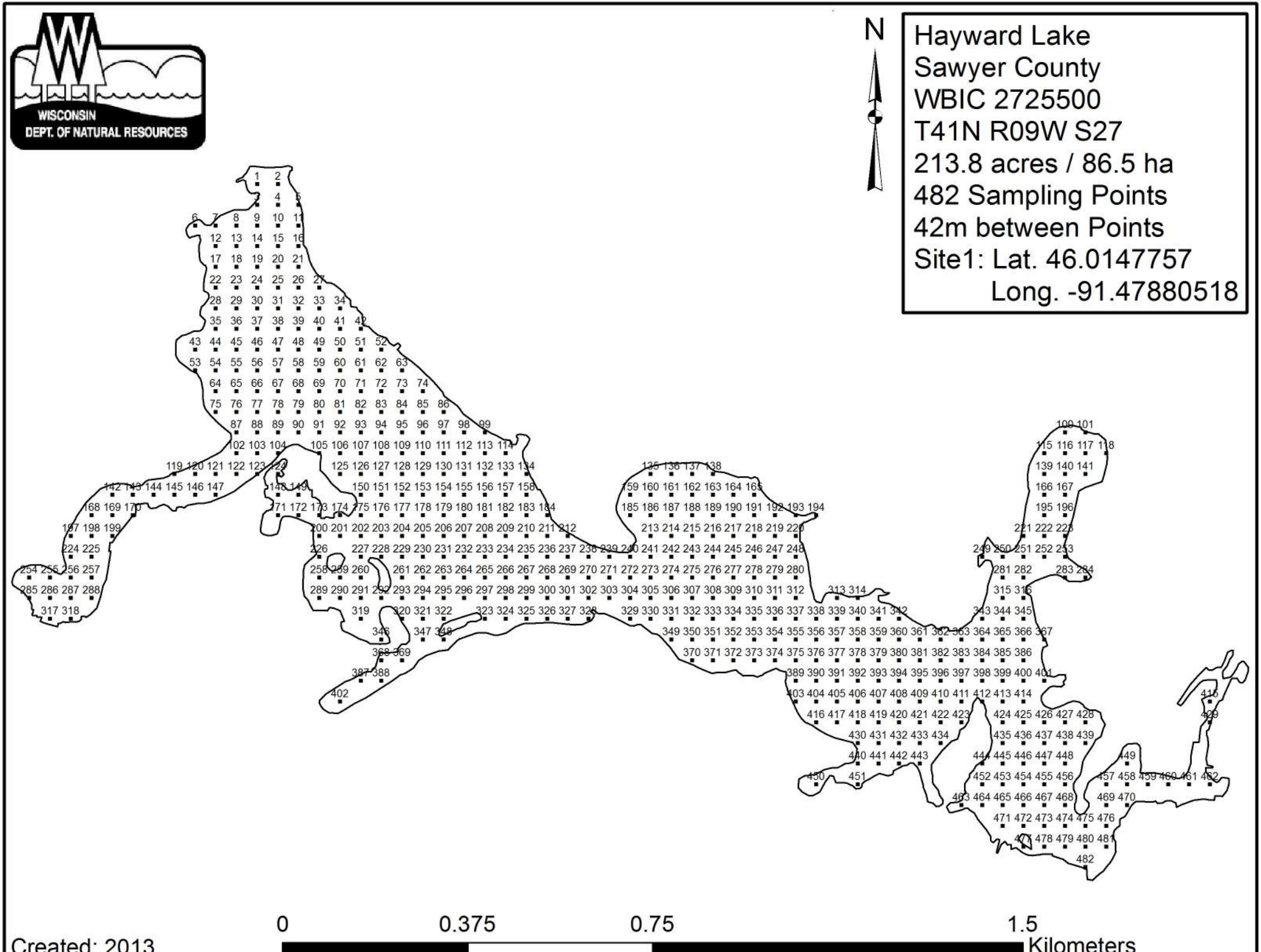
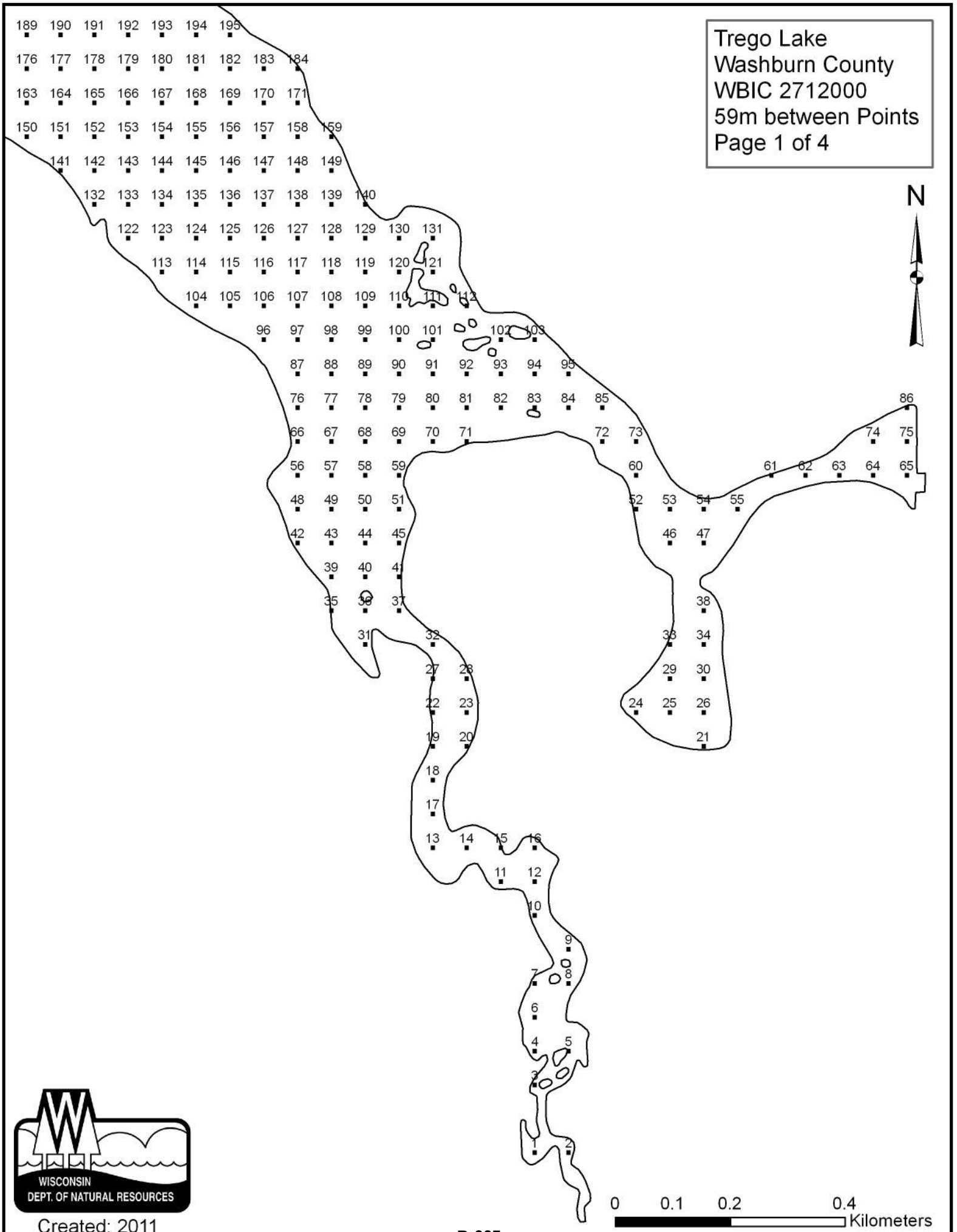
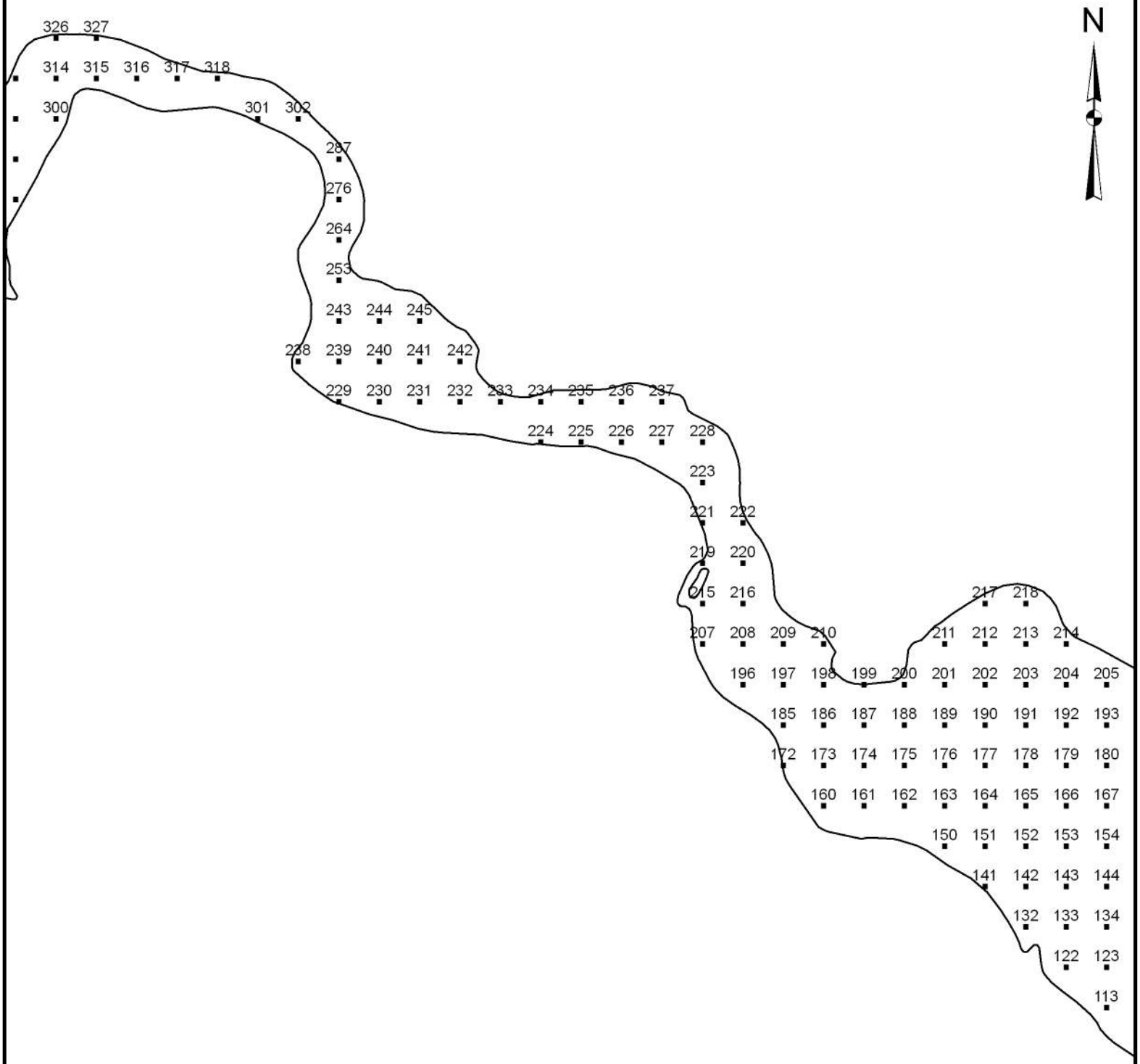

WISCONSIN
DEPT. OF NATURAL RESOURCES
N
Hayward Lake
Sawyer County
WBIC 2725500
T41N R09W S27
213.8 acres / 86.5 ha
482 Sampling Points
42m between Points
Site1: Lat. 46.0147757
Long. -91.47880518
0
0.375
0.75
1.5
Kilometers
Created: 2013

FIGURE 4
Trego Point-Intercept Grid Provided by the WDNR


Trego Lake
Washburn County
WBIC 2712000
59m between Points
Page 1 of 4
N
0 0.1 0.2 0.4
Kilometers
WISCONSIN
DEPT. OF NATURAL RESOURCES
Created: 2011

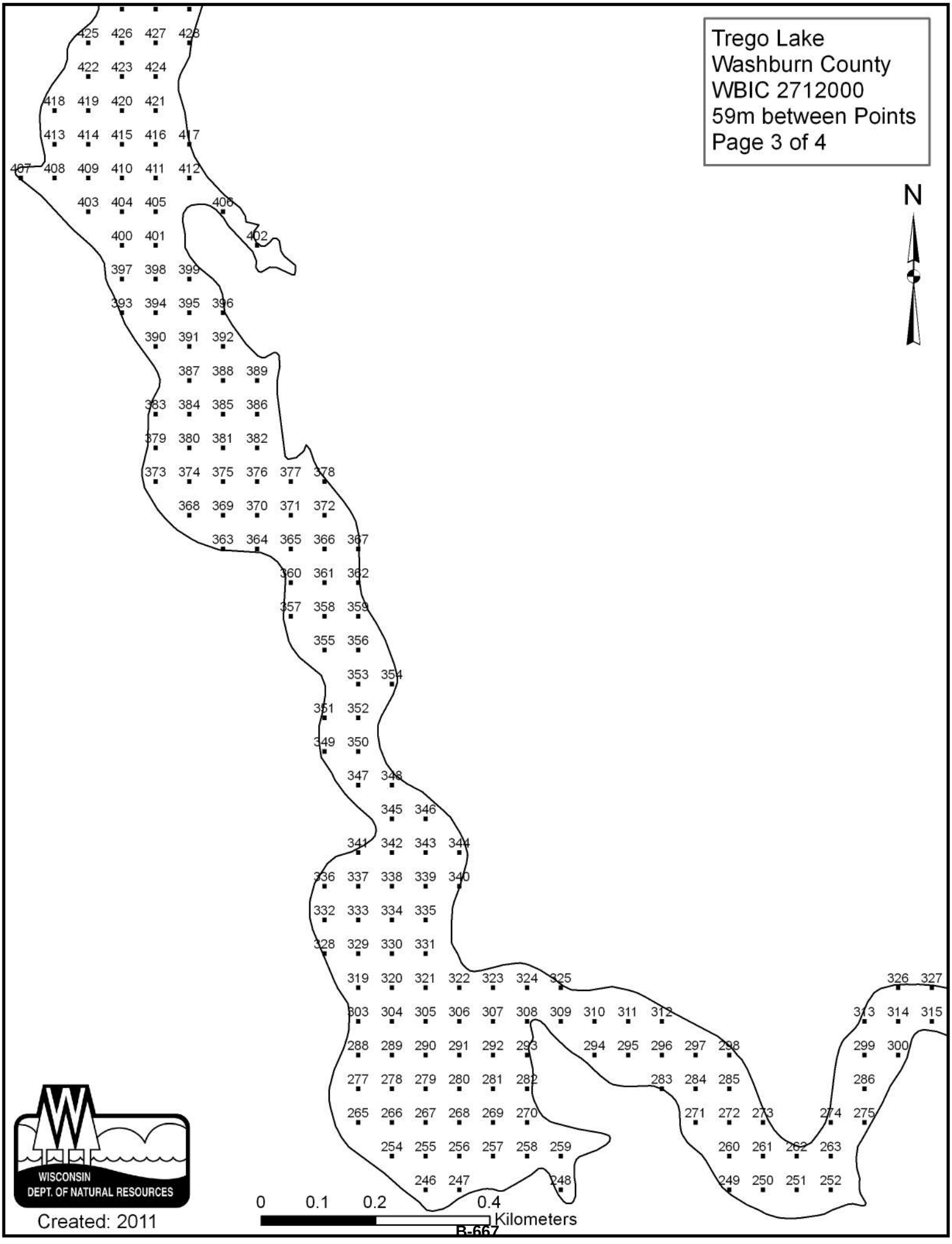
Trego Lake
Washburn County
WBIC 2712000
59m between Points
Page 2 of 4



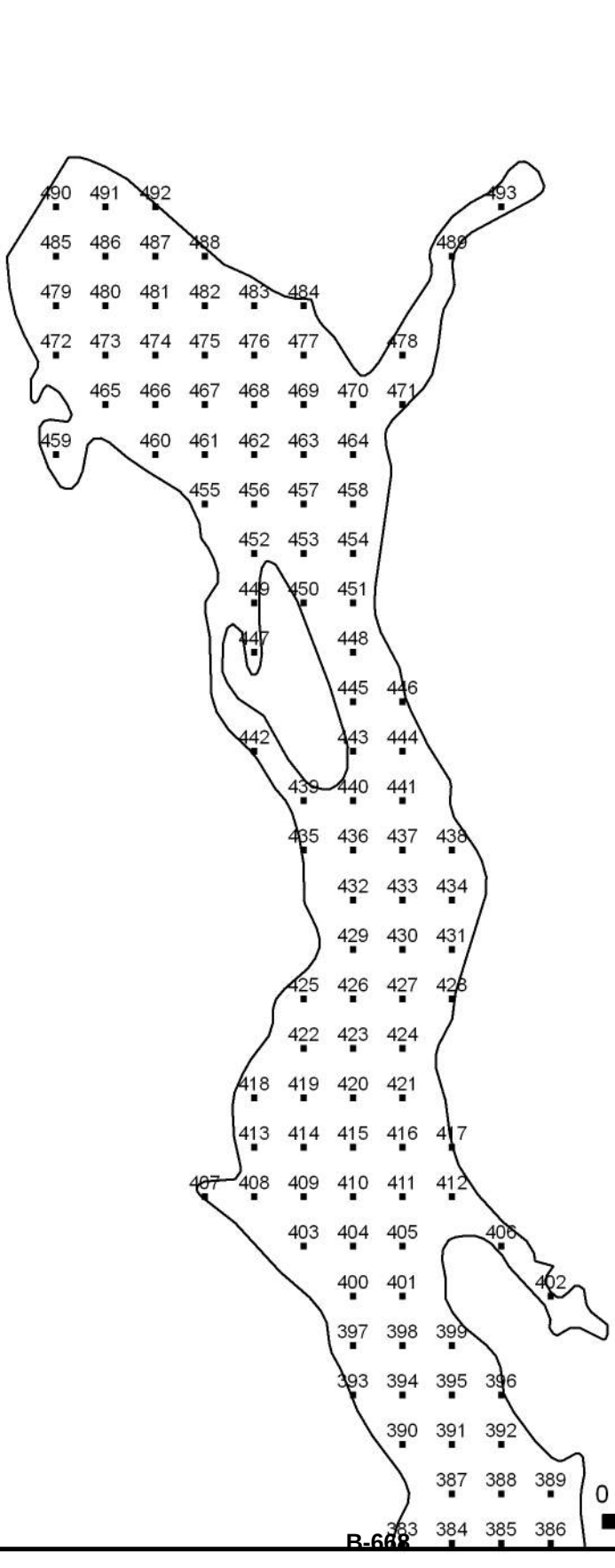
WISCONSIN
DEPT. OF NATURAL RESOURCES

Created: 2011

0 0.1 0.2 0.4
Kilometers


Trego Lake
Washburn County
WBIC 2712000
59m between Points
Page 3 of 4
N
425 426 427 428
422 423 424
418 419 420 421
413 414 415 416 417
407 408 409 410 411 412
403 404 405 406
400 401 402
397 398 399
393 394 395 396
390 391 392
387 388 389
383 384 385 386
379 380 381 382
373 374 375 376 377 378
368 369 370 371 372
363 364 365 366 367
360 361 362
357 358 359
355 356
353 354
351 352
349 350
347 348
345 346
341 342 343 344
336 337 338 339 340
332 333 334 335
328 329 330 331
319 320 321 322 323 324 325
326 327
303 304 305 306 307 308 309 310 311 312
313 314 315
288 289 290 291 292 293 294 295 296 297 298
299 300
277 278 279 280 281 282 283 284 285
286
265 266 267 268 269 270 271 272 273 274 275
254 255 256 257 258 259 260 261 262 263
246 247 248 249 250 251 252
WISCONSIN
DEPT. OF NATURAL RESOURCES
Created: 2011
0 0.1 0.2 0.4
Kilometers

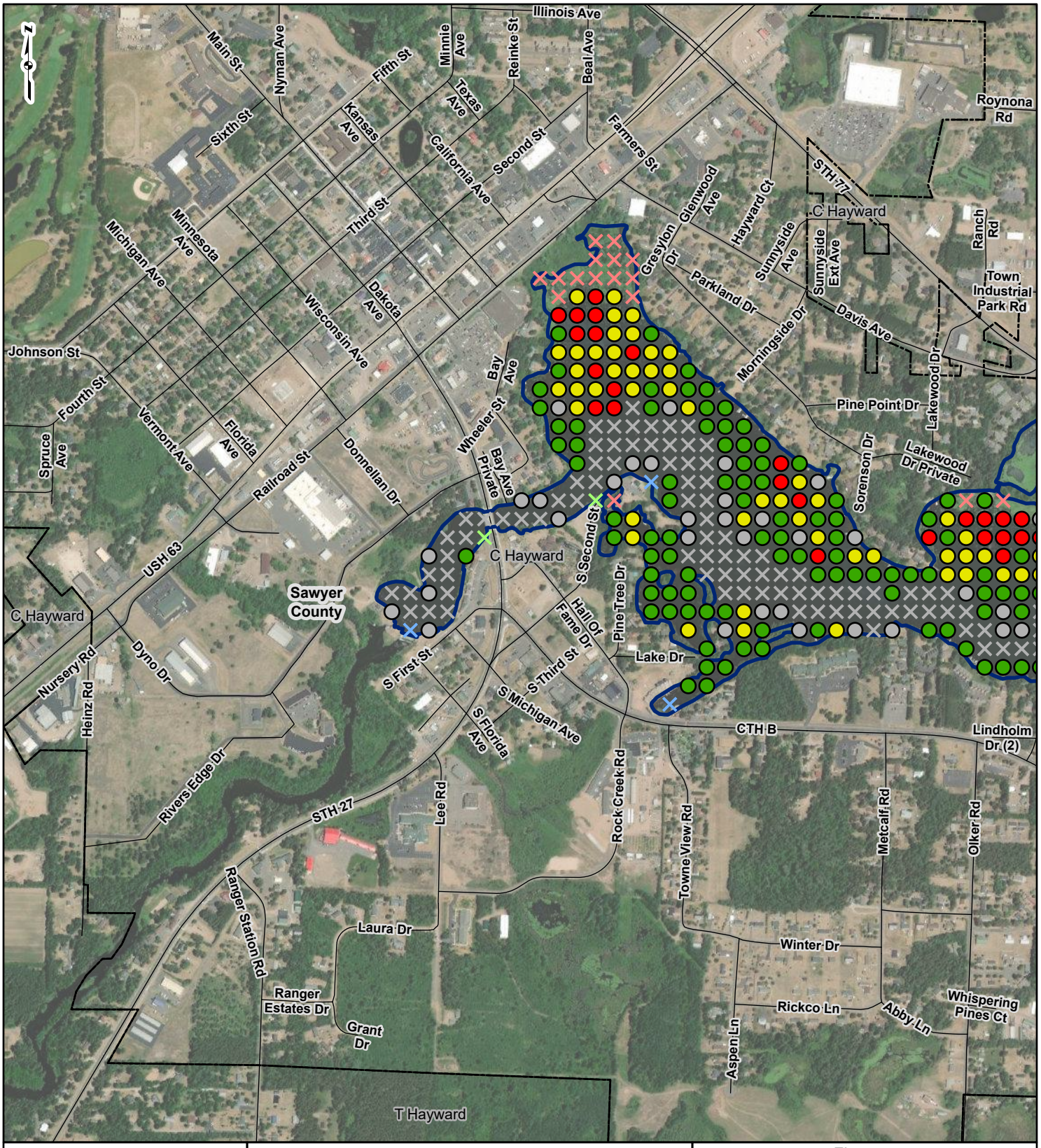
Trego Lake
Washburn County
WBIC 2712000
59m between Points
Page 4 of 4



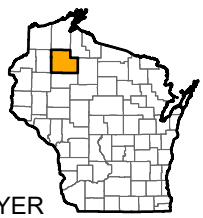
WISCONSIN
DEPT. OF NATURAL RESOURCES

Created: 2011

FIGURE 5
Hayward June Point-Intercept Survey



PROJECT LOCATION



SAWYER COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other

Rake Fullness

- 0
- 1
- 2
- 3

- Point-Intercept Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 5
June Point
Intercept Survey
Sheet 1 OF 2

Hayward Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

DRAWN BY: EMW DATE: 10/27/2022
CHECKED: TDB APPROVED: LLS

REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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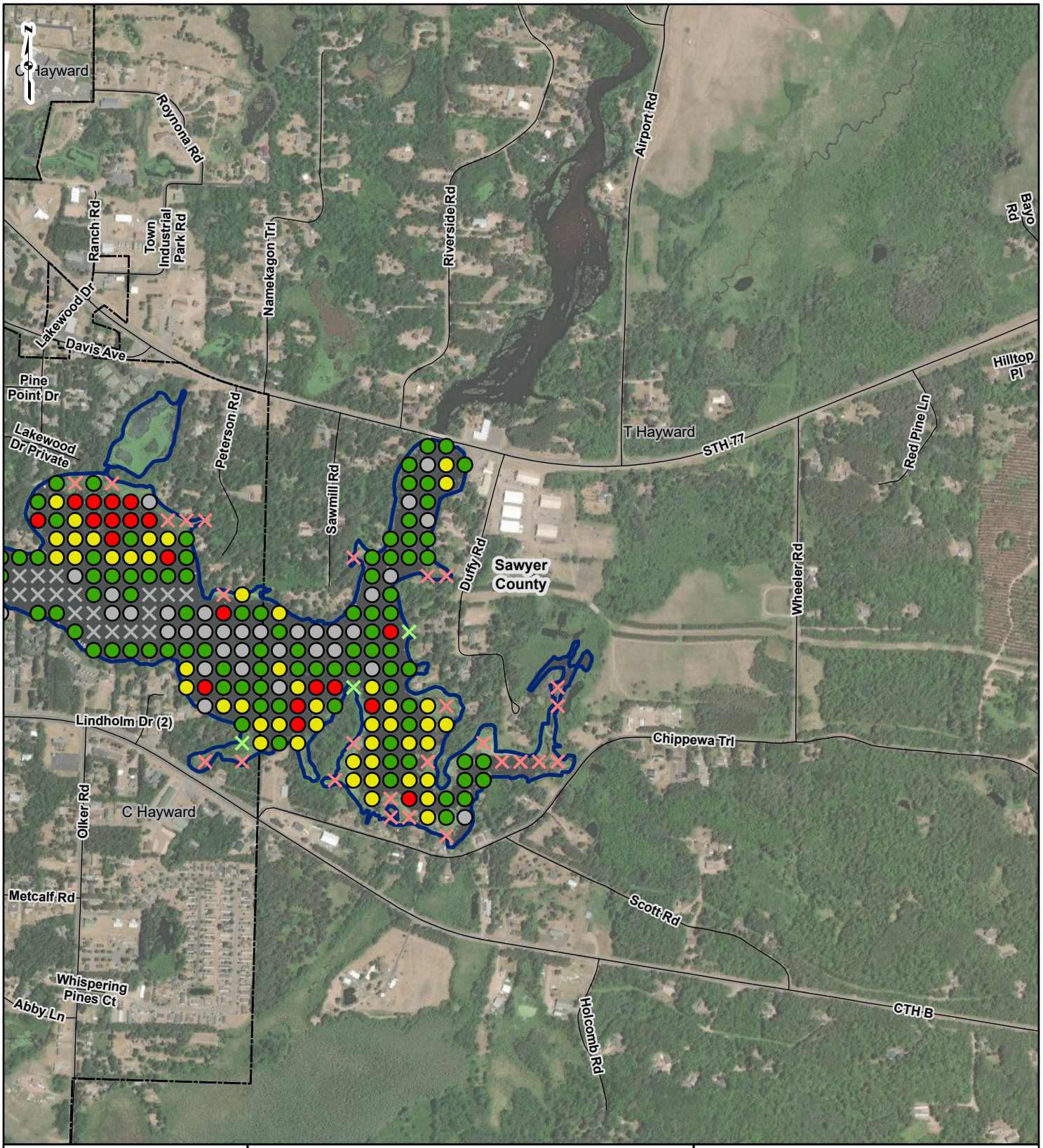
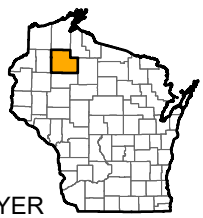


PROJECT LOCATION



SAWYER COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other

Rake Fullness

- 0
- 1
- 2
- 3

- Point-Intercept Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 5
June Point
Intercept Survey
Sheet 2 OF 2

Hayward Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

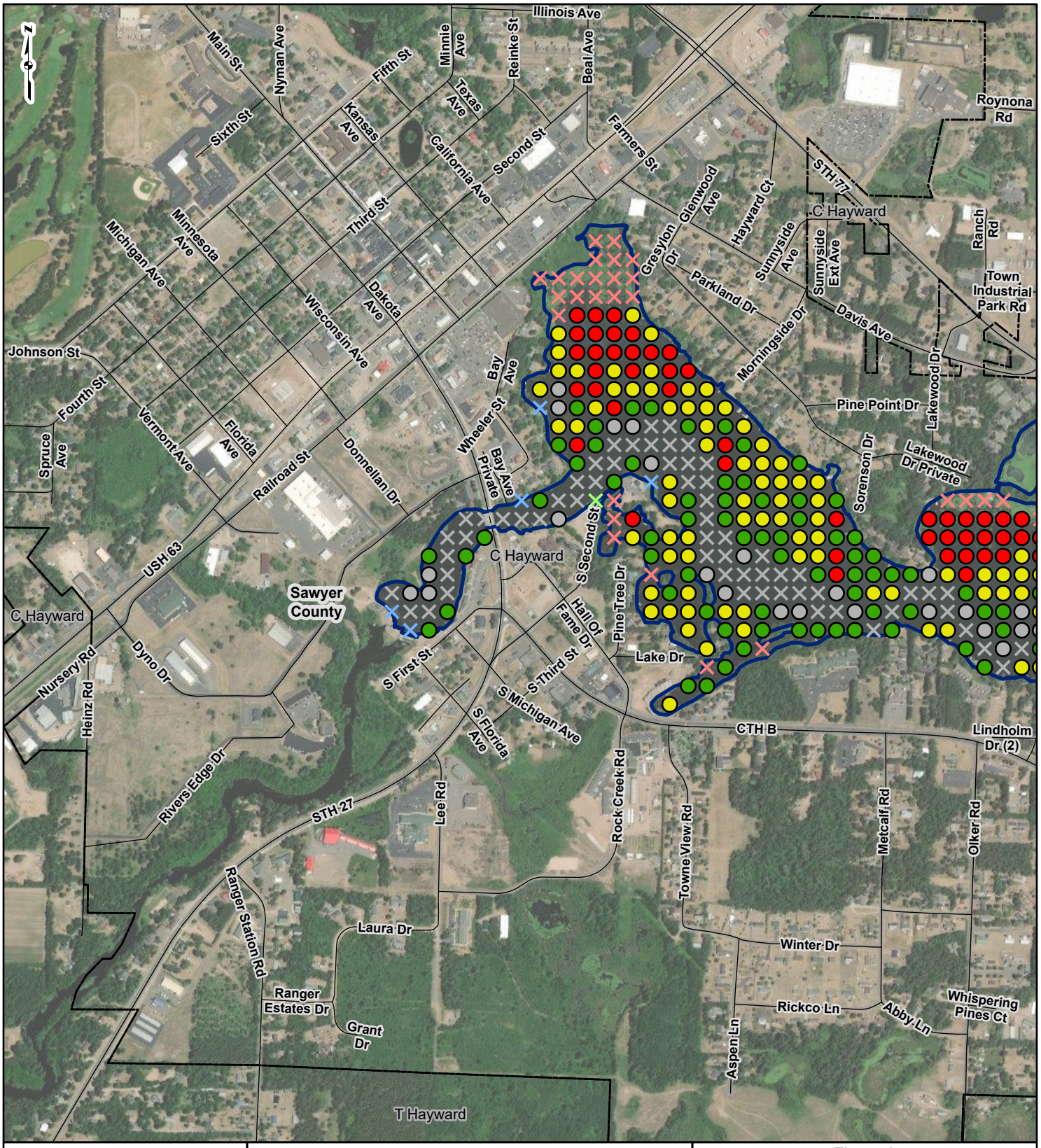
Mead & Hunt

DRAWN BY: EMW DATE: 10/27/2022
CHECKED: TDB APPROVED: LLS

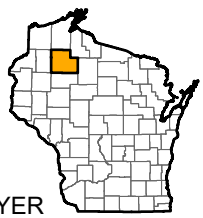
REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Hayward\R220323_00_Hayward_Invasive_Mapping\R220323_00_Hayward_Invasive_Mapping.aprx

FIGURE 6
Hayward August Point-Intercept Survey



PROJECT LOCATION



SAWYER COUNTY, WISCONSIN

LEGEND

Rake Fullness
- 0
- 1
- 2
- 3

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other
- Point-Intercept Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 6
August Point Intercept Survey
Sheet 1 OF 2

Hayward Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

DRAWN BY: EMW DATE: 10/27/2022
CHECKED: TDB APPROVED: LLS

REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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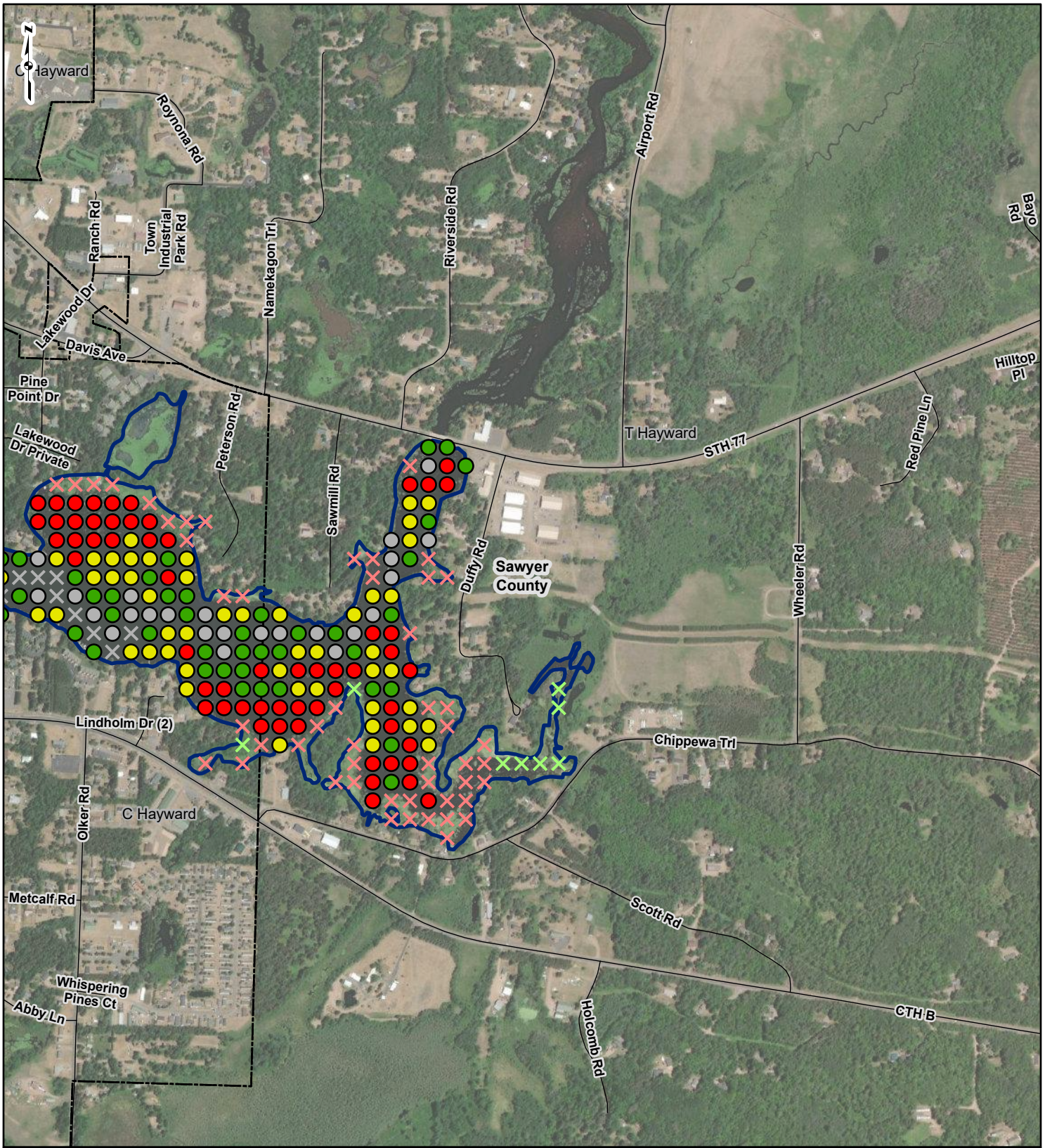
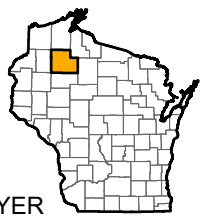


PROJECT LOCATION



SAWYER COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other

Rake Fullness

- 0
- 1
- 2
- 3

- Point-Intercept Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 6
August Point Intercept Survey
Sheet 2 OF 2

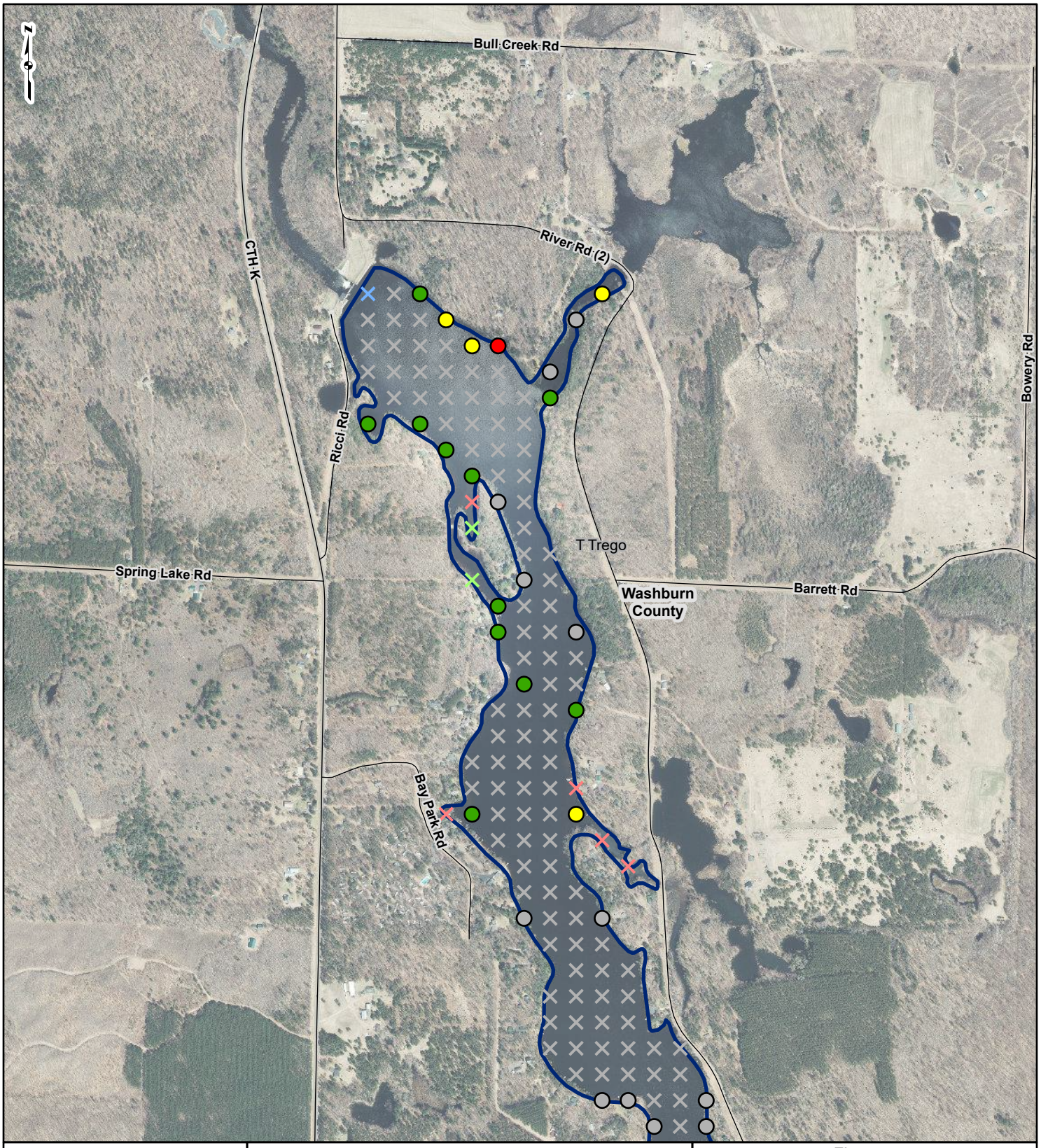
Hayward Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

DRAWN BY: EMW DATE: 10/27/2022
CHECKED: TDB APPROVED: LLS

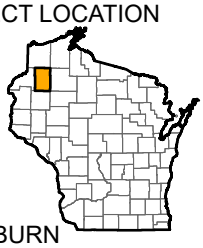
REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Hayward\R220323_00_Hayward_Invasive_Mapping\R220323_00_Hayward_Invasive_Mapping.aprx

FIGURE 7
Trego June Point-Intercept Survey



PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other

Rake Fullness

- 0
- 1
- 2
- 3

- Point-Intercept Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 7
June Point
Intercept Survey
Sheet 1 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

DRAWN BY: EMW DATE: 10/27/2022
CHECKED: TDB APPROVED: LLS

REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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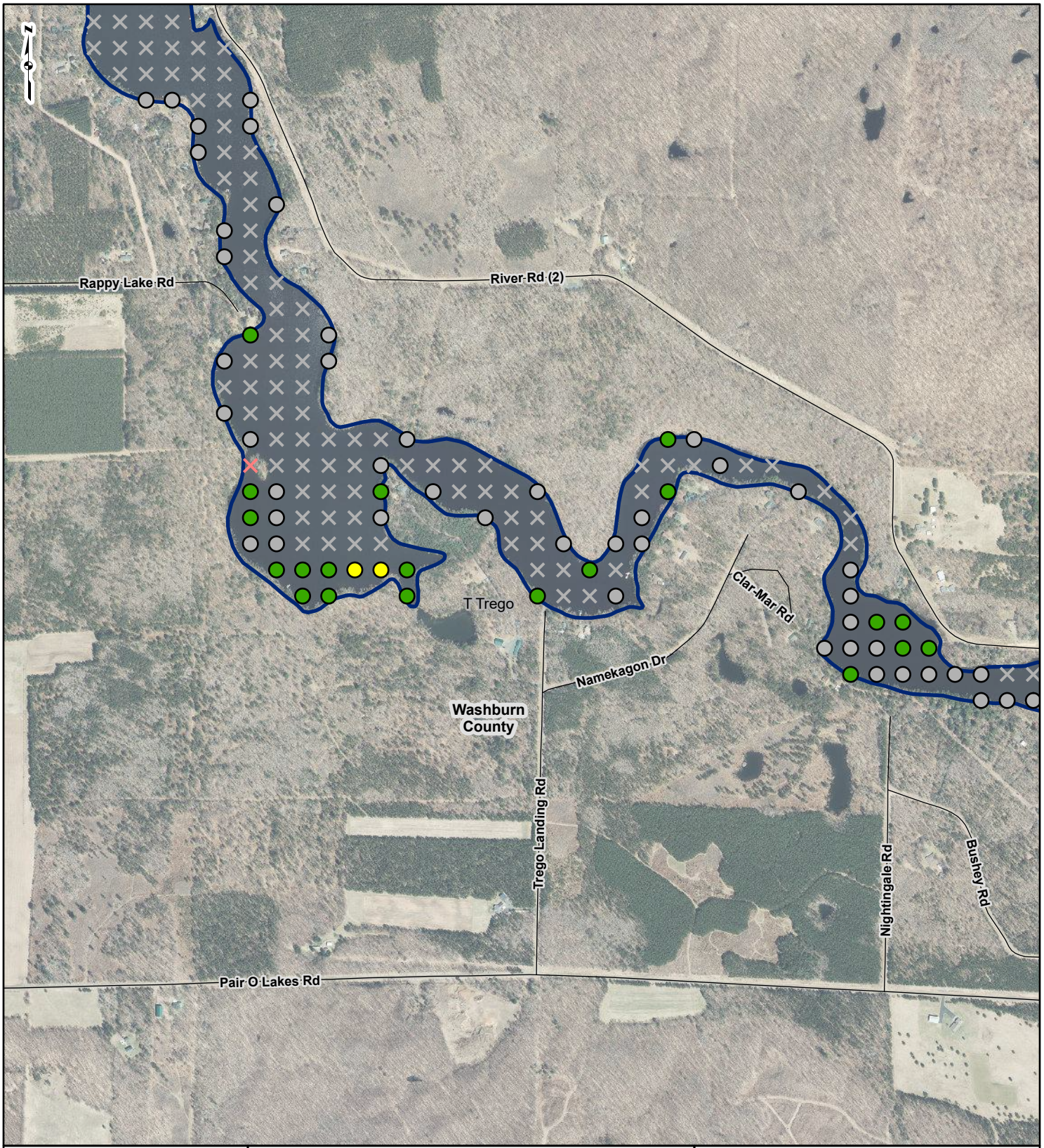
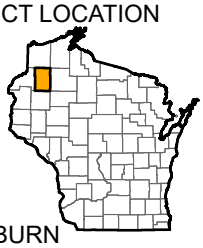


PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other

Rake Fullness

- 0
- 1
- 2
- 3

- Point-Intercept Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 7
June Point
Intercept Survey
Sheet 2 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

Mead & Hunt

DRAWN BY: EMW DATE: 10/27/2022
CHECKED: TDB APPROVED: LLS

REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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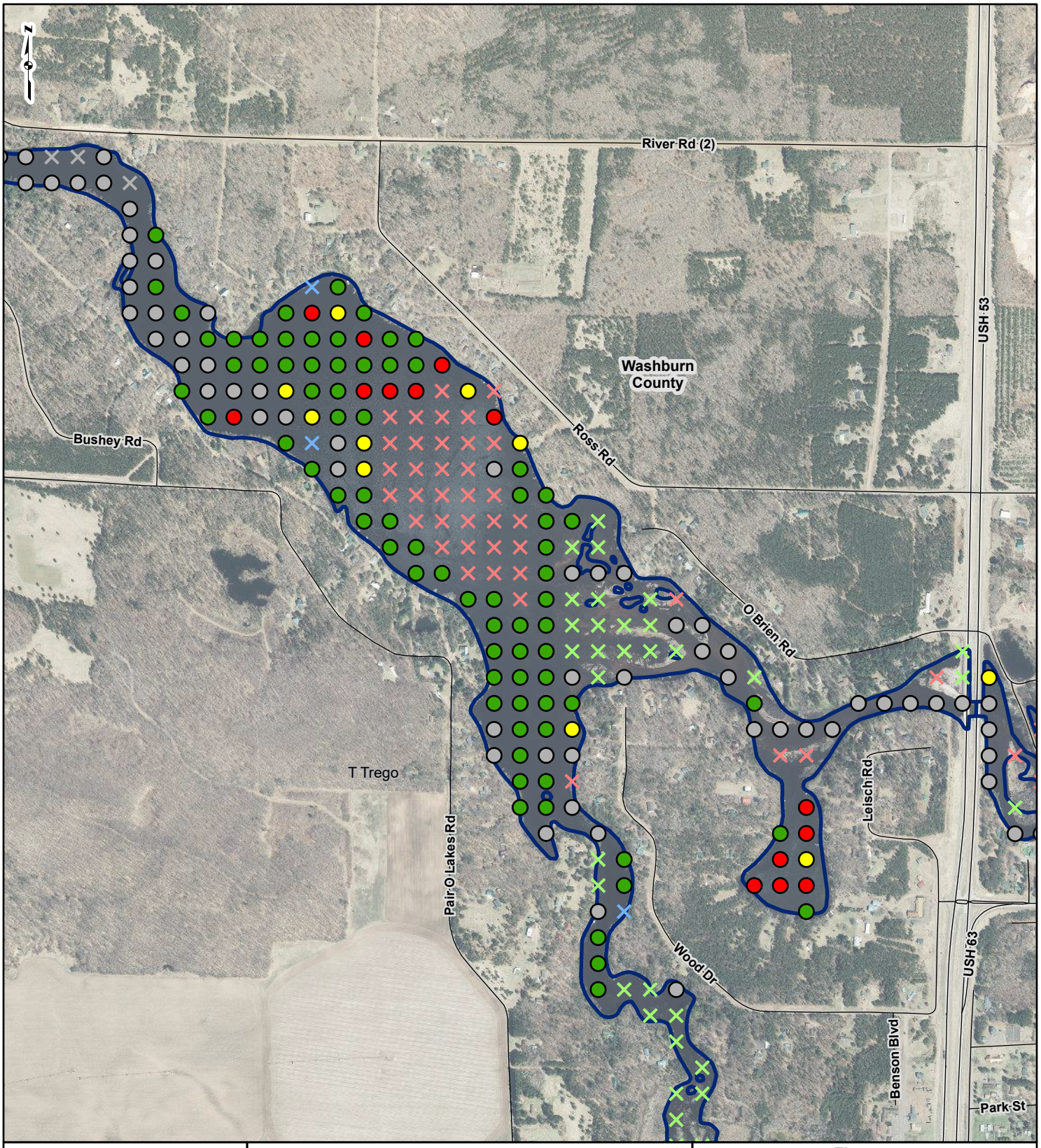
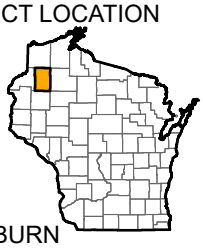


PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other

Rake Fullness

- 0
- 1
- 2
- 3

- Point-Intercept Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 7
June Point Intercept Survey
Sheet 3 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

Mead & Hunt

DRAWN BY: EMW DATE: 10/27/2022
CHECKED: TDB APPROVED: LLS

REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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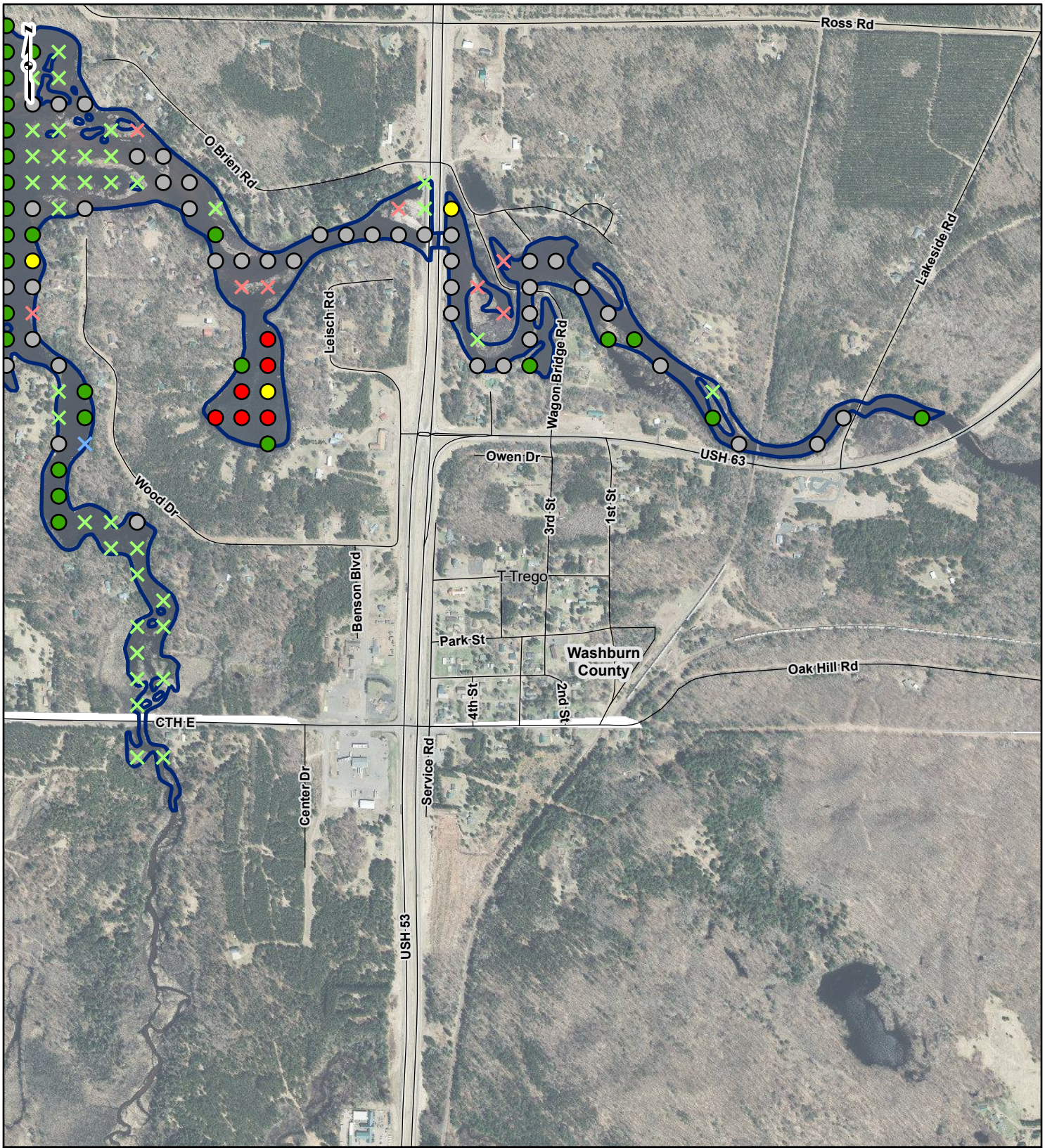
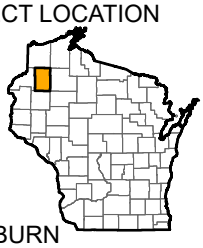


PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other

Rake Fullness

- 0
- 1
- 2
- 3

- Point-Intercept Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 7
June Point
Intercept Survey
Sheet 4 OF 4

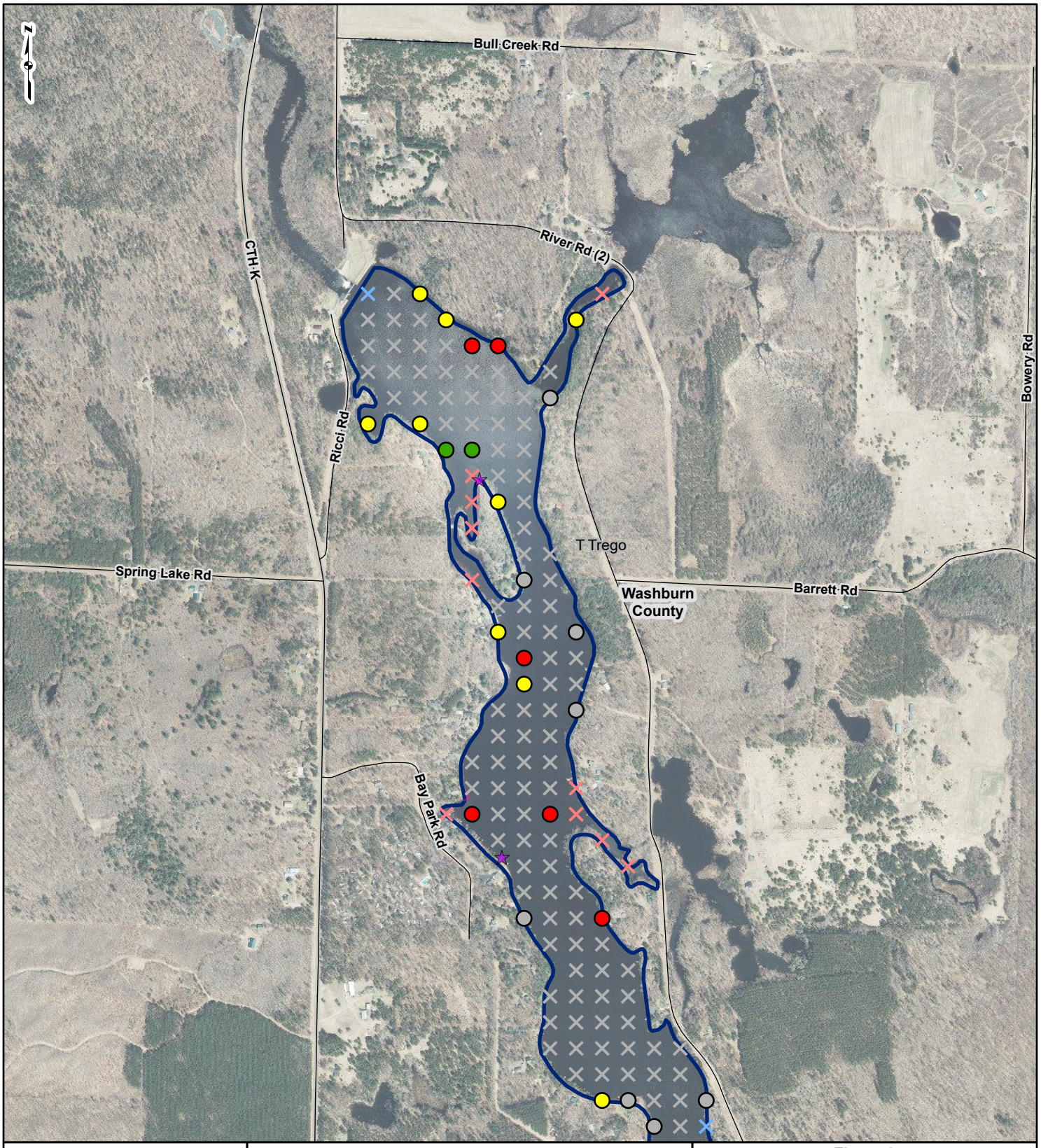
Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

DRAWN BY: EMW DATE: 10/27/2022
CHECKED: TDB APPROVED: LLS

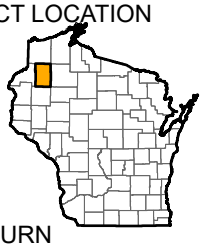
REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Trego\R220323_00_Trego_Inv_Mapping\R220323_00_Trego_Inv_Mapping.aprx

FIGURE 8
Trego July/Aug Point-Intercept Survey



PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other
- Wild Rice Locations

Rake Fullness

- 0
- 1
- 2
- 3

- Wild Rice Area
- Point-Int. Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 8
July/August Point Intercept Survey
Sheet 1 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

Mead & Hunt

DRAWN BY: EMW DATE: 10/27/2022
CHECKED: TDB APPROVED: LLS

REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Cer

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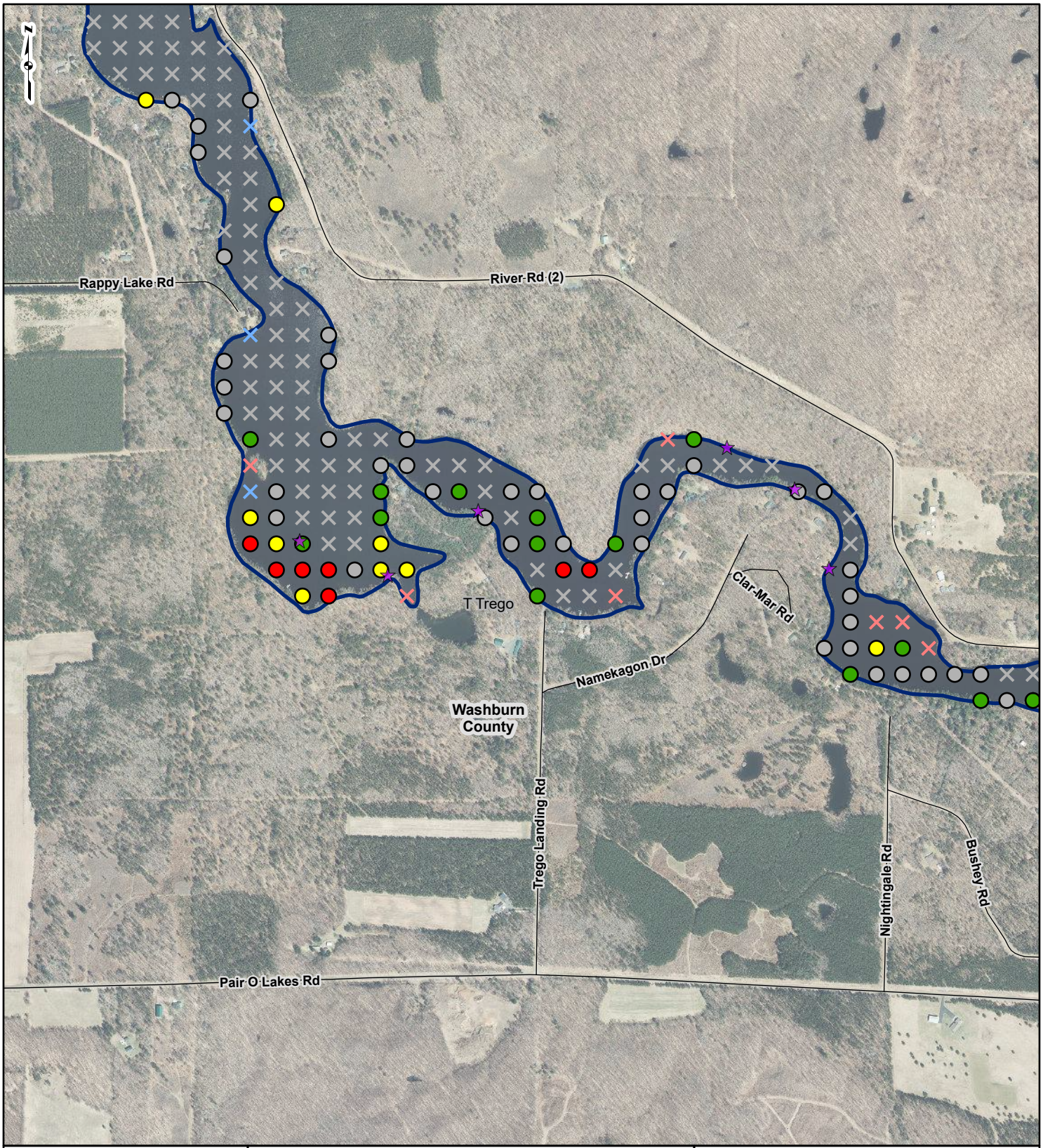
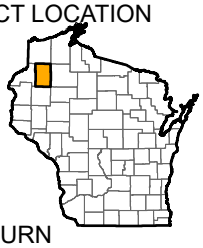


PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other
- Wild Rice Locations

Rake Fullness

- 0
- 1
- 2
- 3

- Wild Rice Area
- Point-Int. Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 8
July/August Point Intercept Survey
Sheet 2 OF 4

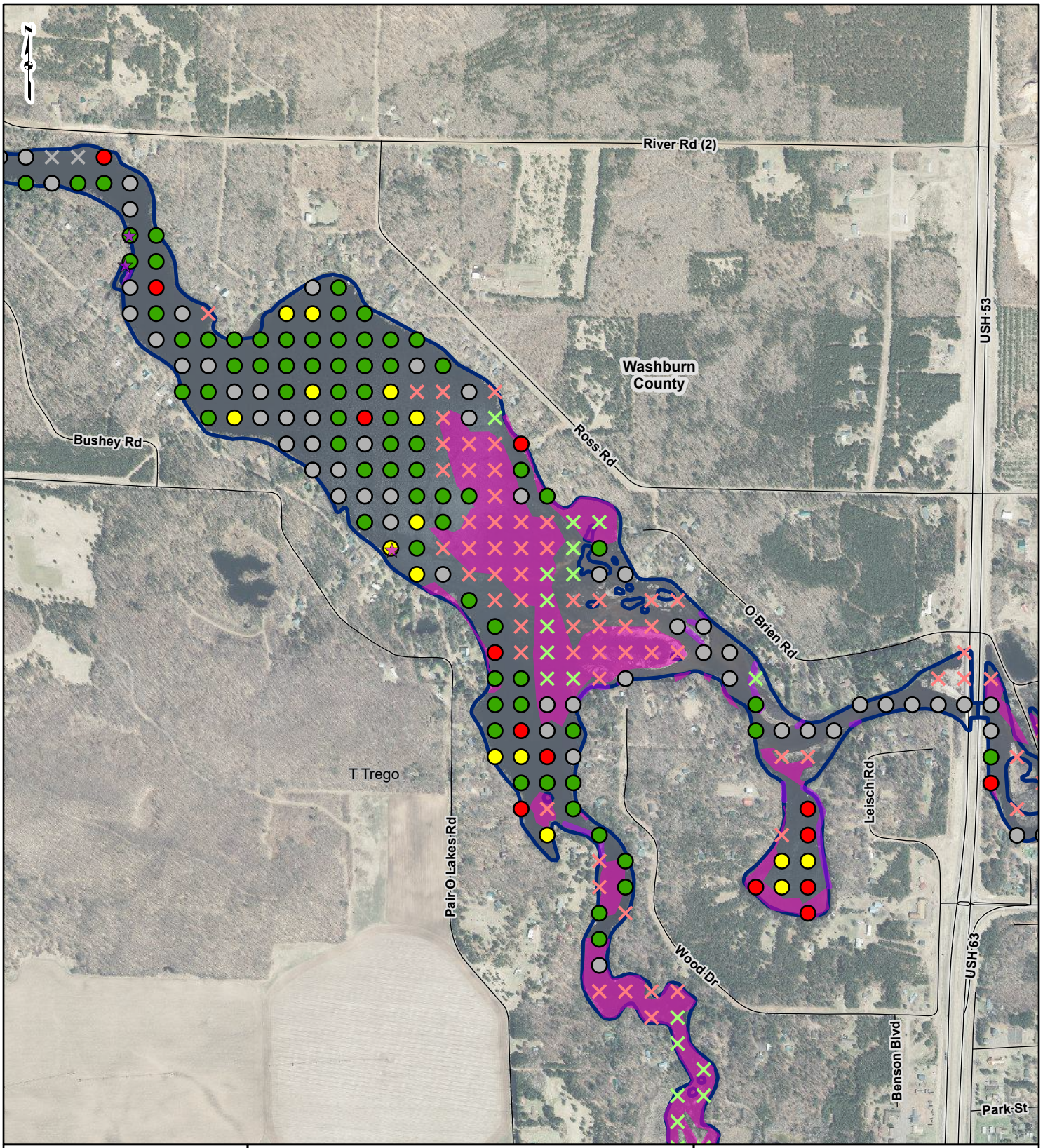
Trego Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

Mead & Hunt

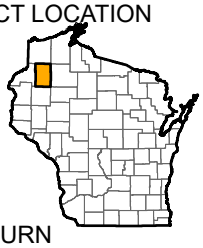
DRAWN BY: EMW DATE: 10/27/2022
CHECKED: TDB APPROVED: LLS

REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Cer

G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Trego\R220323_00_Trego_Inv_Mapping\R220323_00_Trego_Inv_Mapping.aprx



PROJECT LOCATION



WASHBURN
COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other
- Wild Rice Locations

Rake Fullness
- 0
- 1
- 2
- 3

- Wild Rice Area
- Point-Int. Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 8
July/August Point Intercept Survey
Sheet 3 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

Mead & Hunt

DRAWN BY: EMW DATE: 10/27/2022
CHECKED: TDB APPROVED: LLS

REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Cer

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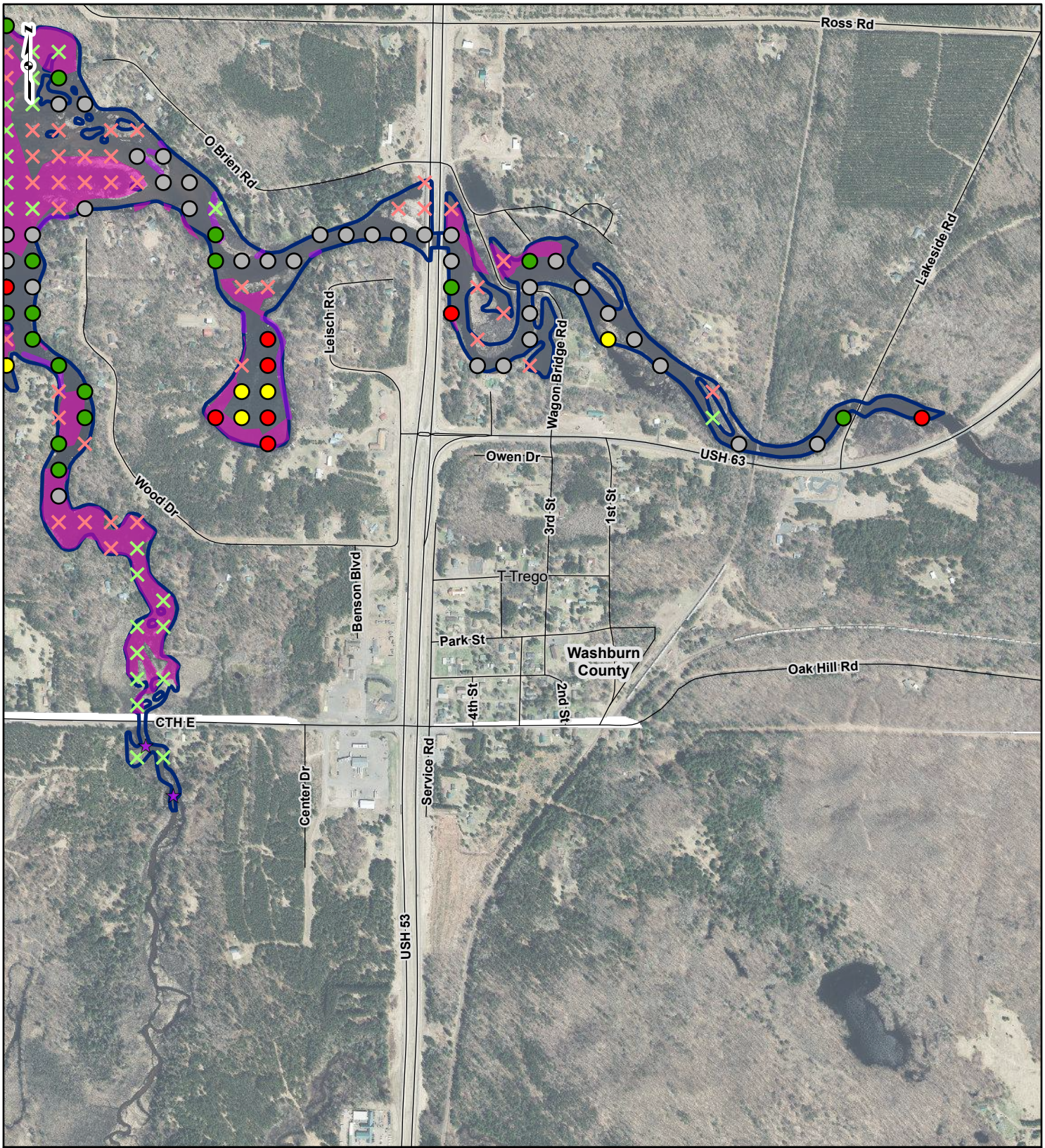
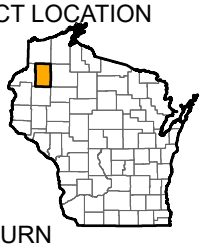


PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

Deeper than Plant Growth
Non-Navigable Vegetation
Non-Navigable Terrestrial/ Shallow
Other
Wild Rice Locations

Rake Fullness
0
1
2
3

Wild Rice Area
Point-Int. Project Boundary
Road Centerline
Community Boundary
County Boundary

0 500 1,000 2,000 Feet

Figure 8
July/August Point Intercept Survey
Sheet 4 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

Mead & Hunt

DRAWN BY: EMW DATE: 10/27/2022
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REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Cer

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FIGURE 9
Rake Fullness per WDNR Protocol

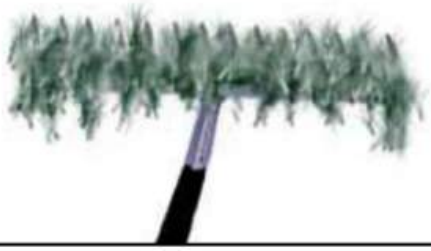
Fullness Rating	Coverage	Description
1		Only few plants. There are not enough plants to entirely cover the length of the rake head in a single layer.
2		There are enough plants to cover the length of the rake head in a single layer, but not enough to fully cover the tines.
3		The rake is completely covered and tines are not visible.

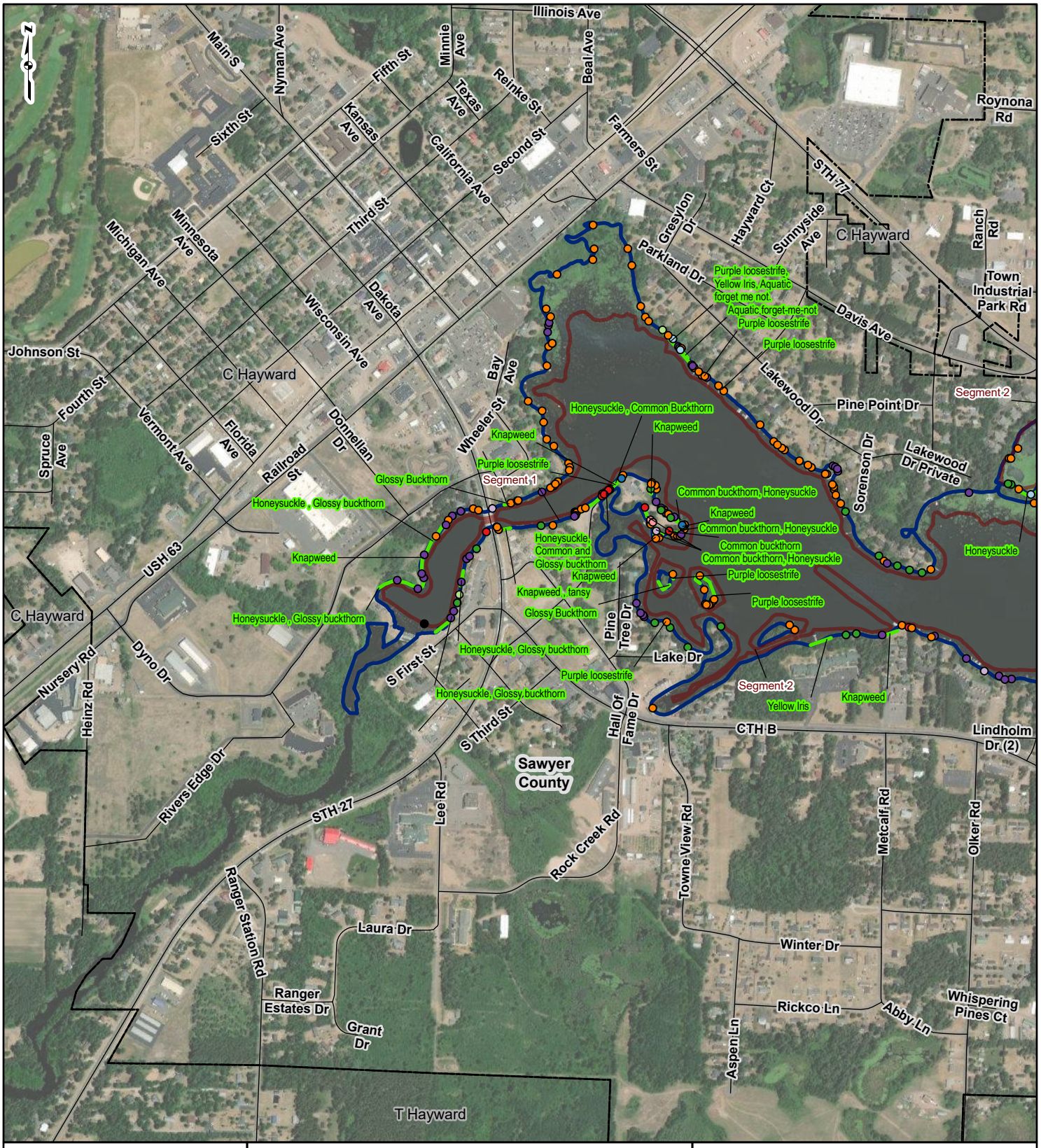
Figure 9. Rake Fullness per WDNR protocol.
Illustration of rake fullness rating used during the survey. Photo used from *Recommended Baseline Monitoring of Aquatic Plants in Wisconsin: sampling design, field and laboratory procedures, data entry and analysis, and applications*. PUB-SS-1068,WDNR 2019.

FIGURE 10
Sediment Sampling Equipment

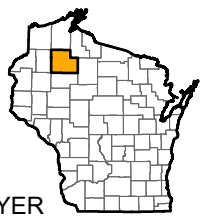
Figure 10. Sediment sampling equipment.

10-inch Tetra Pond Planter Basket, with 1/32-inch mesh, and garden trowel

FIGURE 11A
Hayward Shoreline Terrestrial Invasive Species



PROJECT LOCATION



SAWYER COUNTY, WISCONSIN

LEGEND

Common Name		
Aquatic forget me not	Knapweed	Start/Stop Locations
Common buckthorn	Narrow Leaf Cattail	Meander Segments
Glossy buckthorn	Purple Loosestrife	Project Boundary
Honeysuckle	Tansy	Road Centerline
Honeysuckle, Common Buckthorn	Yellow Iris	Community Boundary
	Invasive Line	County Boundary

0 500 1,000 2,000 Feet

Figure 11A
Shoreline Terrestrial Invasive Species
Sheet 1 of 2

Hayward Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

DRAWN BY: EMW
CHECKED: TDB

DATE: 10/24/2022
APPROVED: LLS

REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/24/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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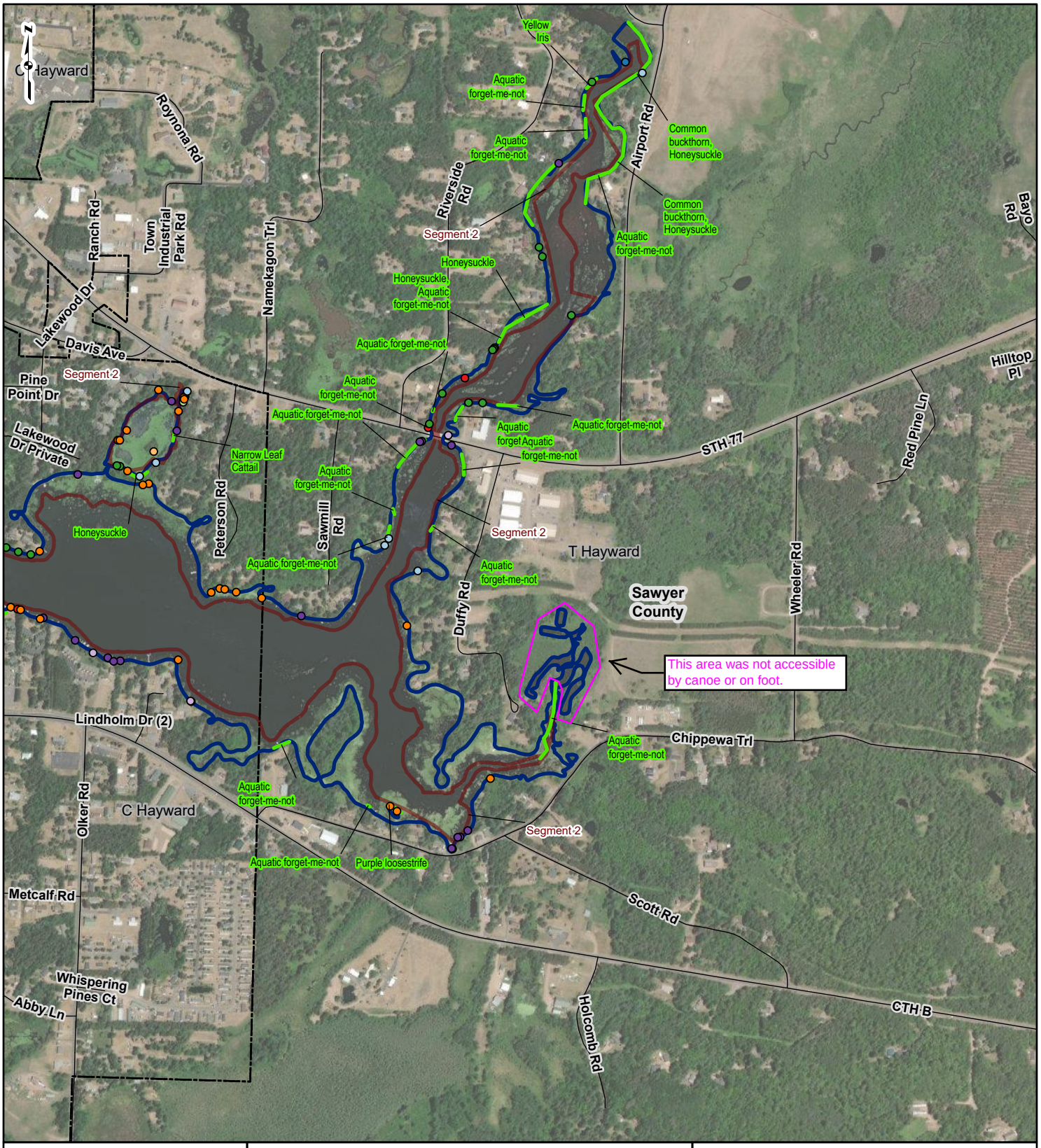
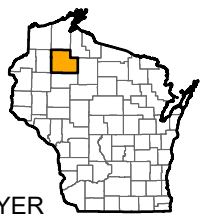


PROJECT LOCATION



SAWYER COUNTY, WISCONSIN

LEGEND

Common Name		
Aquatic forget me not	Knapweed	Start/Stop Locations
Common buckthorn	Narrow Leaf Cattail	Meander Segments
Glossy buckthorn	Purple Loosestrife	Project Boundary
Honeysuckle	Tansy	Road Centerline
Honeysuckle, Common Buckthorn	Yellow Iris	Community Boundary
	Invasive Line	County Boundary

0 500 1,000 2,000 Feet

Figure 11A
Shoreline Terrestrial Invasive Species
Sheet 2 OF 2

Hayward Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

DRAWN BY: EMW DATE: 10/24/2022
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REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/24/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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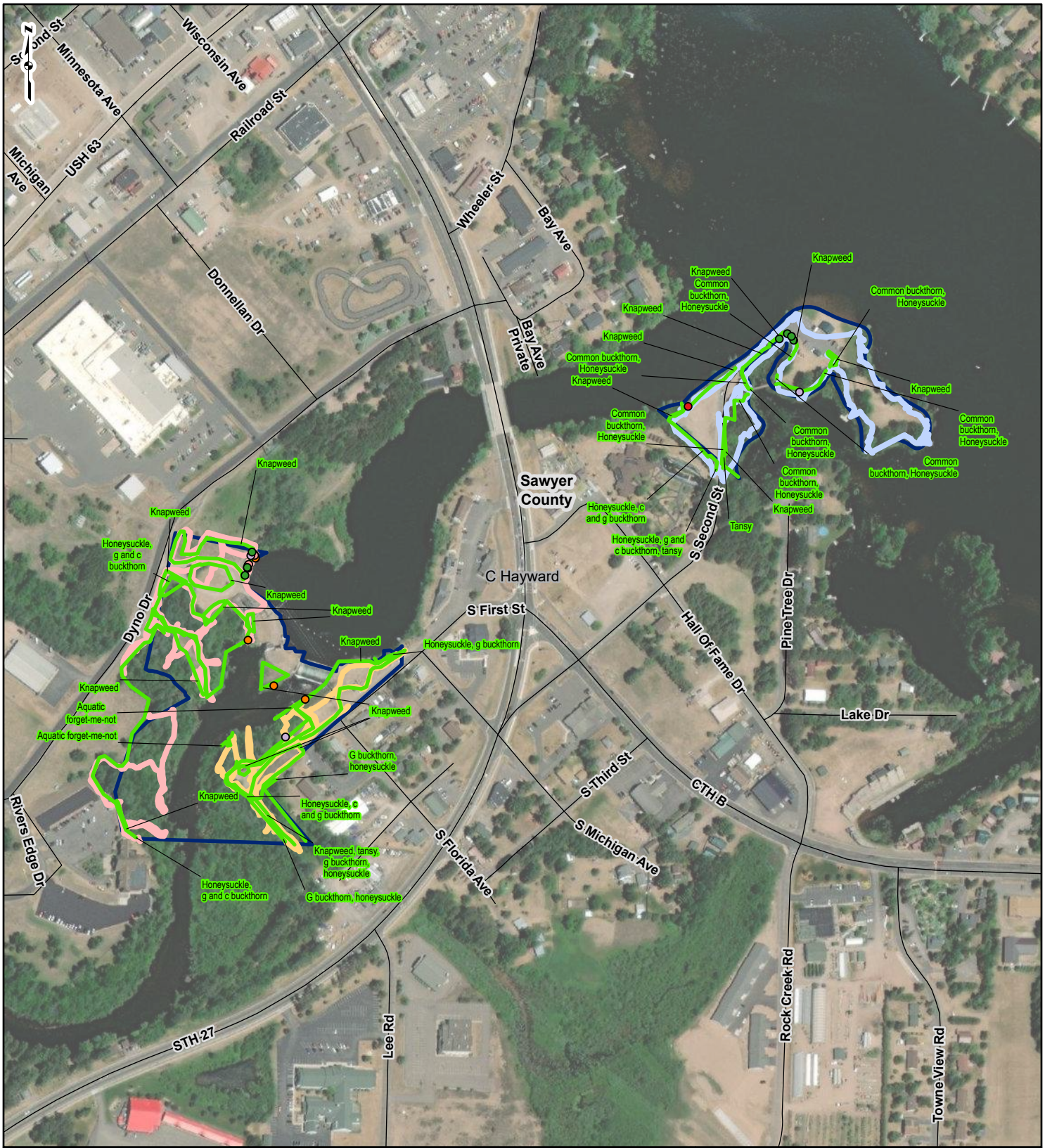
FIGURE 11B
Hayward Upland Terrestrial Meanders and Invasive Species



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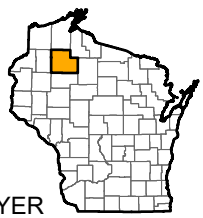

SAWYER COUNTY, WISCONSIN

LEGEND

Common Name		
Aquatic forget me not	Narrow Leaf Cattail	Terrestrial Meander Segment 2
Common buckthorn	Purple Loosestrife	Terrestrial Meander Segment 3
Glossy buckthorn	Tansy	Project Boundary
Honeysuckle	Yellow Iris	Road Centerline
Honeysuckle, Common Buckthorn	Invasive Line	Community Boundary
Knapweed	Terrestrial Meander Segment 1	County Boundary

0 225 450 900 Feet

Figure 11B
Upland Terrestrial Meanders and Invasive Species

Hayward Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

gai consultants | Mead & Hunt

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DATE: 10/24/2022
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REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/24/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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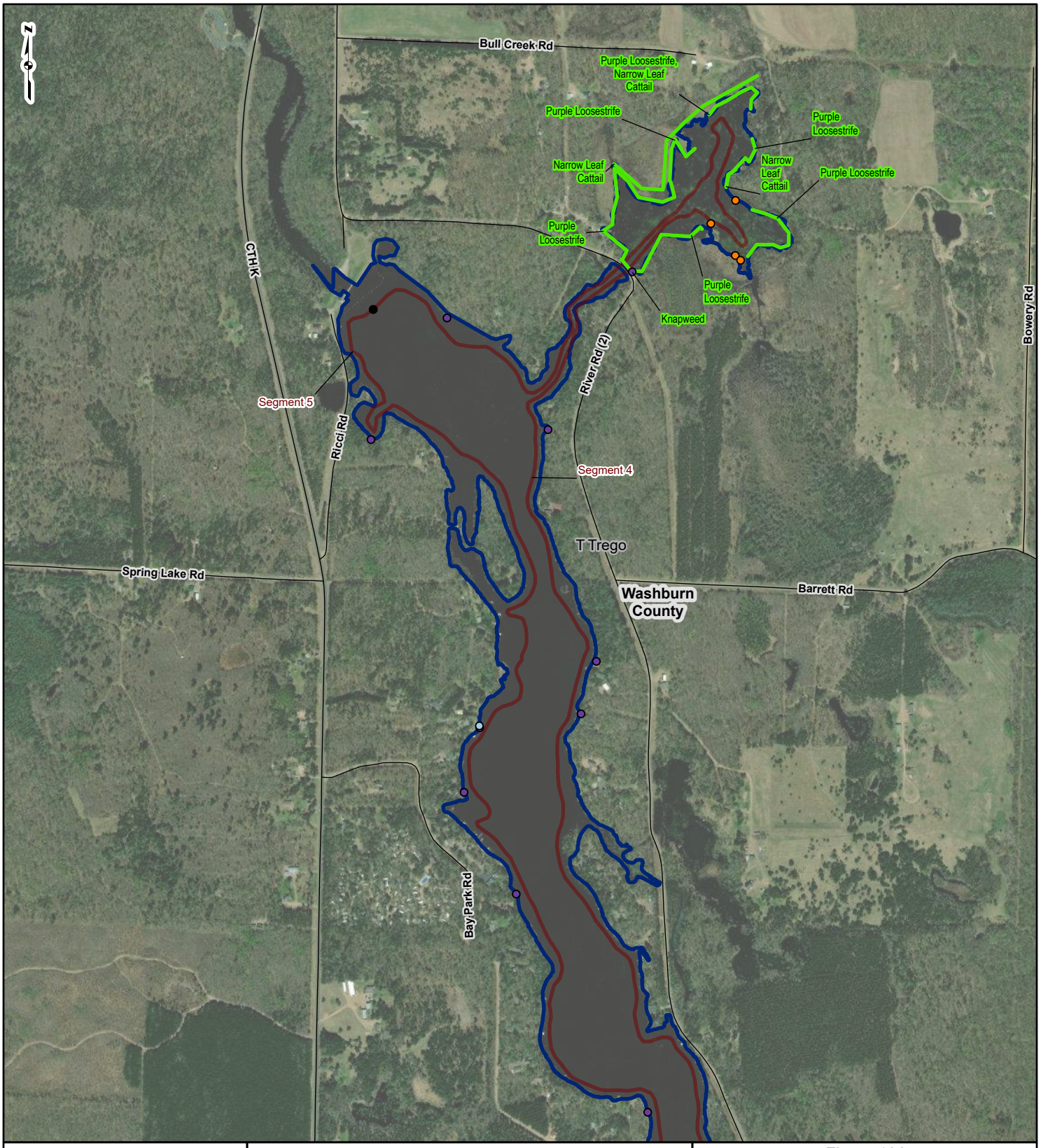
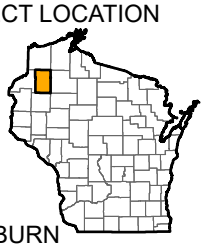
FIGURE 12A
Trego Shoreline Terrestrial Invasive Species



PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

Common Name
- Aquatic forget me not
- Knapweed
- Purple Loosestrife
- Yellow Iris
- Japanese Knotweed
- Narrow leaf cattail
- Nightshade
- Start/Stop Locations
- Invasive Species
- Meander Segments
- Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 12A
Trego Shoreline Terrestrial Invasive Species
Sheet 1 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

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REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/26/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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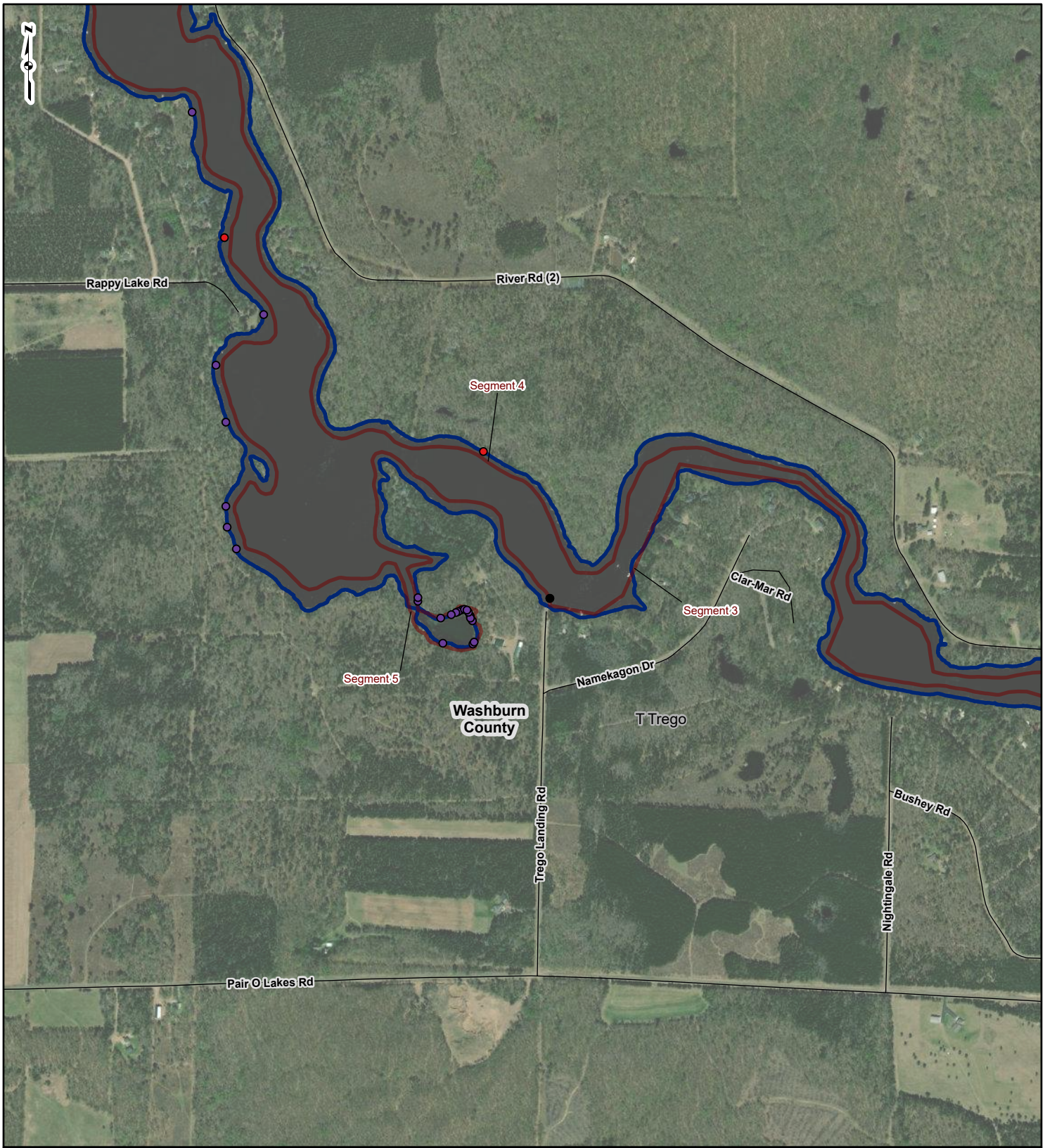
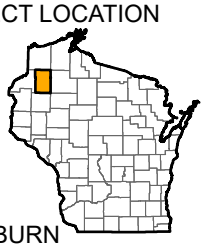


PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

Common Name
- Aquatic forget me not
- Knapweed
- Purple Loosestrife
- Yellow Iris
- Japanese Knotweed
- Narrow leaf cattail
- Nightshade
- Start/Stop Locations
- Invasive Species
- Meander Segments
- Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 12A
Trego Shoreline Terrestrial Invasive Species
Sheet 2 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

DRAWN BY: EMW DATE: 10/26/22
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REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/26/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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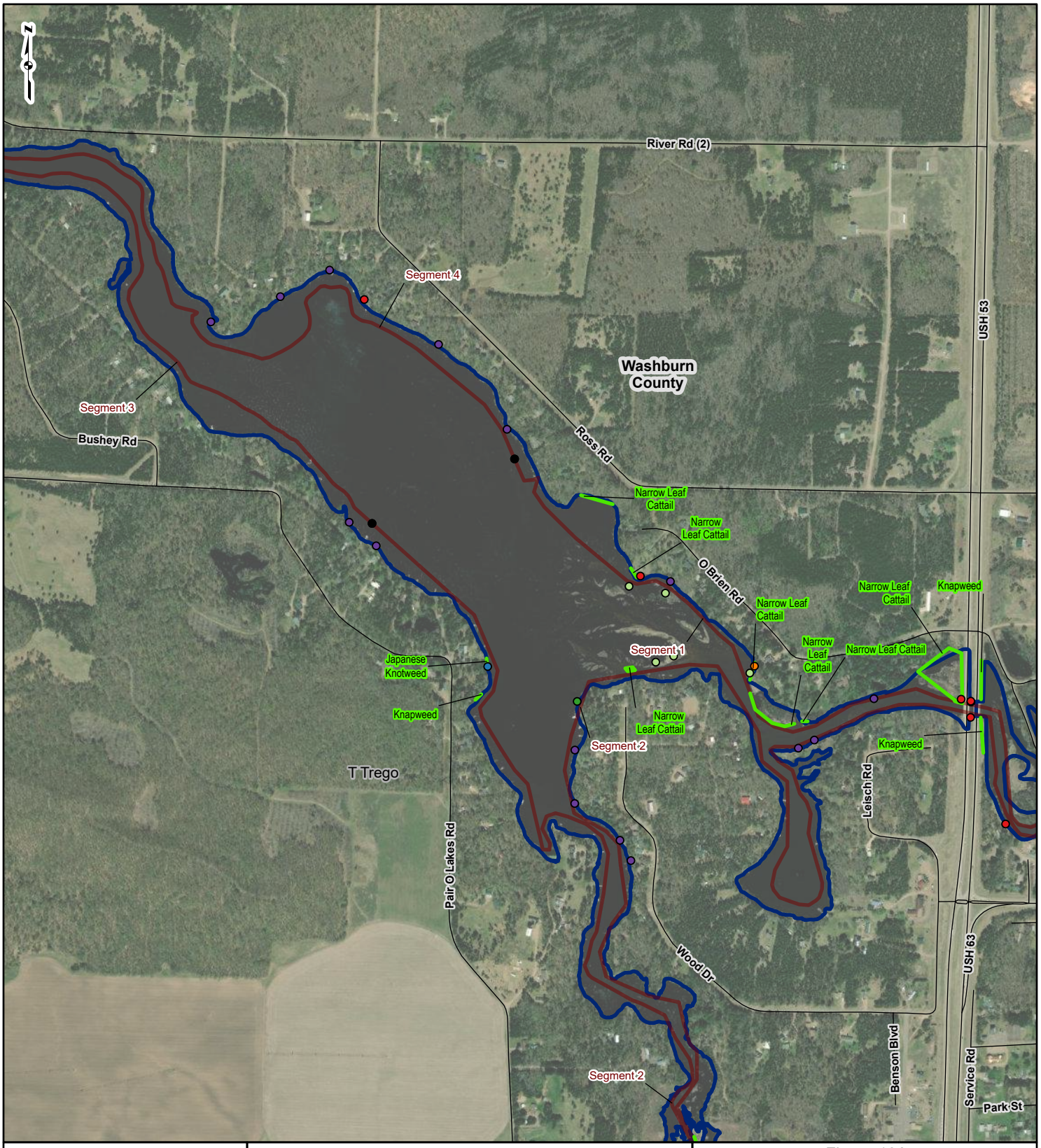

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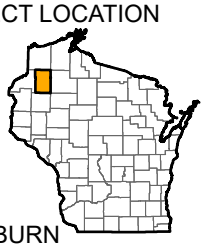

WASHBURN COUNTY, WISCONSIN

LEGEND

Common Name
- Aquatic forget me not
- Knapweed
- Purple Loosestrife
- Yellow Iris
- Japanese Knotweed
- Narrow leaf cattail
- Nightshade
- Start/Stop Locations
- Invasive Species
- Meander Segments
- Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 12A
Trego Shoreline Terrestrial Invasive Species
Sheet 3 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

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REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/26/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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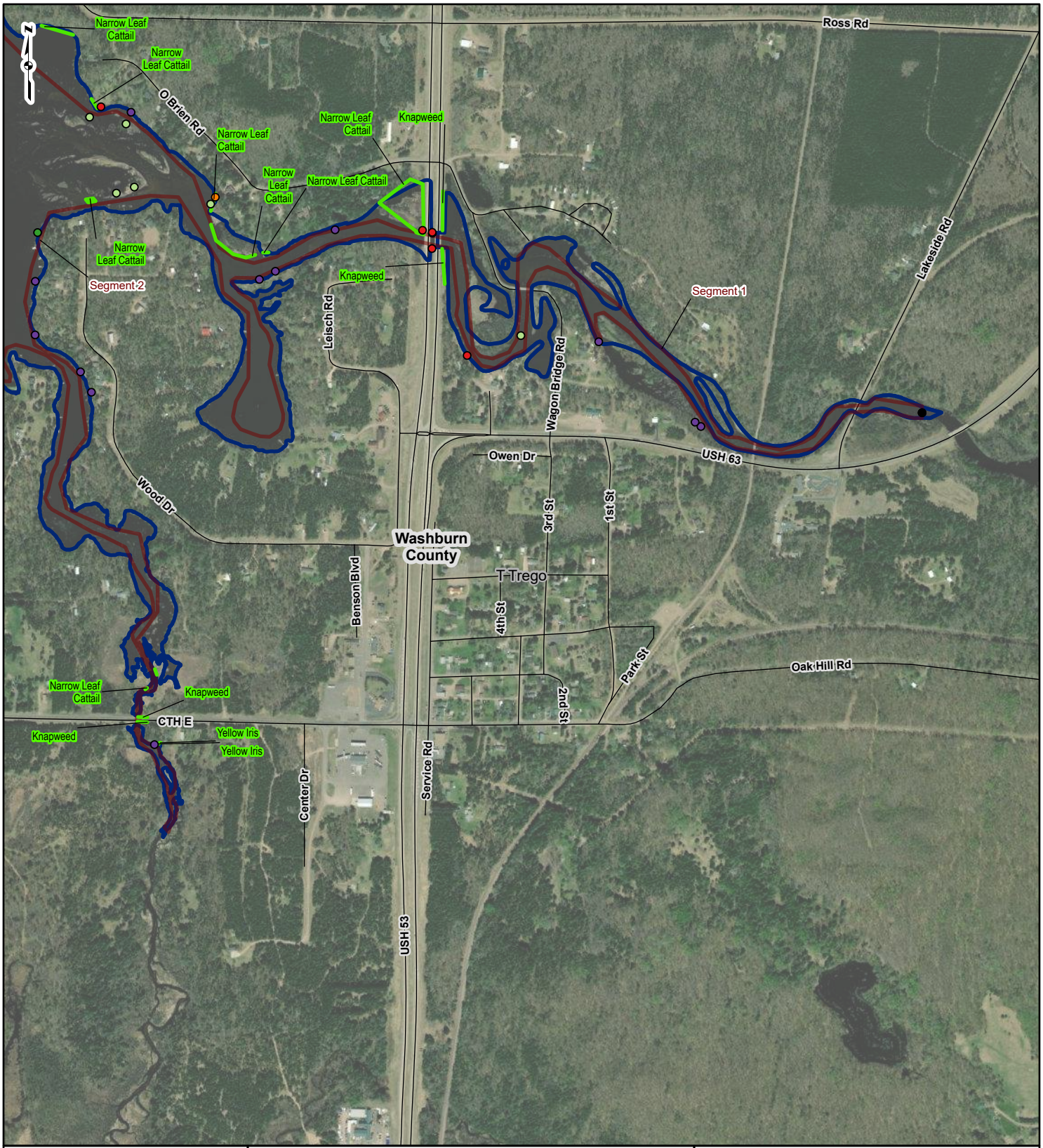

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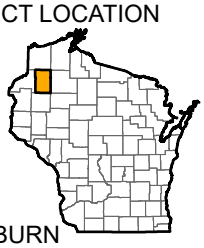

WASHBURN COUNTY, WISCONSIN

LEGEND

Common Name
- Aquatic forget me not
- Knapweed
- Purple Loosestrife
- Yellow Iris
- Japanese Knotweed
- Narrow leaf cattail
- Nightshade
- Start/Stop Locations
- Invasive Species
- Meander Segments
- Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 12A
Trego Shoreline Terrestrial Invasive Species
Sheet 4 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

Mead & Hunt

DRAWN BY: EMW DATE: 10/26/2022
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REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/26/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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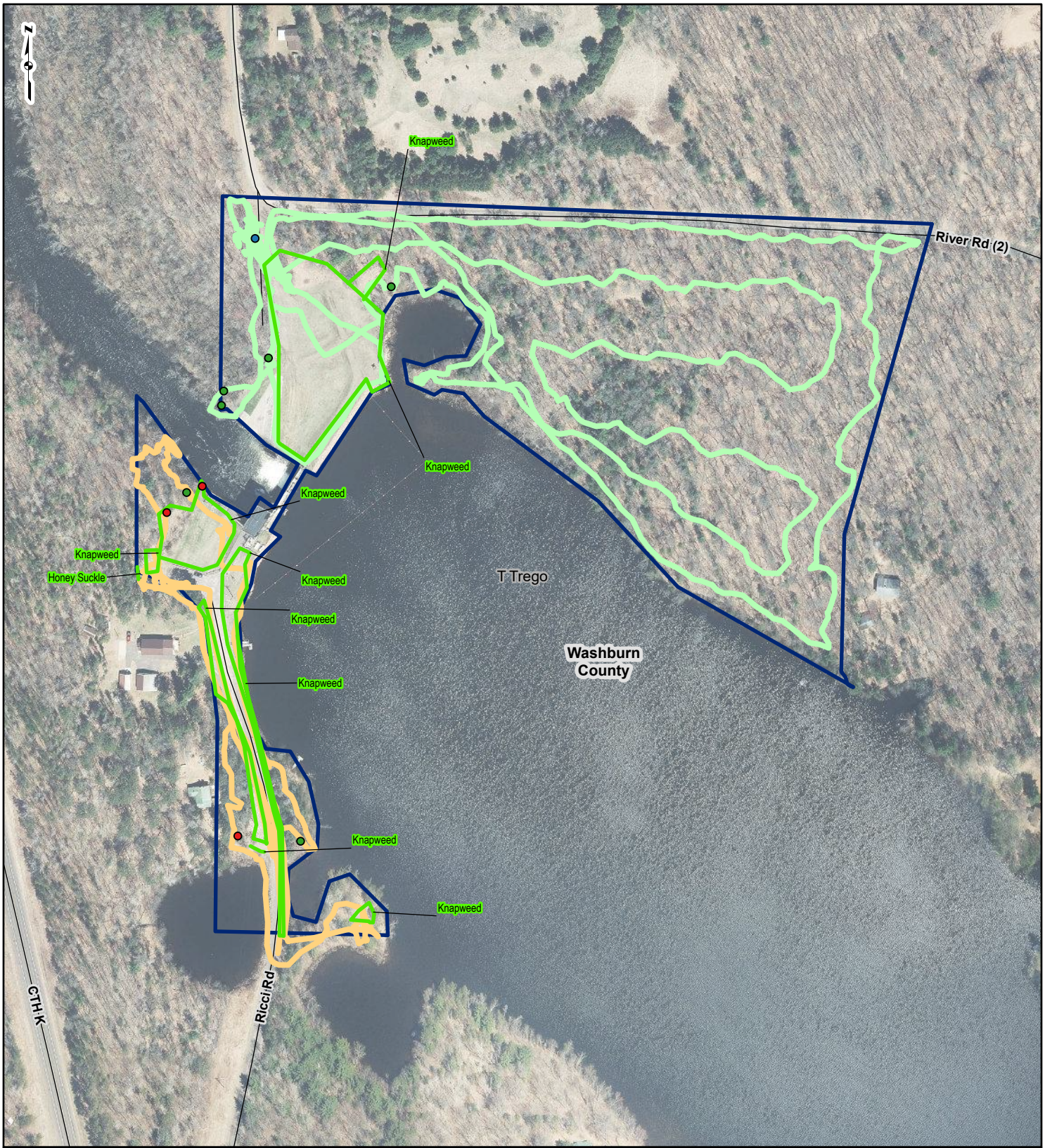
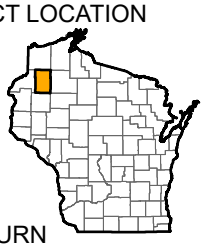
FIGURE 12B
Trego Upland Terrestrial Meanders and Invasive Species



PROJECT LOCATION



WASHBURN
COUNTY, WISCONSIN

LEGEND

Common Name
- Common buckthorn
- Honeysuckle
- Knapweed
- Purple Loosestrife

- Invasive Species
- Cash Road
- North Side Dam
- South Side Dam
- Trego Landing

- Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 125 250 500 Feet

Figure 12B
Upland Terrestrial Meanders and Invasive Species
Sheet 1 of 3

Trego Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

DRAWN BY: EMW DATE: 10/26/22
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REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/26/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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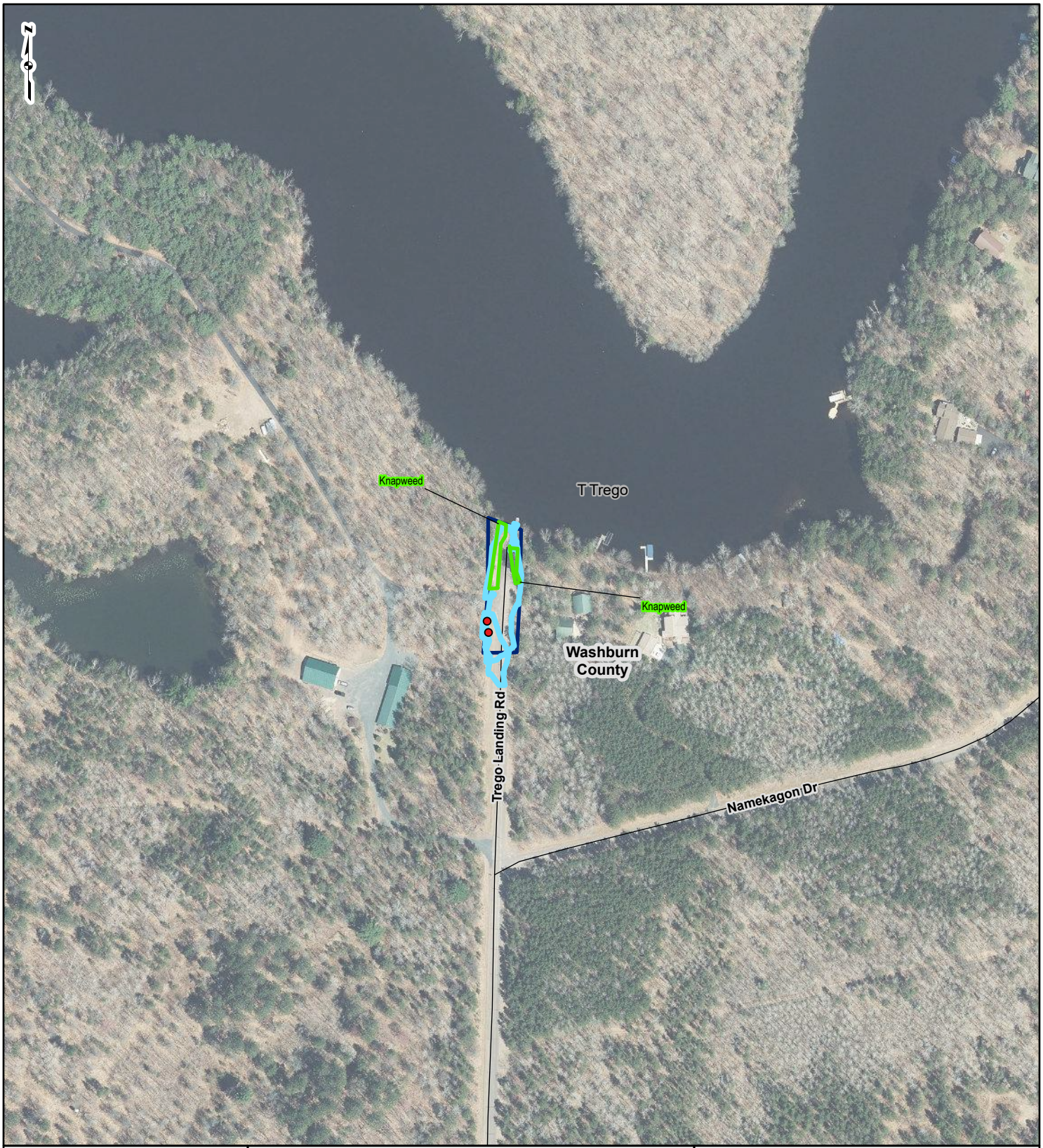
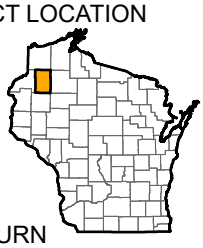


PROJECT LOCATION



WASHBURN
COUNTY, WISCONSIN

LEGEND

Common Name
- Common buckthorn
- Honeysuckle
- Knapweed
- Purple Loosestrife

- Invasive Species
- Cash Road
- North Side Dam
- South Side Dam
- Trego Landing

- Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 125 250 500 Feet

Figure 12B
Upland Terrestrial Meanders and Invasive Species
Sheet 2 of 3

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

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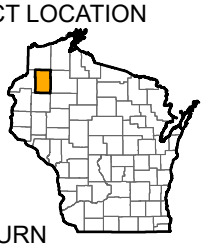
PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

Common Name
- Common buckthorn
- Honeysuckle
- Knapweed
- Purple Loosestrife

- Invasive Species
- Cash Road
- North Side Dam
- South Side Dam
- Trego Landing

- Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 125 250 500 Feet

Figure 12B
Upland Terrestrial Meanders and Invasive Species
Sheet 3 of 3

Trego Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

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REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/26/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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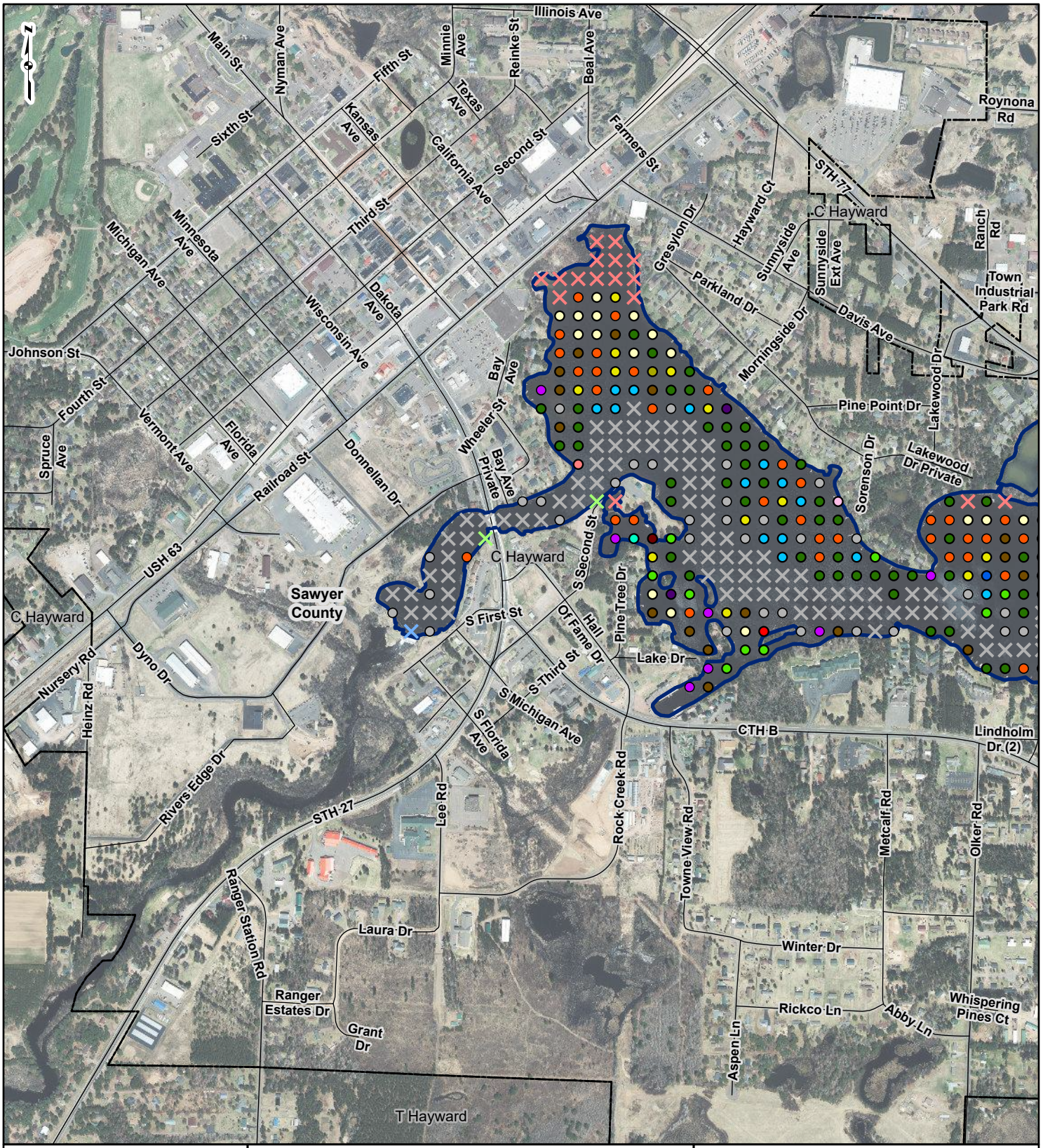
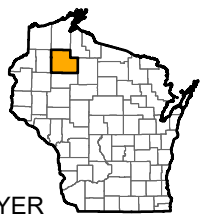
FIGURE 13
Hayward June Predominant Species



PROJECT LOCATION



SAWYER COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/Shallow
- Other

Predominant Species

- None
- Arrowhead sp.
- Clasping-leaf pondweed
- Common bur-reed
- Common waterweed
- Coontail
- Curly-leaf pondweed
- Eurasian watermilfoil
- Fern pondweed
- Flat-stem pondweed
- Forked duckweed
- Fries' pondweed
- Large-leaf pondweed
- Muskgrass
- Nitella
- Small pondweed
- Variable-leaf pondweed
- Water stargrass
- Wild celery
- Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 13
June Predominant Species
Sheet 1 OF 2

Hayward Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

Mead & Hunt

DRAWN BY: EMW DATE: 10/31/2022
CHECKED: TDB APPROVED: LLS

REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/31/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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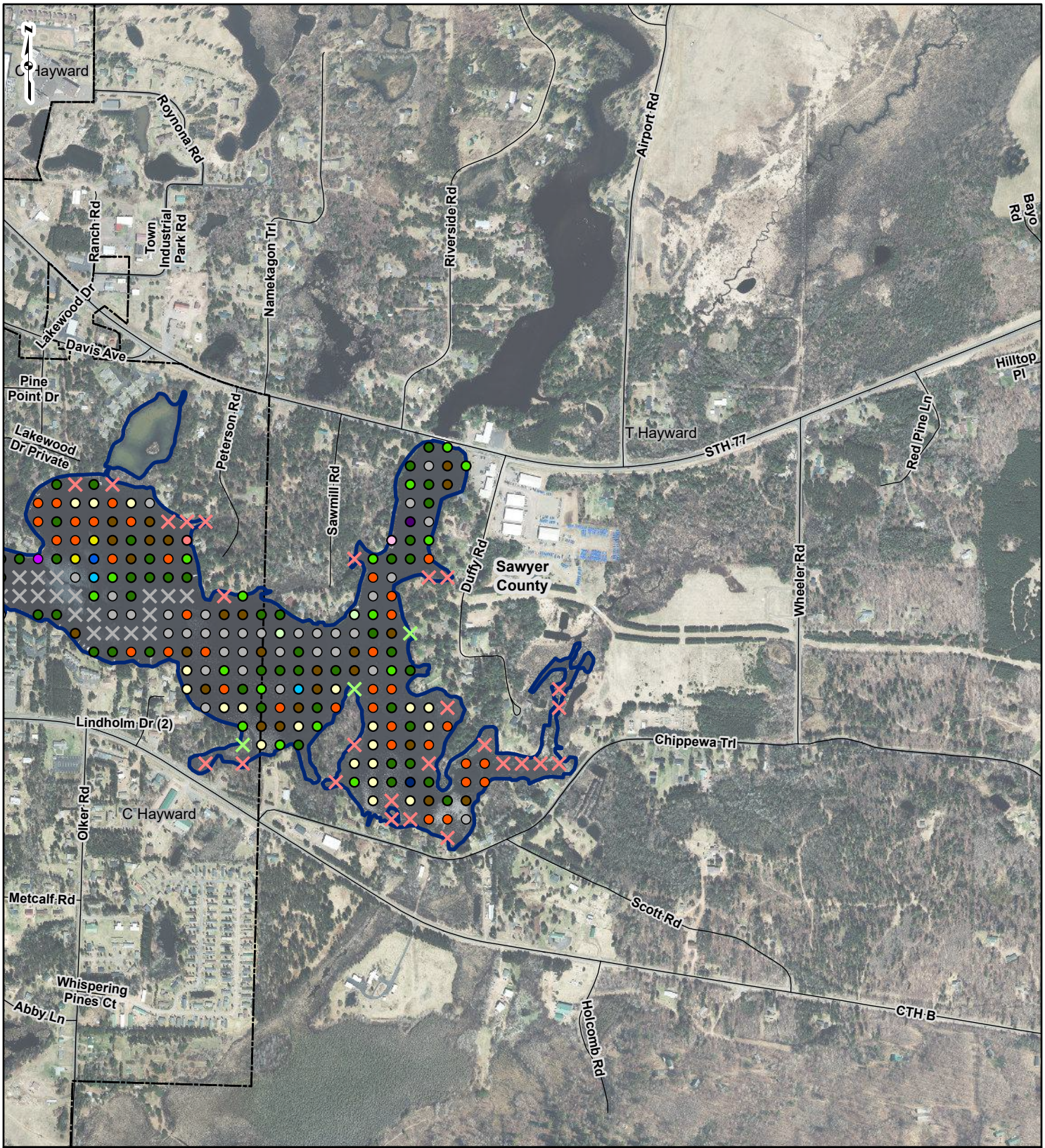
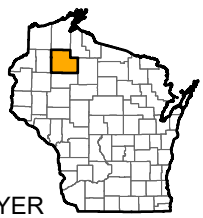


PROJECT LOCATION



SAWYER COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/Shallow
- Other

Predominant Species

- None
- Arrowhead sp.
- Clasping-leaf pondweed
- Common bur-reed
- Common waterweed
- Coontail
- Curly-leaf pondweed
- Eurasian watermilfoil
- Fern pondweed
- Flat-stem pondweed
- Forked duckweed
- Fries' pondweed
- Large-leaf pondweed
- Muskgrass
- Nitella
- Small pondweed
- Variable-leaf pondweed
- Water stargrass
- Wild celery
- Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 13
June Predominant Species
Sheet 2 OF 2

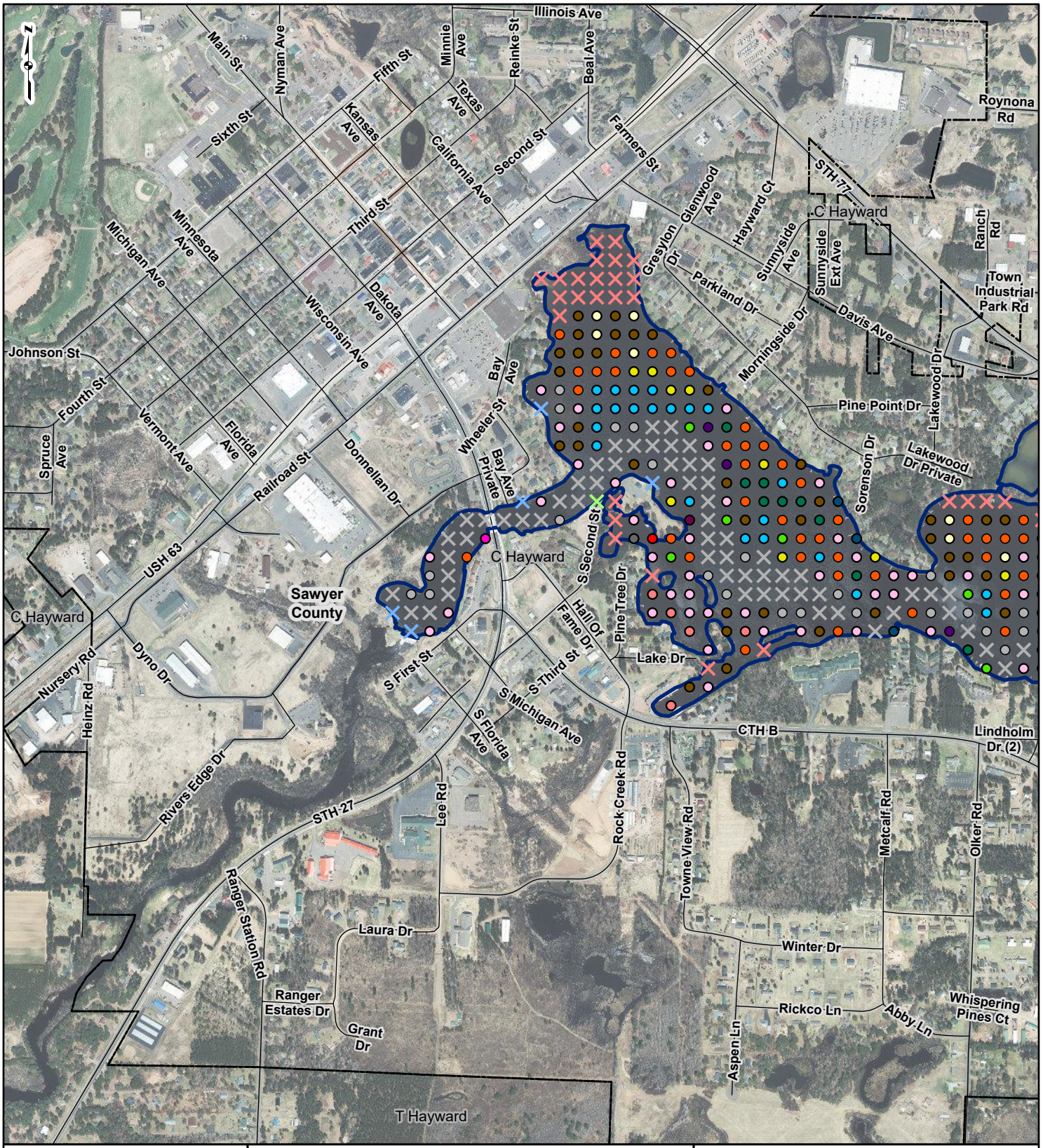
Hayward Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

DRAWN BY: EMW DATE: 10/31/2022
CHECKED: TDB APPROVED: LLS

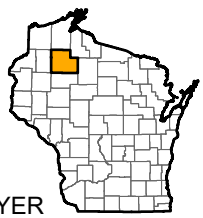
REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/31/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Hayward\R220323_00_Hayward_Invasive_Mapping\R220323_00_Hayward_Invasive_Mapping.aprx

FIGURE 14
Hayward August Predominant Species



PROJECT LOCATION



SAWYER COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/Shallow
- Other

Predominant Species

- None
- Arrowhead sp.
- Clasping-leaf pondweed
- Common waterweed
- Coontail
- Eurasian watermilfoil
- Fern pondweed
- Flat-stem pondweed
- Floating-leaf pondweed
- Forked duckweed
- Nitella
- Slender naiad
- Water marigold
- Water stargrass
- White-stem pondweed
- White water lily
- Wild celery
- Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

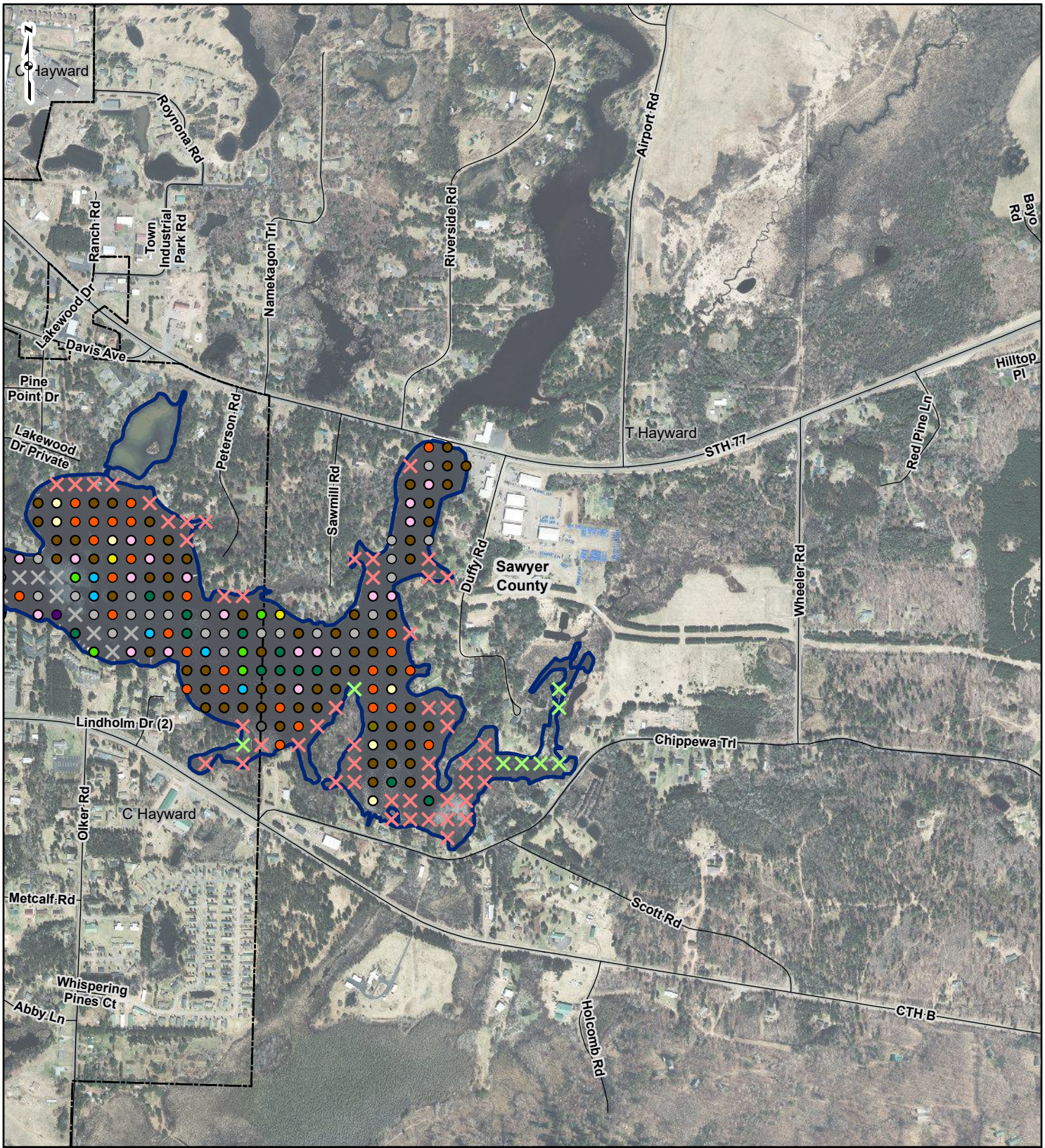
Figure 14
August
Predominant Species
Sheet 1 OF 2

Hayward Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

DRAWN BY: EMW DATE: 10/31/2022
CHECKED: TDB APPROVED: LLS

REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/31/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Hayward\R220323_00_Hayward_Invasive_Mapping\R220323_00_Hayward_Invasive_Mapping.aprx



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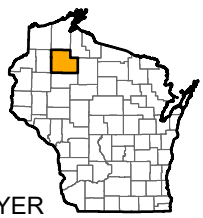


SAWYER COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/Shallow
- Other

Predominant Species

- None
- Arrowhead sp.
- Clasping-leaf pondweed
- Common waterweed
- Coontail
- Eurasian watermilfoil
- Fern pondweed
- Flat-stem pondweed
- Floating-leaf pondweed
- Forked duckweed
- Nitella
- Slender naiad
- Water marigold
- Water stargrass
- White-stem pondweed
- White water lily
- Wild celery
- Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 14
August
Predominant Species
Sheet 2 OF 2

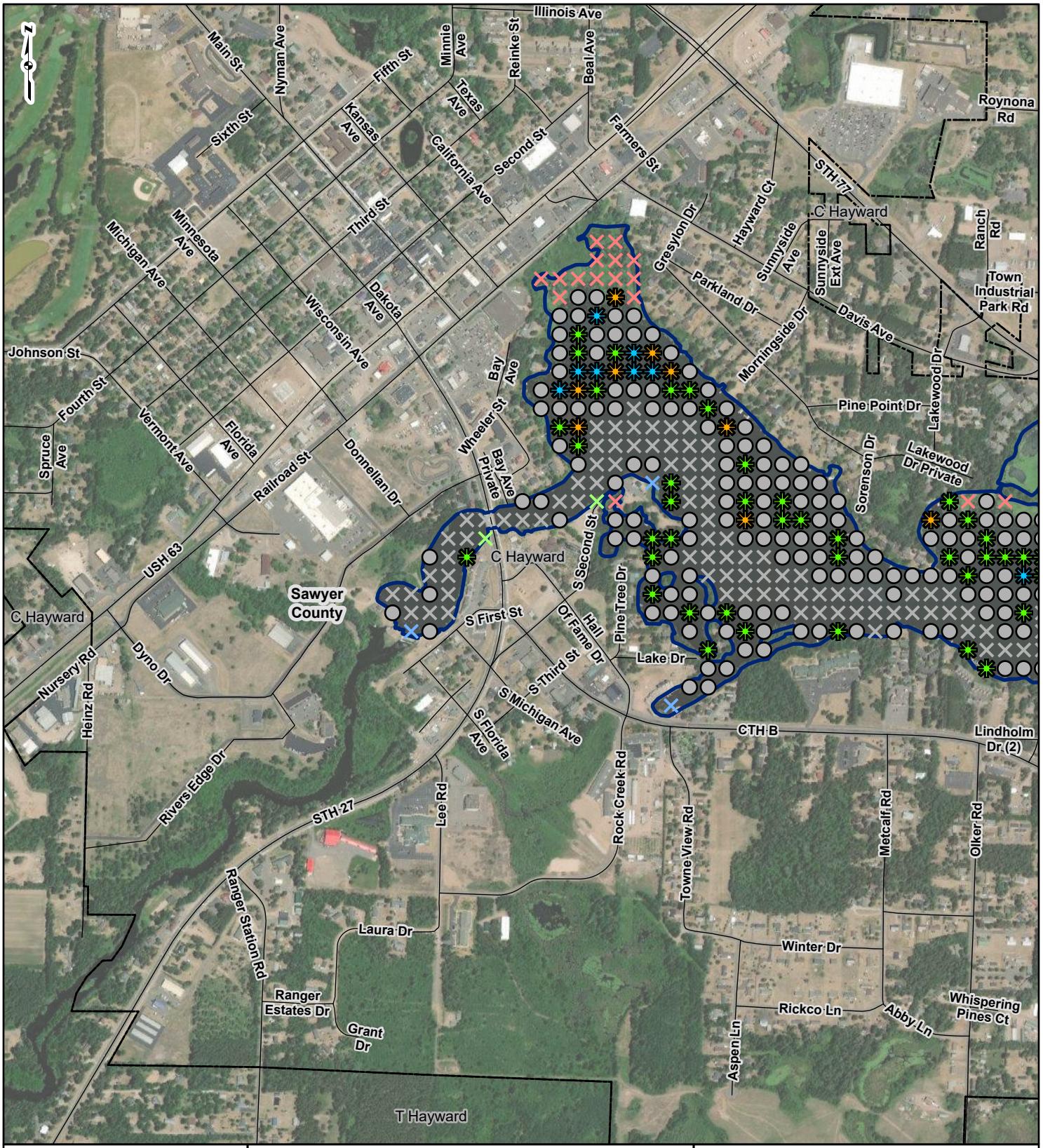
Hayward Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

DRAWN BY: EMW DATE: 10/31/2022
CHECKED: TDB APPROVED: LLS

REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/31/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Hayward\R220323_00_Hayward_Invasive_Mapping\R220323_00_Hayward_Invasive_Mapping.aprx

FIGURE 15
Hayward June Aquatic Invasive Species



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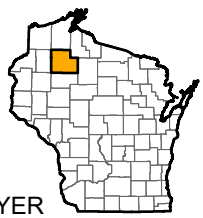

SAWYER COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other
- No Invasives Present
- Curly-leaf pondweed
- Eurasian watermilfoil
- Both Invasives Present
- Point-Intercept Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 15
June
Aquatic Invasive Species
Sheet 1 OF 2

Hayward Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

DRAWN BY: EMW DATE: 10/27/2022
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REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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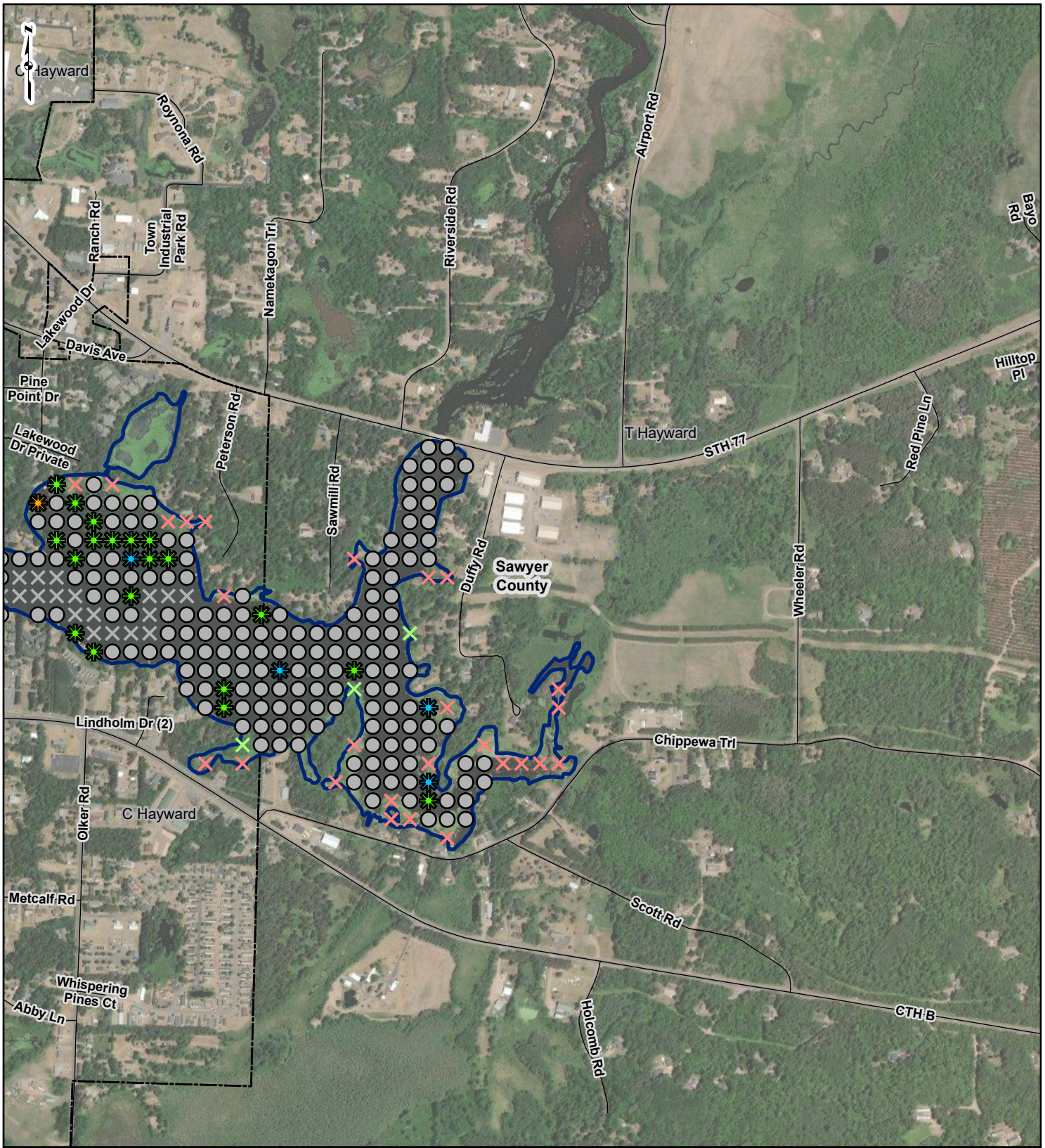
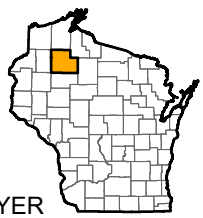


PROJECT LOCATION



SAWYER COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other
- No Invasives Present
- Curly-leaf pondweed
- Eurasian watermilfoil
- Both Invasives Present
- Point-Intercept Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 15
June
Aquatic Invasive Species
Sheet 2 OF 2

Hayward Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

DRAWN BY: EMW DATE: 10/27/2022
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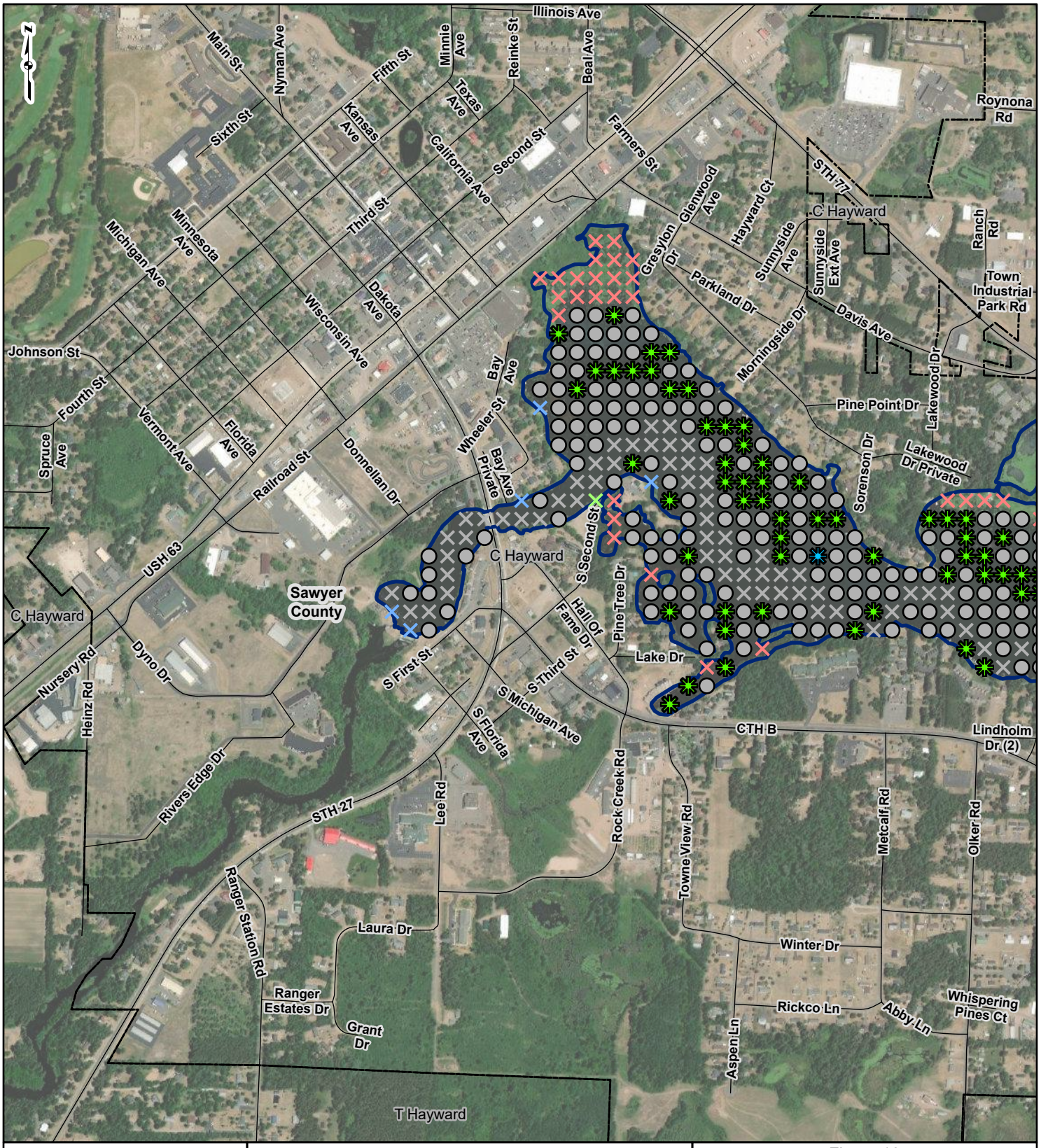
REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Hayward\R220323_00_Hayward_Invasive_Mapping\R220323_00_Hayward_Invasive_Mapping.aprx

FIGURE 16
Hayward August Aquatic Invasive Species



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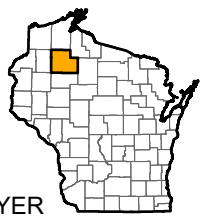

SAWYER COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other
- No Invasives Present
- Curly-leaf pondweed
- Eurasian watermilfoil
- Point-Intercept Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 16
August
Aquatic Invasive Species
Sheet 1 OF 2

Hayward Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

DRAWN BY: EMW DATE: 10/27/2022
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REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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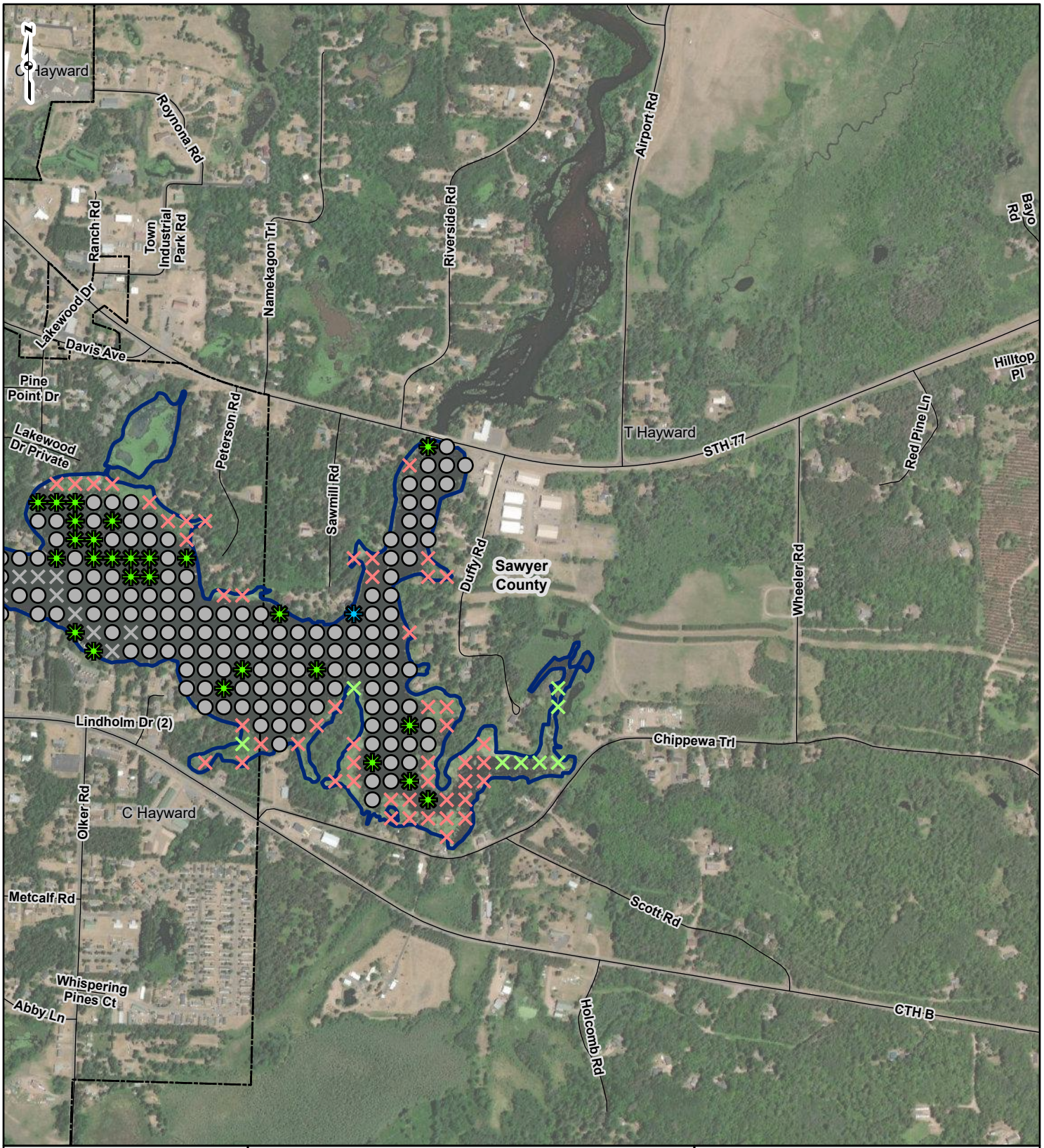
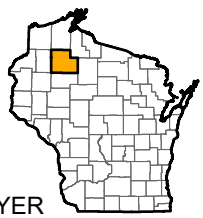


PROJECT LOCATION



SAWYER COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other
- No Invasives Present
- Curly-leaf pondweed
- Eurasian watermilfoil
- Point-Intercept Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 16
August
Aquatic Invasive Species
Sheet 2 OF 2

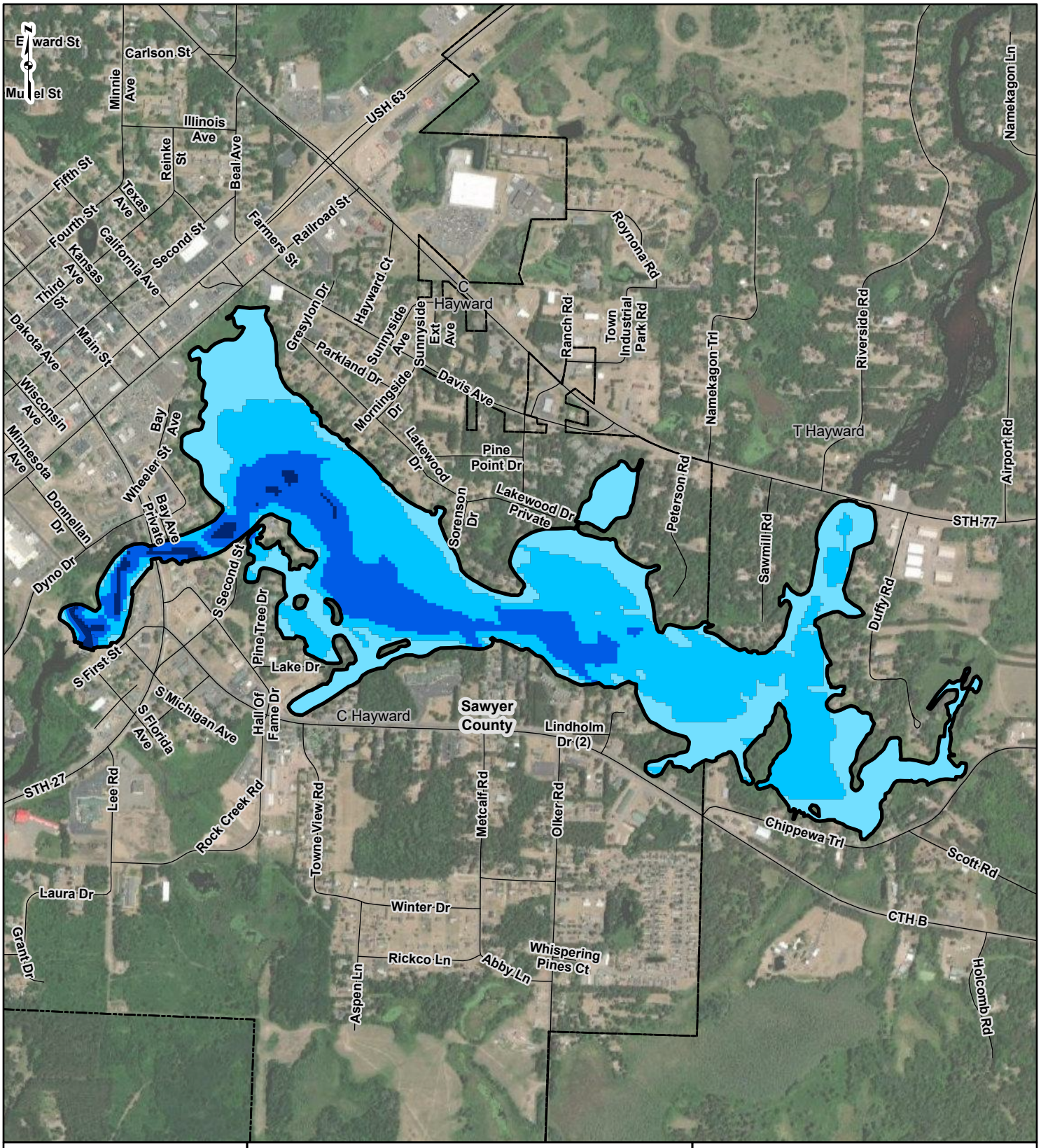
Hayward Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

DRAWN BY: EMW DATE: 10/27/2022
CHECKED: TDB APPROVED: LLS

REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Hayward\R220323_00_Hayward_Invasive_Mapping\R220323_00_Hayward_Invasive_Mapping.aprx

FIGURE 17
Hayward Bathymetric Map



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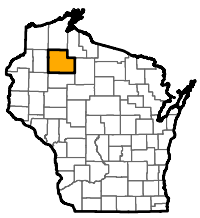

SAWYER COUNTY, WISCONSIN

LEGEND

Depth
- 0 - 5 ft
- 5 - 10 ft
- 10 - 15 ft
- >15 ft

- Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 600 1,200 2,400 Feet

Figure 17
Hayward Bathymetric Map

Hayward Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

Mead & Hunt

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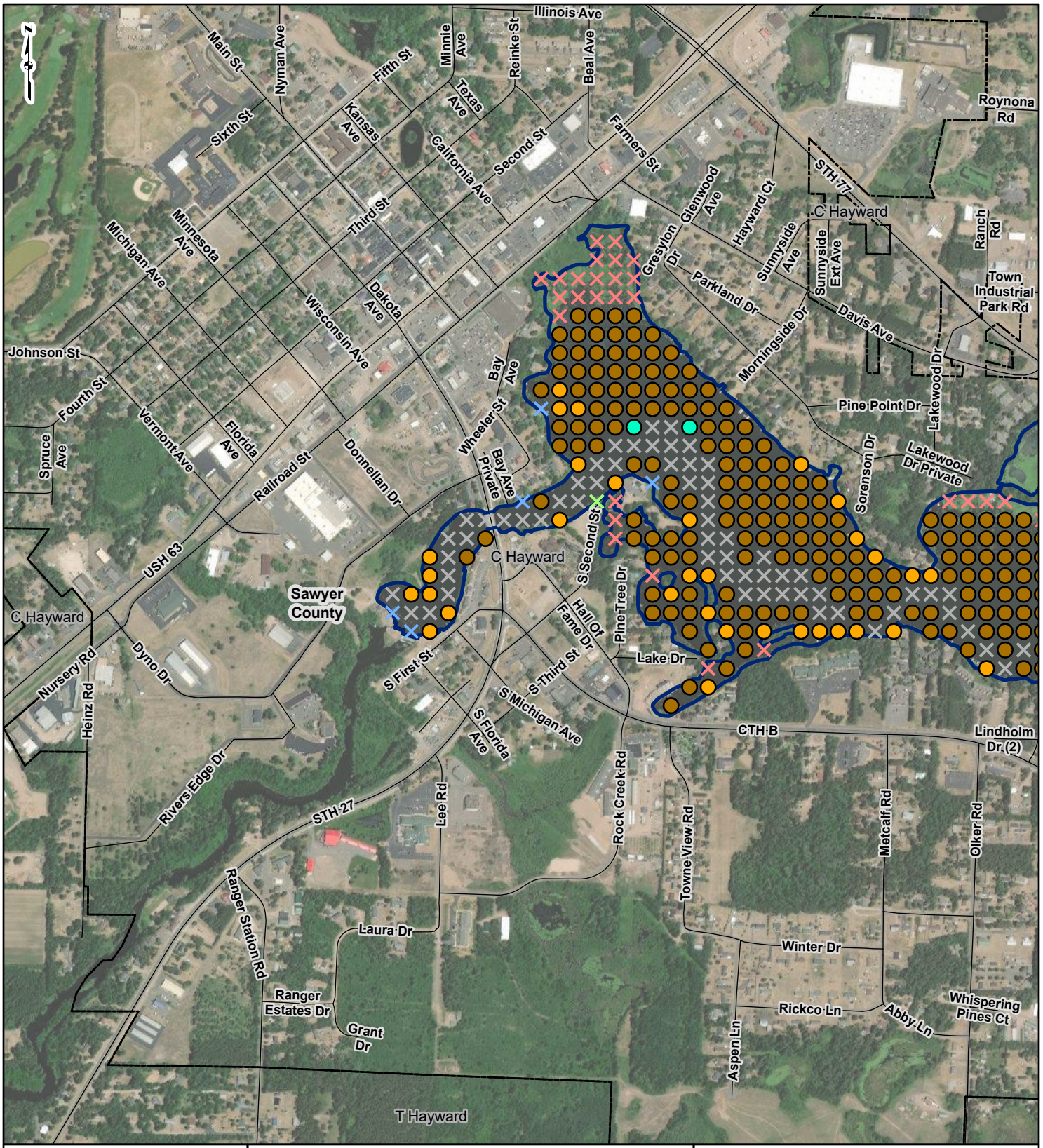
REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Depth_Mapping\R220323_Hayward_Depth_Mapping\Depth\Hayward_Depth_Mapping_2022_10_27.aprx

FIGURE 18
Hayward Substrate Types



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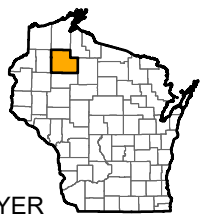

SAWYER COUNTY, WISCONSIN

LEGEND

Deeper than Plant Growth
Non-Navigable Vegetation
Non-Navigable Terrestrial/ Shallow
Other

Dominant Substrate
Gravel
Organic
Sand
Wood

Point-Intercept Project Boundary
Road Centerline
Community Boundary
County Boundary

0 500 1,000 2,000 Feet

Figure 18
Substrate Types
Sheet 1 OF 2

Hayward Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

DRAWN BY: EMW DATE: 10/27/2022
CHECKED: TDB APPROVED: LLS

REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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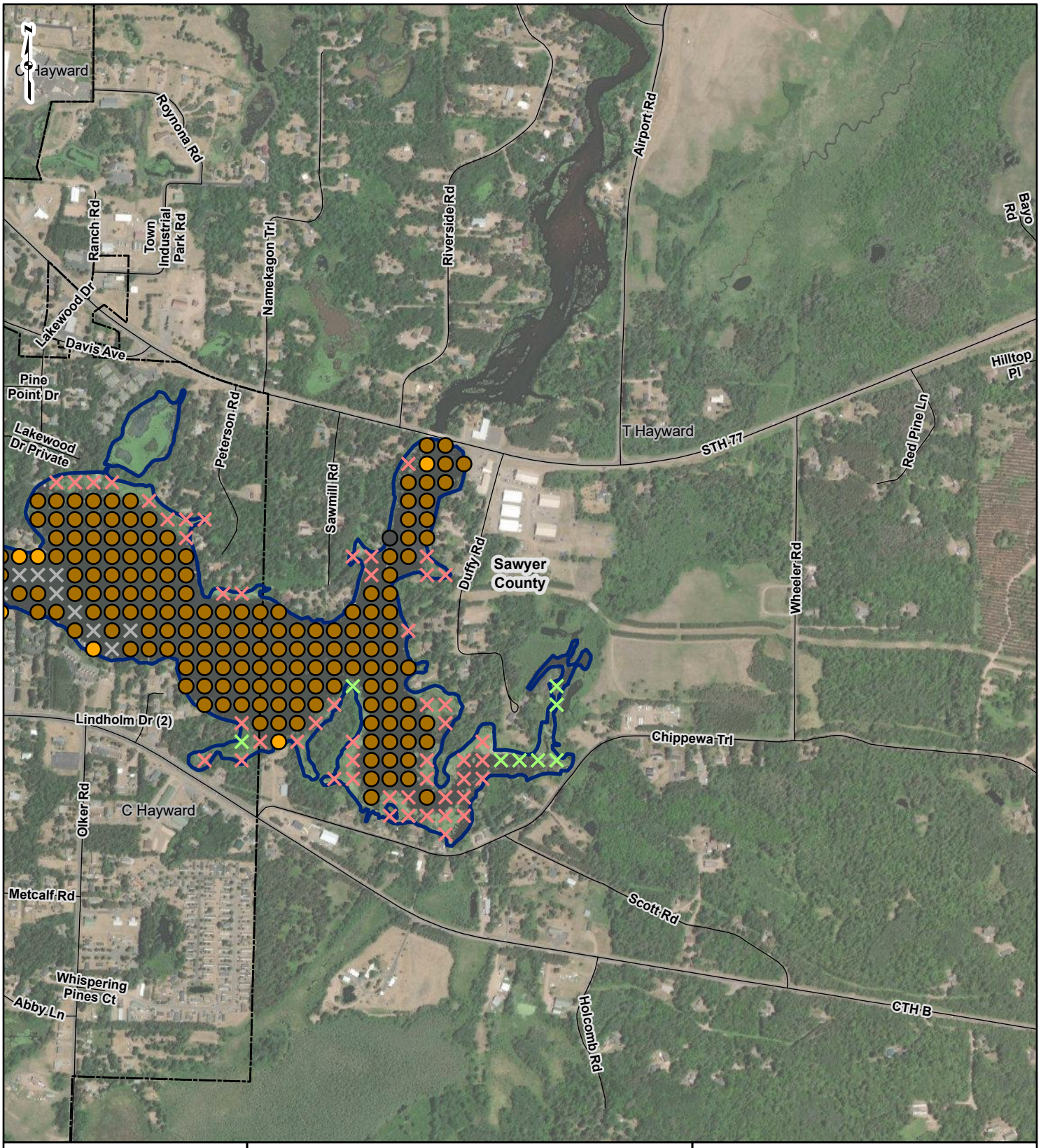

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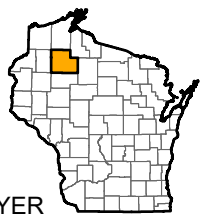


SAWYER COUNTY, WISCONSIN

LEGEND

Deeper than Plant Growth
Non-Navigable Vegetation
Non-Navigable Terrestrial/ Shallow
Other

Dominant Substrate
Gravel
Organic
Sand
Wood

Point-Intercept Project Boundary
Road Centerline
Community Boundary
County Boundary

0 500 1,000 2,000 Feet

Figure 18
Substrate Types
Sheet 2 OF 2

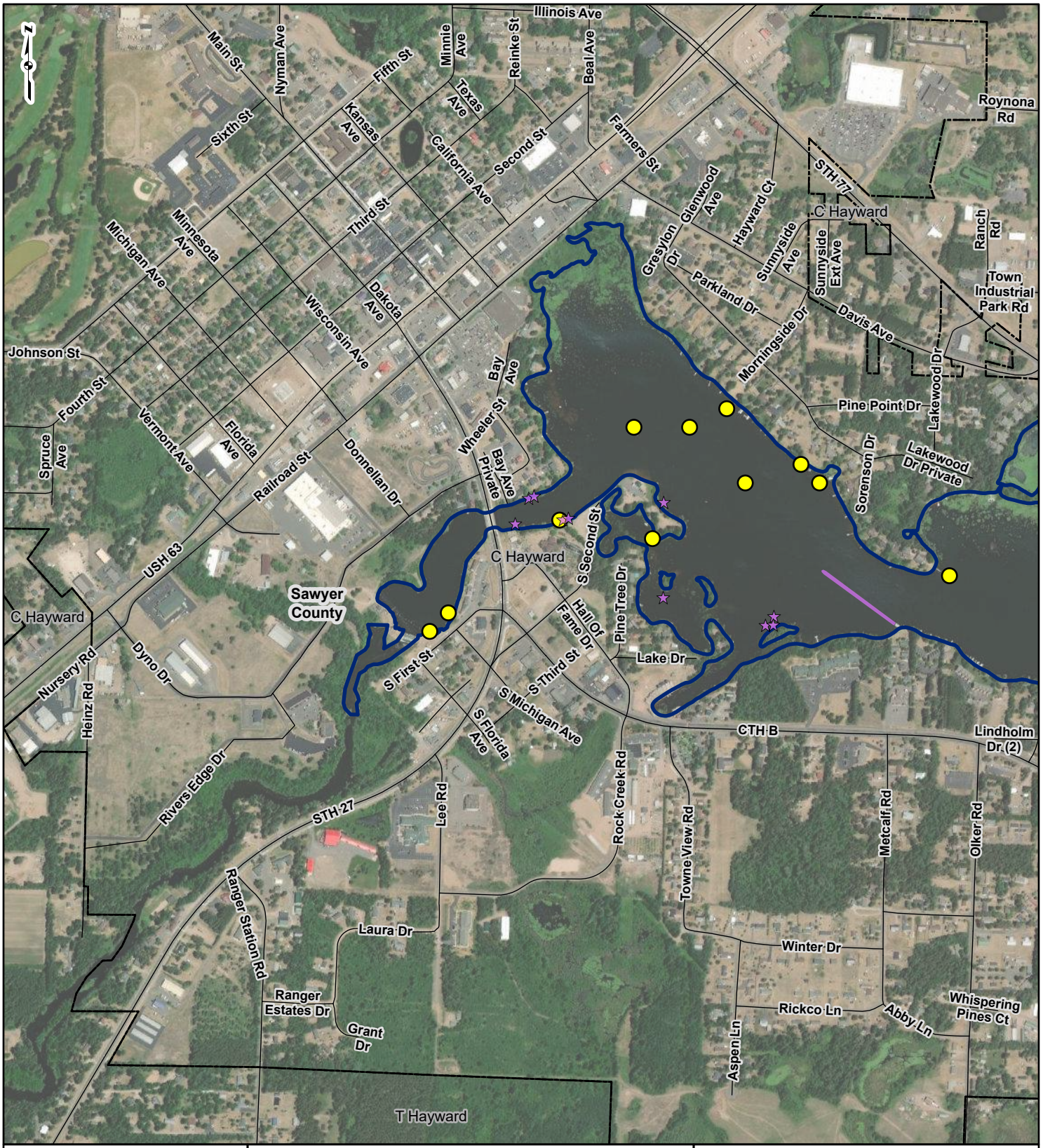
Hayward Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

DRAWN BY: EMW DATE: 10/27/2022
CHECKED: TDB APPROVED: LLS

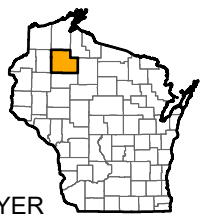
REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Hayward\R220323_00_Hayward_Invasive_Mapping\R220323_00_Hayward_Invasive_Mapping.aprx

FIGURE 19
Hayward Coarse Woody Debris/Habitat Map



PROJECT LOCATION



SAWYER COUNTY, WISCONSIN

LEGEND

- Coarse Woody Habitat
- Coarse Woody Debris Present
- Coarse Woody Habitat Area
- Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 19
Coarse Woody Debris/Habitat
Sheet 1 OF 2

Hayward Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

DRAWN BY: EMW DATE: 10/31/2022
CHECKED: TDB APPROVED: LLS

REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/31/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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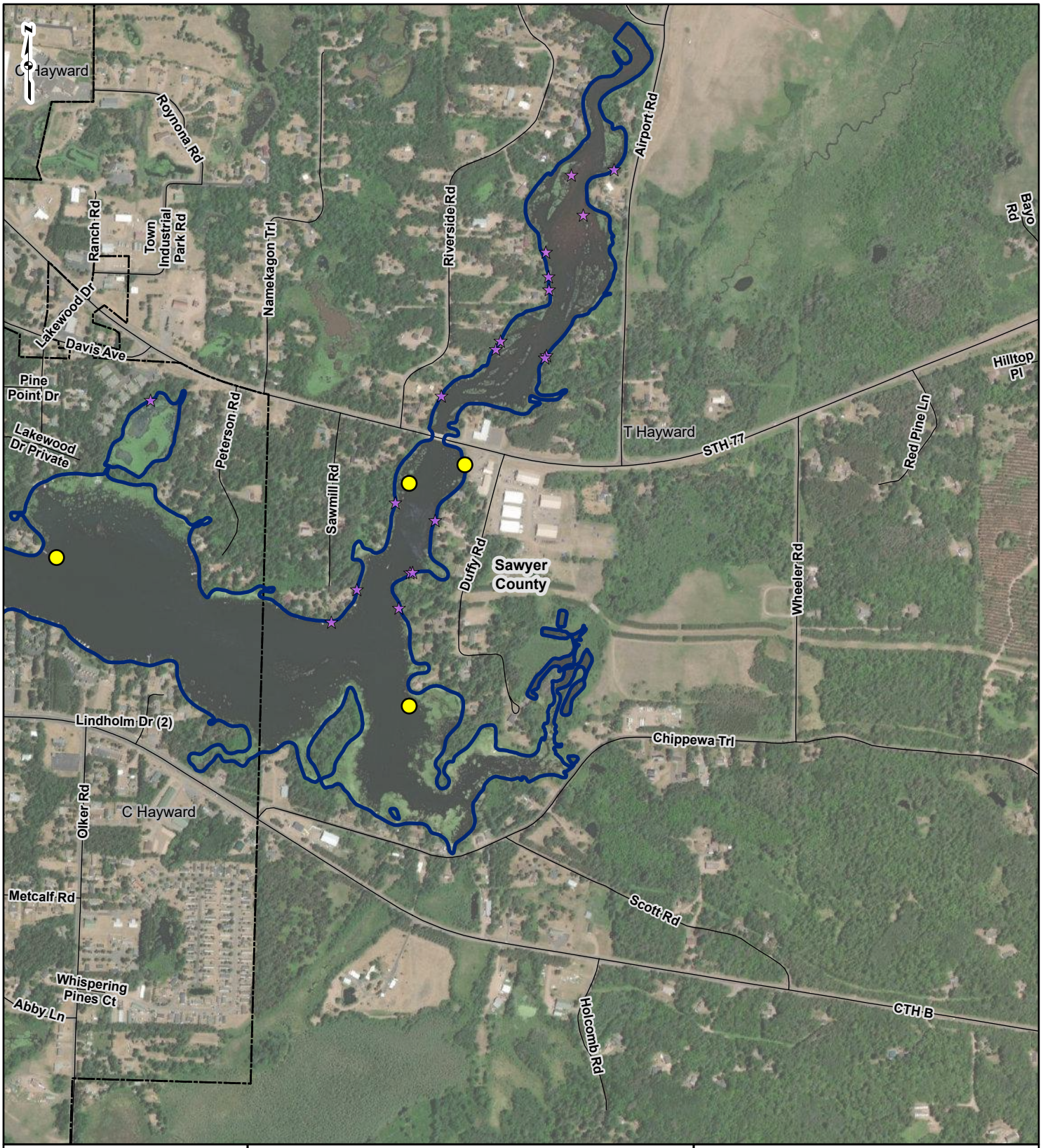

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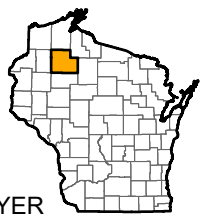


SAWYER COUNTY, WISCONSIN

LEGEND

- Coarse Woody Habitat
- Coarse Woody Debris Present
- Coarse Woody Habitat Area
- Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 19
Coarse Woody Debris/Habitat
Sheet 2 OF 2

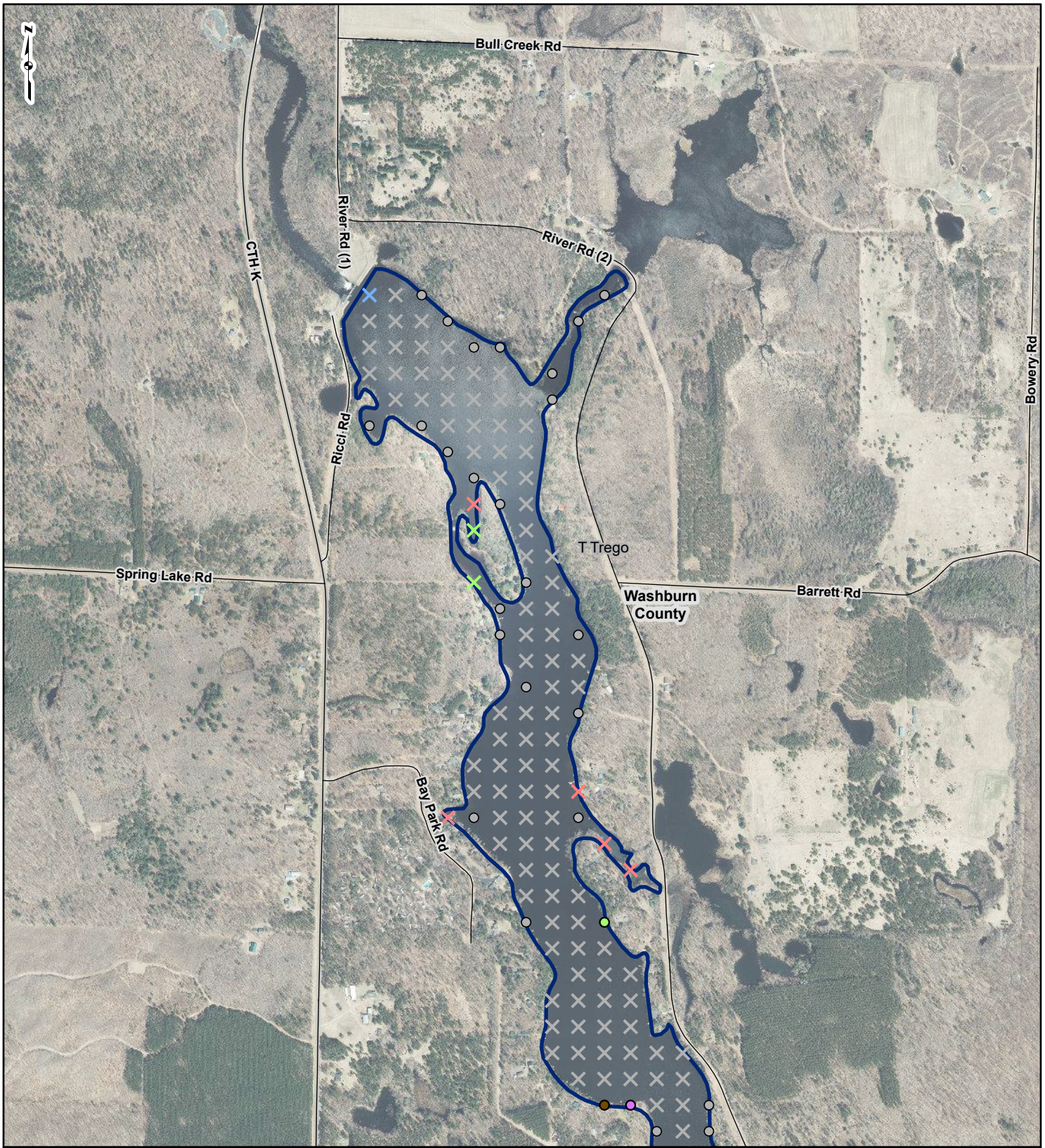
Hayward Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

DRAWN BY: EMW DATE: 10/31/2022
CHECKED: TDB APPROVED: LLS

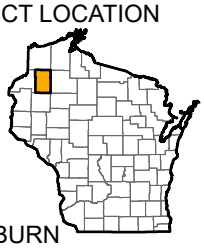
REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/31/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Hayward\R220323_00_Hayward_Invasive_Mapping\R220323_00_Hayward_Invasive_Mapping.aprx

FIGURE 20
Trego June Predominant Species



PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

Deeper than Plant Growth
Non-Navigable Vegetation
Non-Navigable Terrestrial/Shallow
Other

Predominant Species
None
Common waterweed
Coontail
Curly-leaf pondweed
Eurasian watermilfoil
Fern pondweed
Flat-stem pondweed
Forked duckweed
Muskgrasses
Nitella
Small duckweed
Water stargrass
Wild celery
Wild rice

Project Boundary
Road Centerline
Community Boundary
County Boundary

0 500 1,000 2,000 Feet

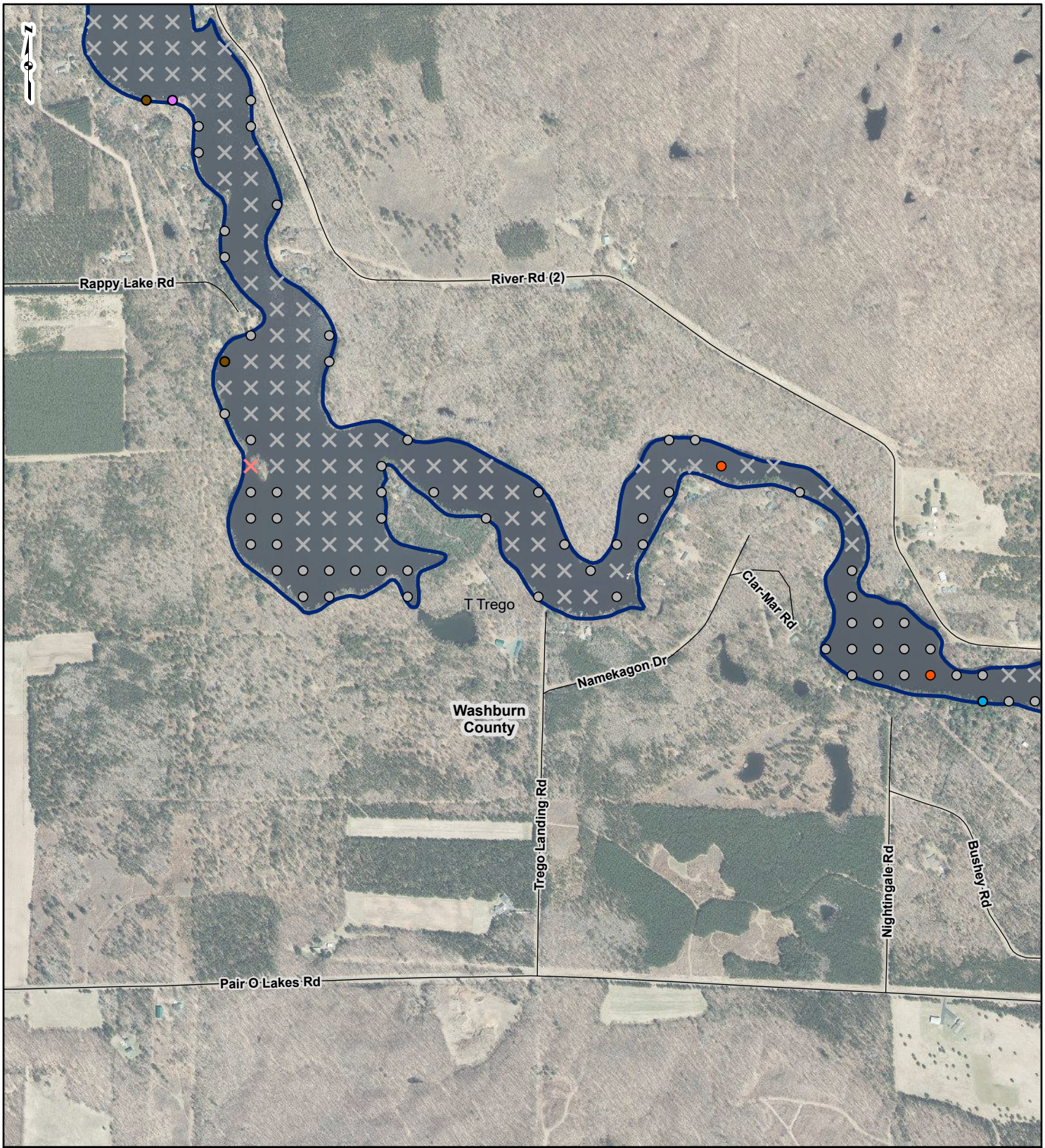
Figure 20
June Predominant Species
Sheet 1 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

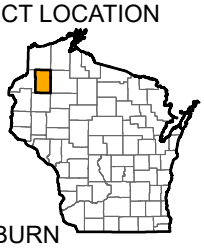
DRAWN BY: EMW DATE: 10/31/2022
CHECKED: TDB APPROVED: LLS

REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/31/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Trego\R220323_00_Trego_Inv_Mapping\VOID\R220323_00_Trego_Inv_Mapping_2022_10_30.aprx



PROJECT LOCATION



WASHBURN
COUNTY, WISCONSIN

LEGEND

Deeper than Plant Growth
Non-Navigable Vegetation
Non-Navigable Terrestrial/Shallow
Other

Predominant Species
None
Common waterweed
Coontail
Curly-leaf pondweed
Eurasian watermilfoil
Fern pondweed
Flat-stem pondweed
Forked duckweed
Muskgrasses
Nitella
Small duckweed
Water stargrass
Wild celery
Wild rice

Project Boundary
Road Centerline
Community Boundary
County Boundary

0 500 1,000 2,000 Feet

Figure 20
June Predominant Species
Sheet 2 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

Mead & Hunt

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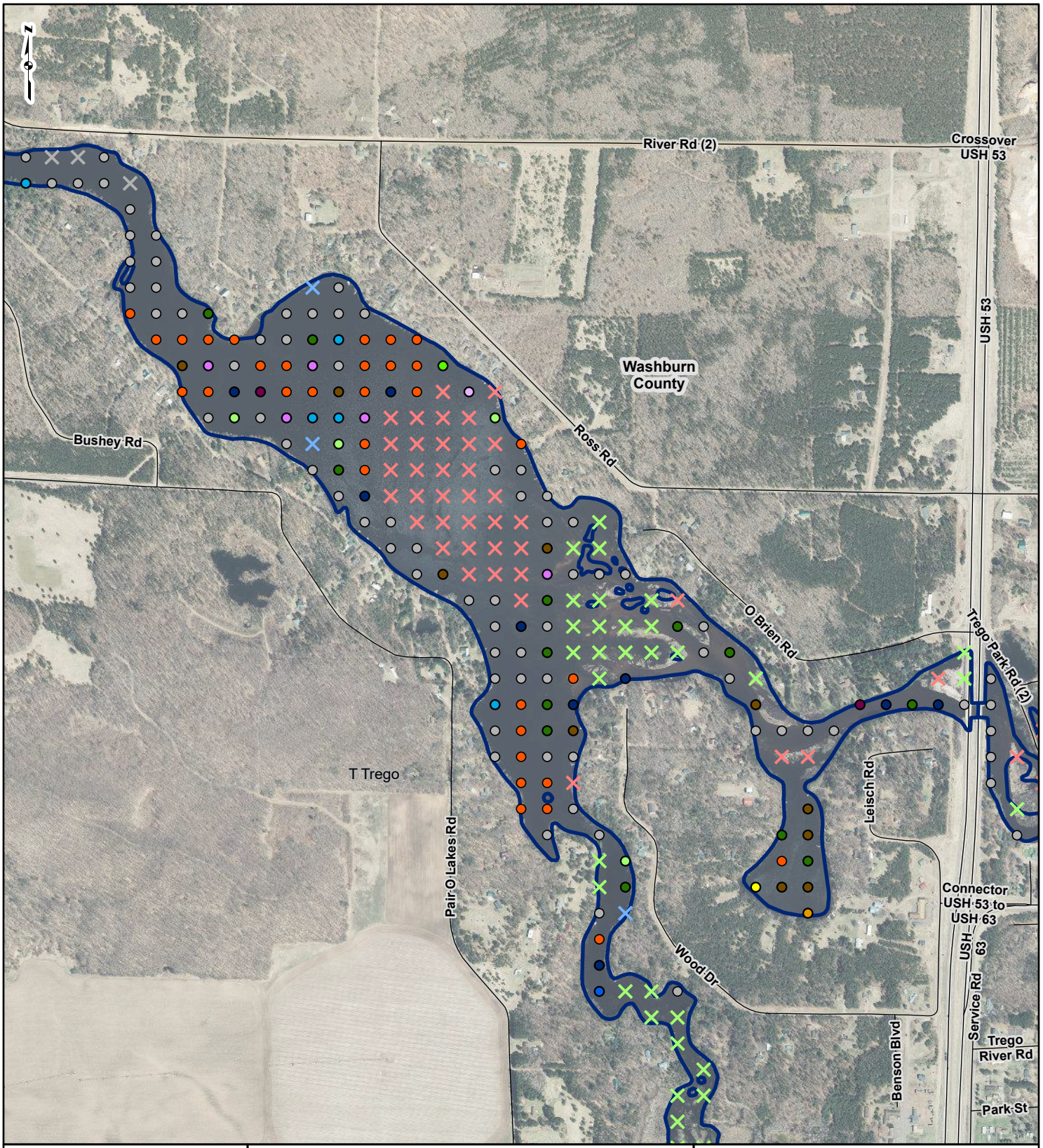
REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/31/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Trego\R220323_00_Trego_Inv_Mapping\VOID\R220323_00_Trego_Inv_Mapping_2022_10_30.aprx



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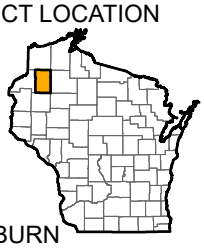

WASHBURN
COUNTY, WISCONSIN

LEGEND

Deeper than Plant Growth
Non-Navigable Vegetation
Non-Navigable Terrestrial/Shallow
Other

Predominant Species
None
Common waterweed
Coontail
Curly-leaf pondweed
Eurasian watermilfoil
Fern pondweed
Flat-stem pondweed
Forked duckweed
Muskgrasses
Nitella
Small duckweed
Water stargrass
Wild celery
Wild rice

Project Boundary
Road Centerline
Community Boundary
County Boundary

0 500 1,000 2,000 Feet

Figure 20
June Predominant Species
Sheet 3 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

Mead & Hunt

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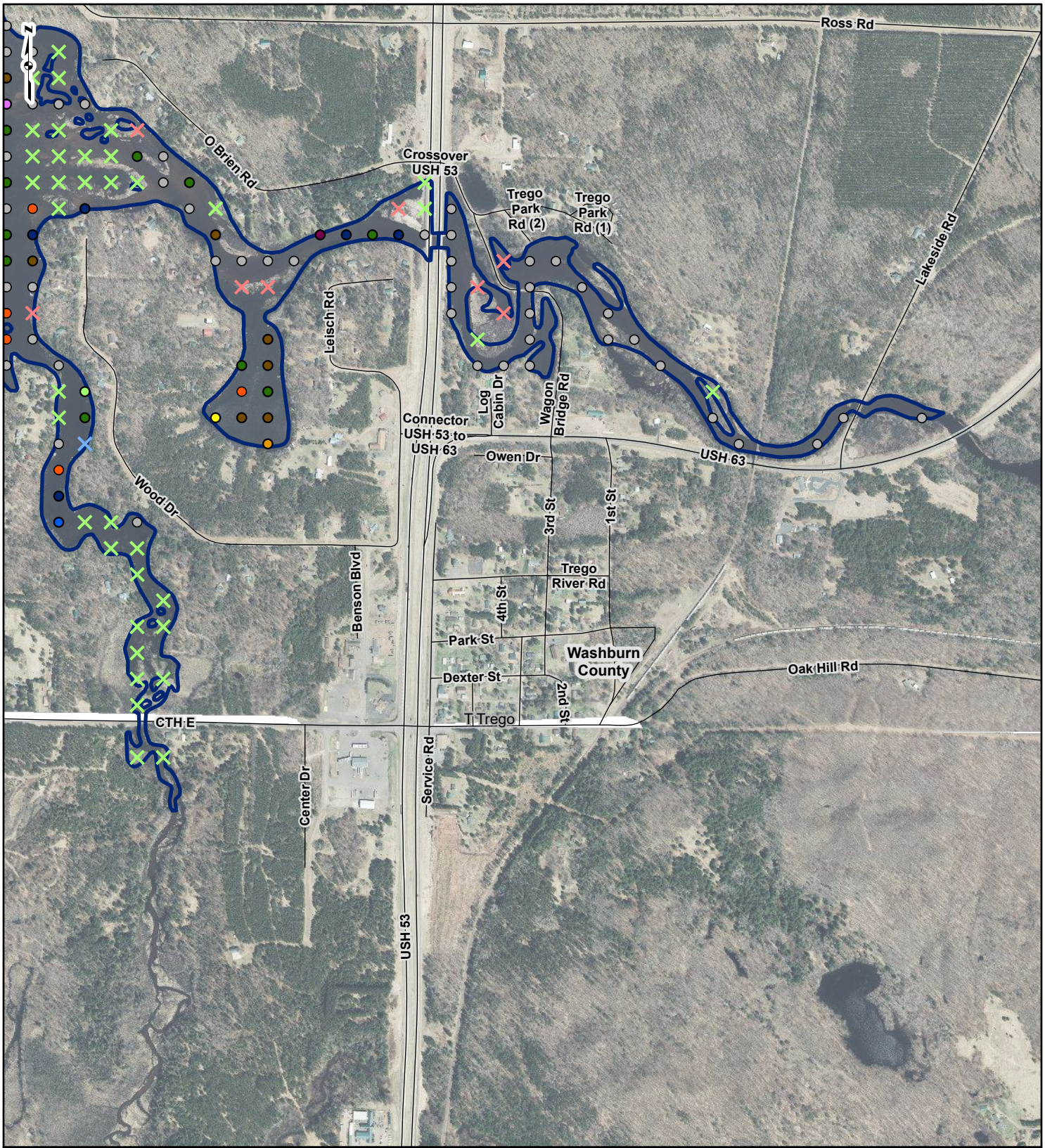

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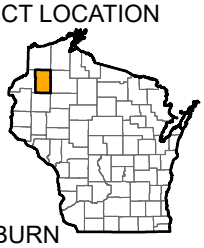

WASHBURN COUNTY, WISCONSIN

LEGEND

Deeper than Plant Growth
Non-Navigable Vegetation
Non-Navigable Terrestrial/Shallow
Other

Predominant Species
None
Common waterweed
Coontail
Curly-leaf pondweed
Eurasian watermilfoil
Fern pondweed
Flat-stem pondweed
Forked duckweed
Muskgrasses
Nitella
Small duckweed
Water stargrass
Wild celery
Wild rice

Project Boundary
Road Centerline
Community Boundary
County Boundary

0 500 1,000 2,000 Feet

Figure 20
June Predominant Species
Sheet 4 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

Mead & Hunt

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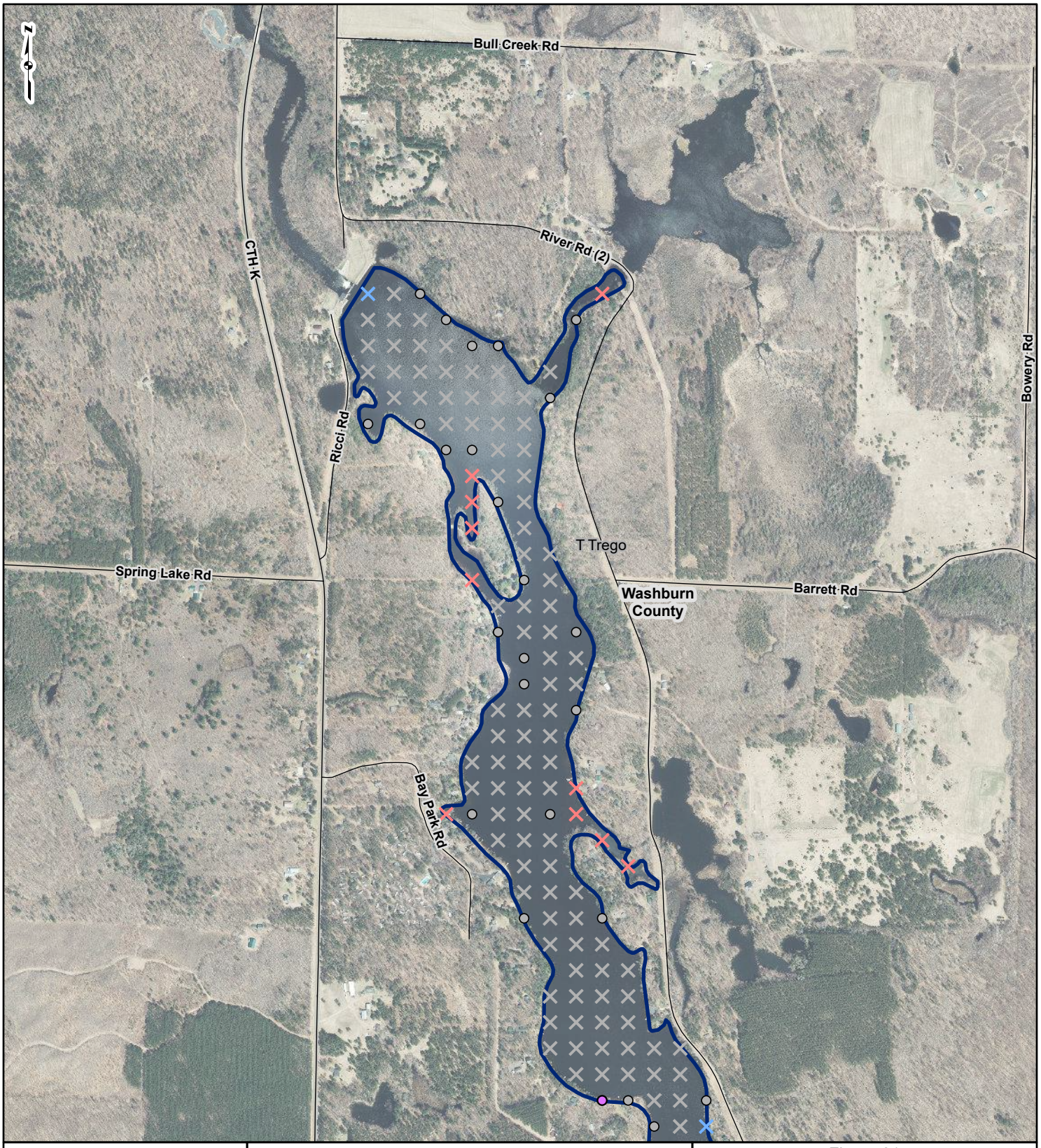
FIGURE 21
Trego July/Aug Predominant Species



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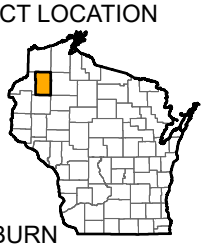

WASHBURN COUNTY, WISCONSIN

LEGEND

Deeper than Plant Growth
Non-Navigable Vegetation
Non-Navigable Terrestrial/Shallow
Other

Predominant Species
None
Common bur-reed
Common waterweed
Coontail
Curly-leaf pondweed
Fern pondweed
Flat-stem pondweed
Forked duckweed
Nitella
Wild celery
Project Boundary
Road Centerline
Community Boundary
County Boundary

0 500 1,000 2,000 Feet

Figure 21
July/August
Predominant Species
Sheet 1 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

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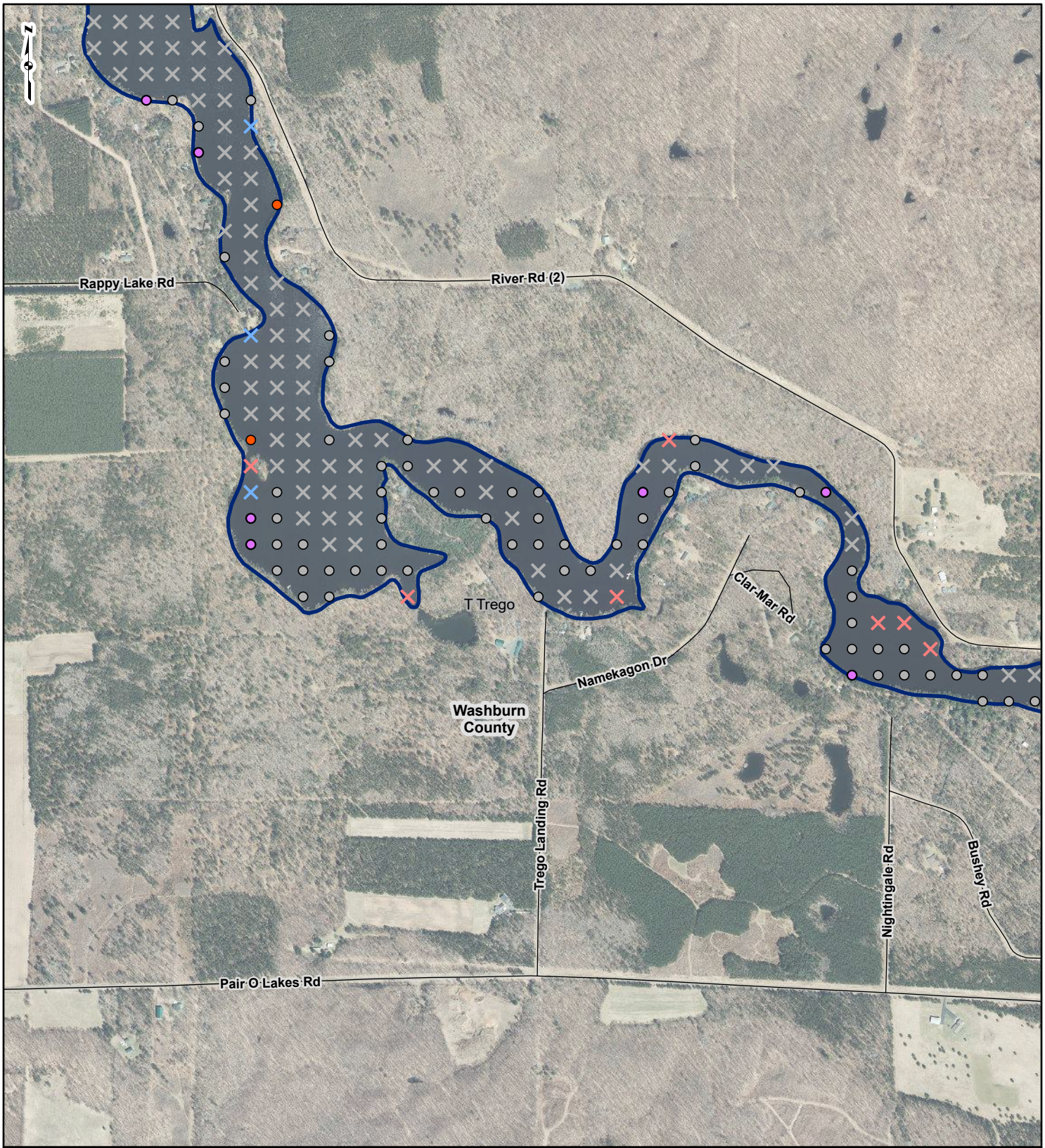
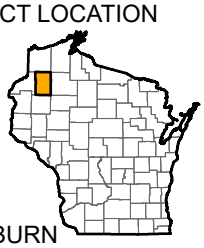


PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

Deeper than Plant Growth
Non-Navigable Vegetation
Non-Navigable Terrestrial/Shallow
Other

Predominant Species
None
Common bur-reed
Common waterweed
Coontail
Curly-leaf pondweed
Fern pondweed
Flat-stem pondweed
Forked duckweed
Nitella
Wild celery
Project Boundary
Road Centerline
Community Boundary
County Boundary

0 500 1,000 2,000 Feet

Figure 21
July/August
Predominant Species
Sheet 2 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

Mead & Hunt

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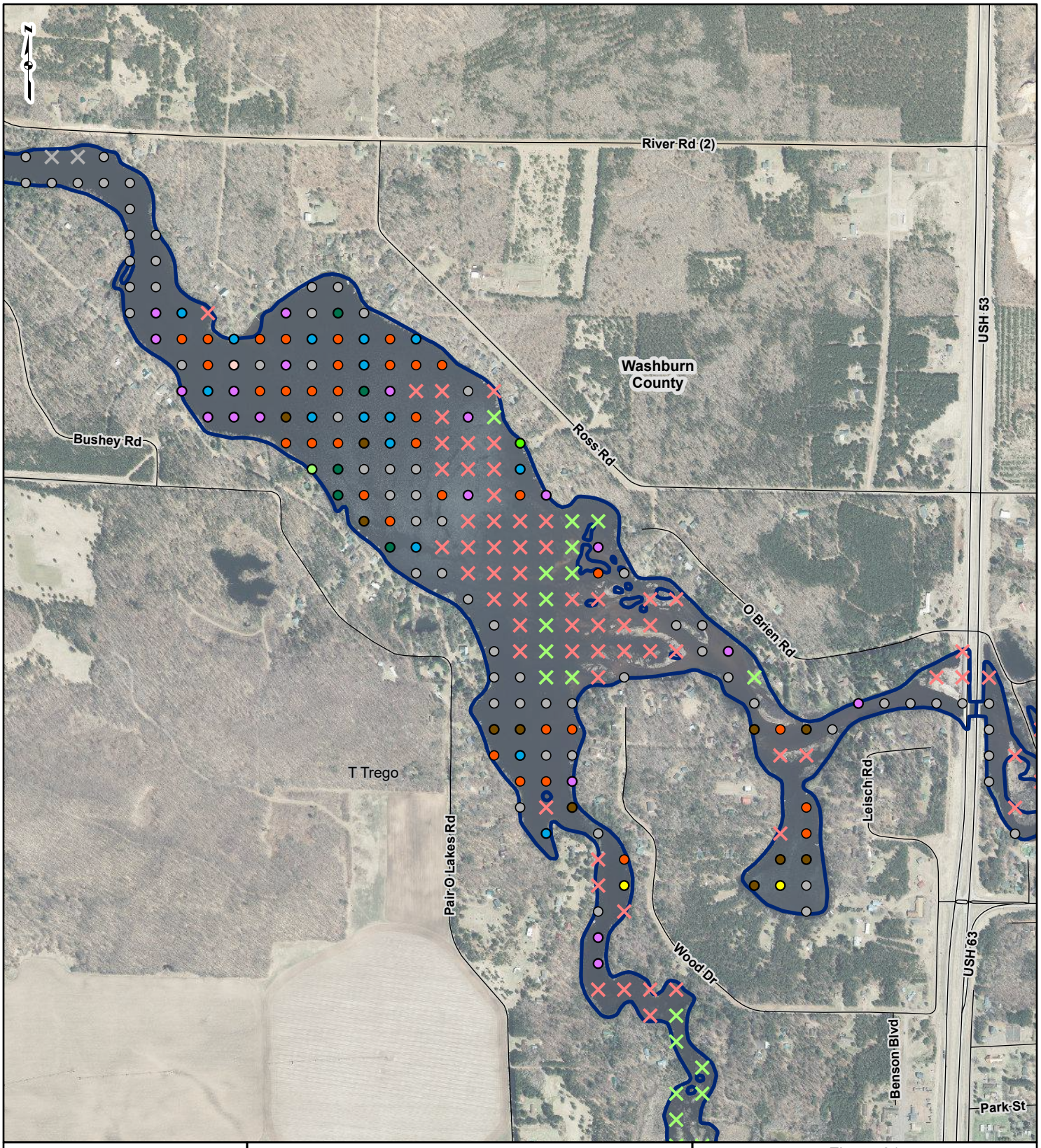

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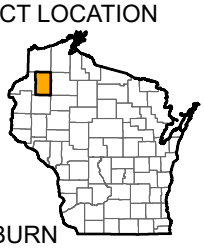

WASHBURN COUNTY, WISCONSIN

LEGEND

Deeper than Plant Growth
Non-Navigable Vegetation
Non-Navigable Terrestrial/Shallow
Other

Predominant Species
None
Common bur-reed
Common waterweed
Coontail
Curly-leaf pondweed
Fern pondweed
Flat-stem pondweed
Forked duckweed
Nitella
Wild celery
Project Boundary
Road Centerline
Community Boundary
County Boundary

0 500 1,000 2,000 Feet

Figure 21
July/August
Predominant Species
Sheet 3 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

Mead & Hunt

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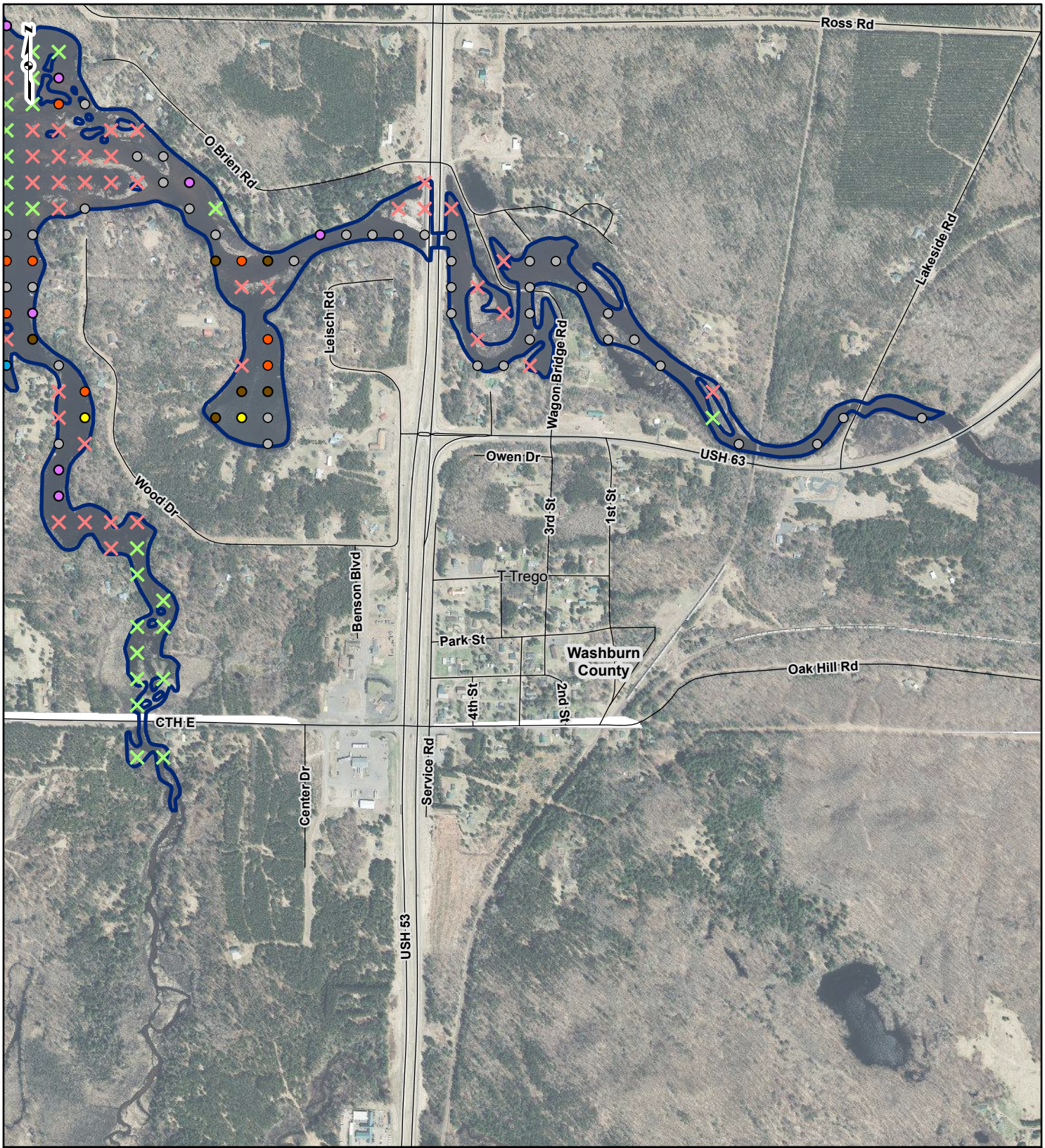

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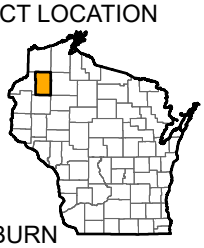

WASHBURN COUNTY, WISCONSIN

LEGEND

Deeper than Plant Growth
Non-Navigable Vegetation
Non-Navigable Terrestrial/Shallow
Other

Predominant Species
None
Common bur-reed
Common waterweed
Coontail
Curly-leaf pondweed
Fern pondweed
Flat-stem pondweed
Forked duckweed
Nitella
Wild celery

Project Boundary
Road Centerline
Community Boundary
County Boundary

0 500 1,000 2,000 Feet

Figure 21
July/August
Predominant Species
Sheet 4 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

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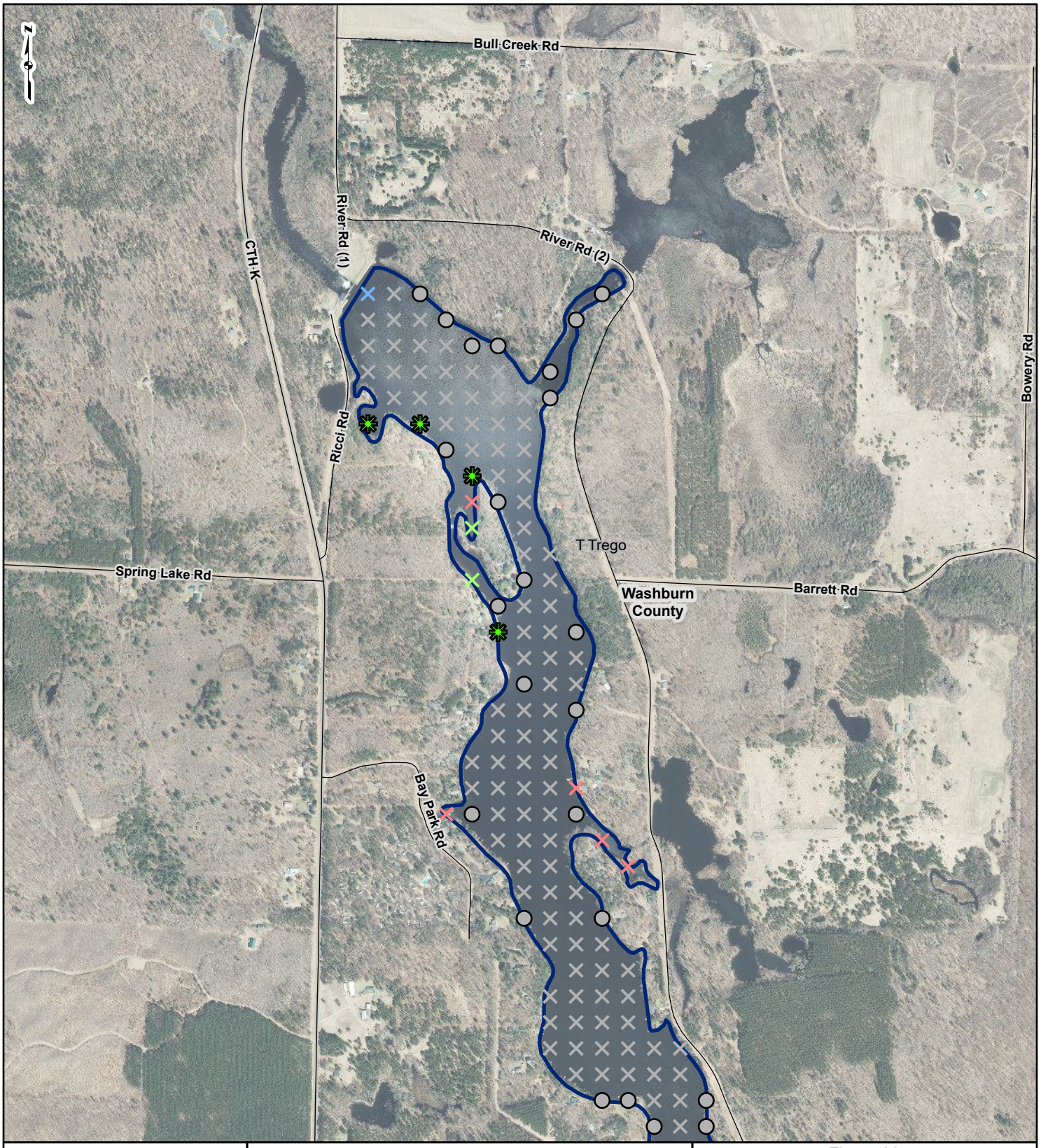
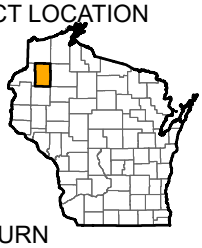
FIGURE 22
Trego June Aquatic Invasive Species



PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other
- No Invasives Present
- Curly-leaf pondweed
- Eurasian watermilfoil
- Both Invasives Present
- Point-Intercept Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 22
June
Aquatic Invasive Species
Sheet 1 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

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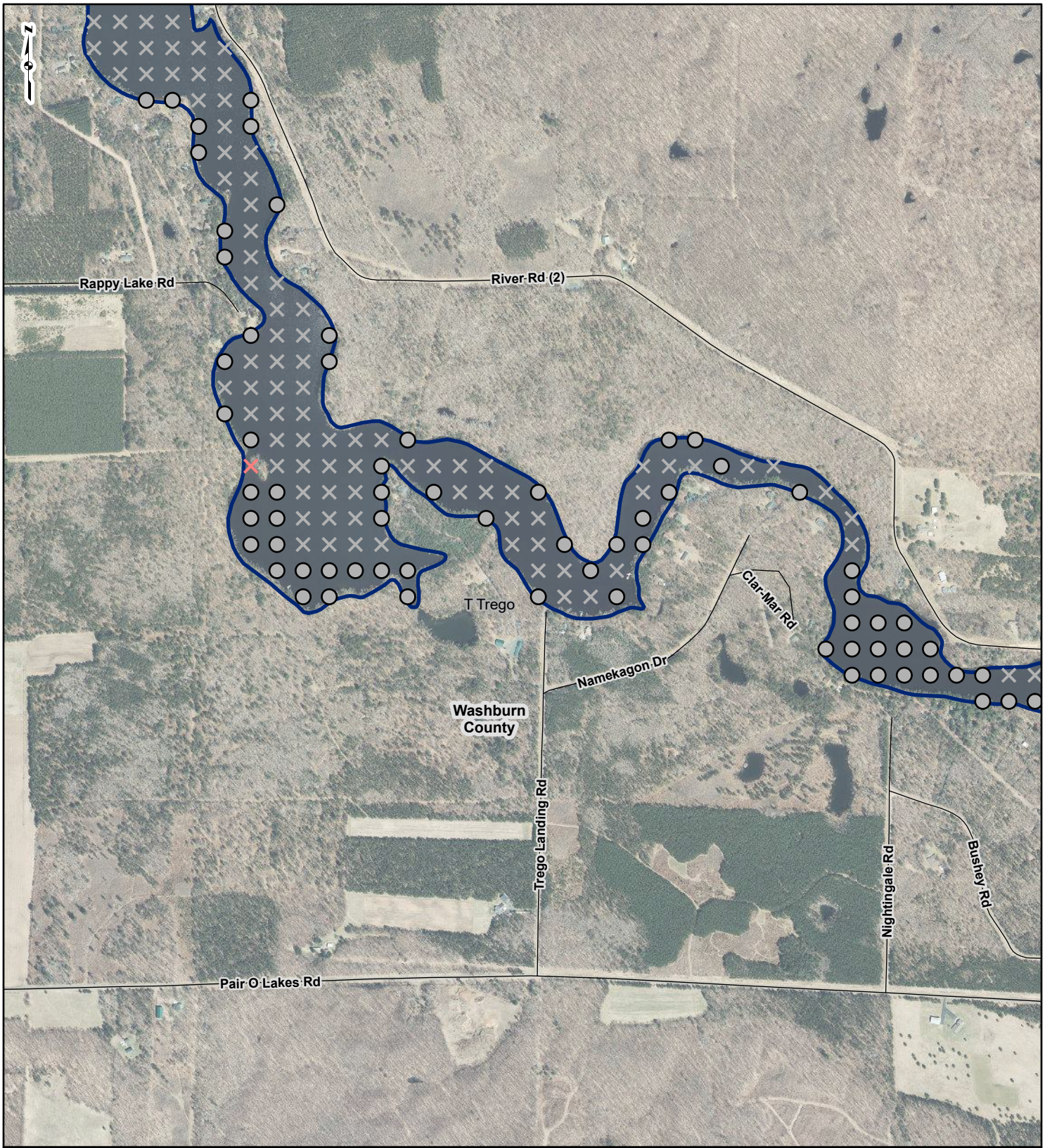

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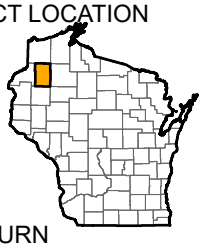

WASHBURN
COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other
- No Invasives Present
- Curly-leaf pondweed
- Eurasian watermilfoil
- Both Invasives Present
- Point-Intercept Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 22
June
Aquatic Invasive Species
Sheet 2 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

Mead & Hunt

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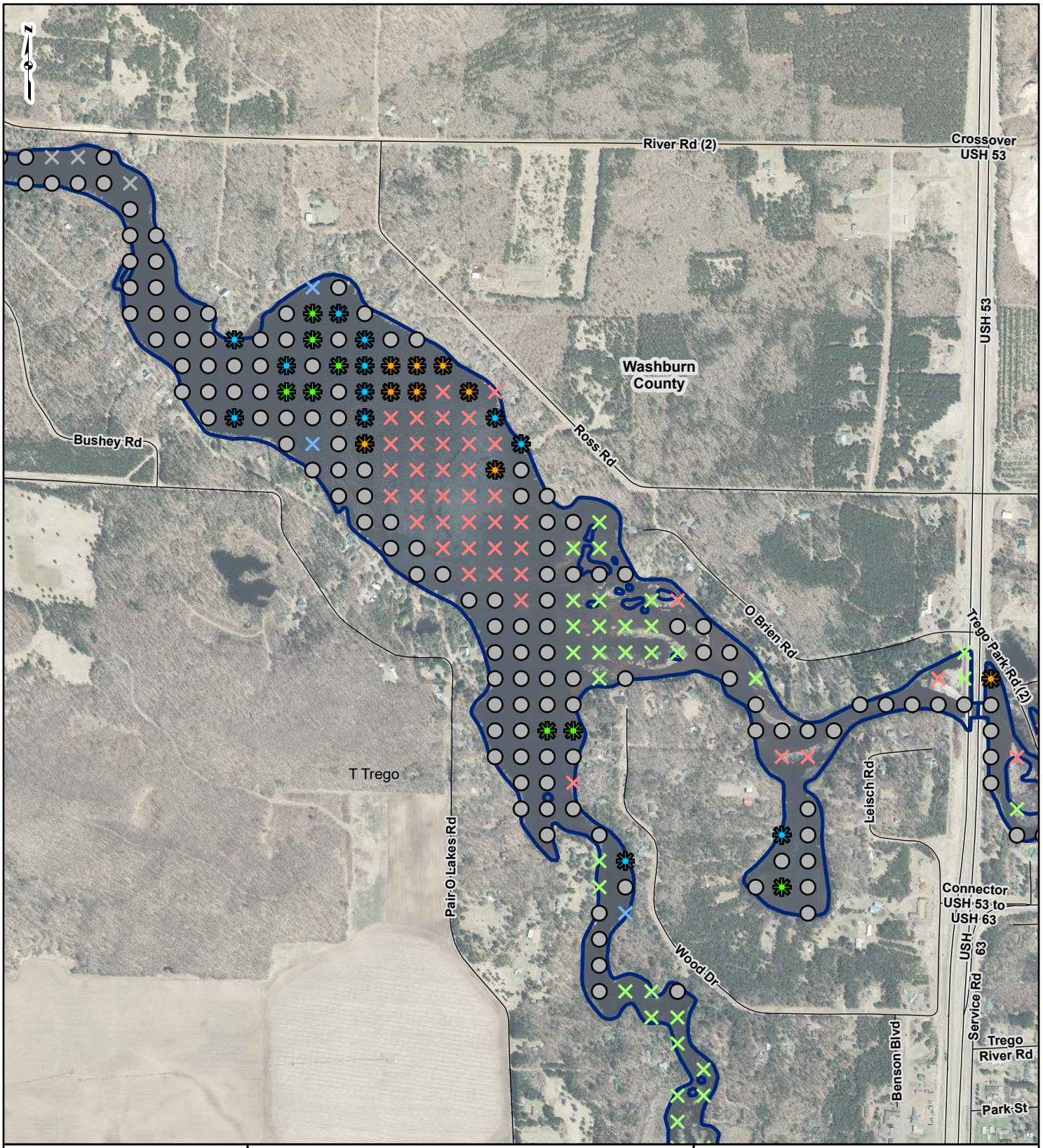

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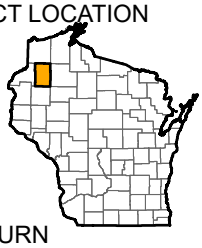

WASHBURN COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other
- No Invasives Present
- Curly-leaf pondweed
- Eurasian watermilfoil
- Both Invasives Present
- Point-Intercept Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 22
June
Aquatic Invasive Species
Sheet 3 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

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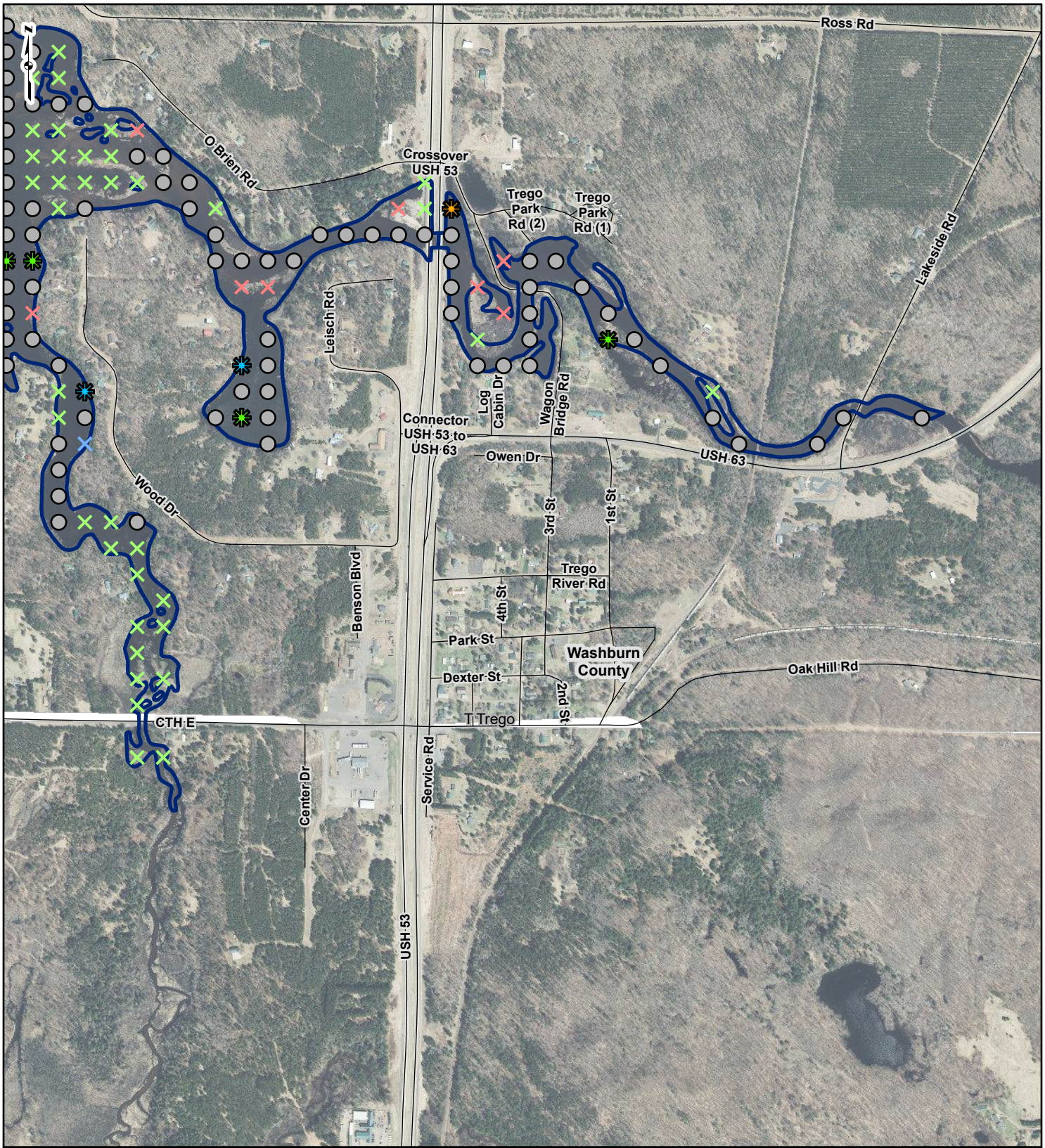

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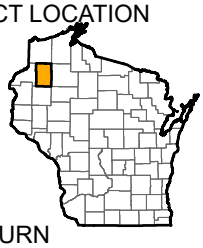

WASHBURN COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other
- No Invasives Present
- Curly-leaf pondweed
- Eurasian watermilfoil
- Both Invasives Present
- Point-Intercept Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 22
June
Aquatic Invasive Species
Sheet 4 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

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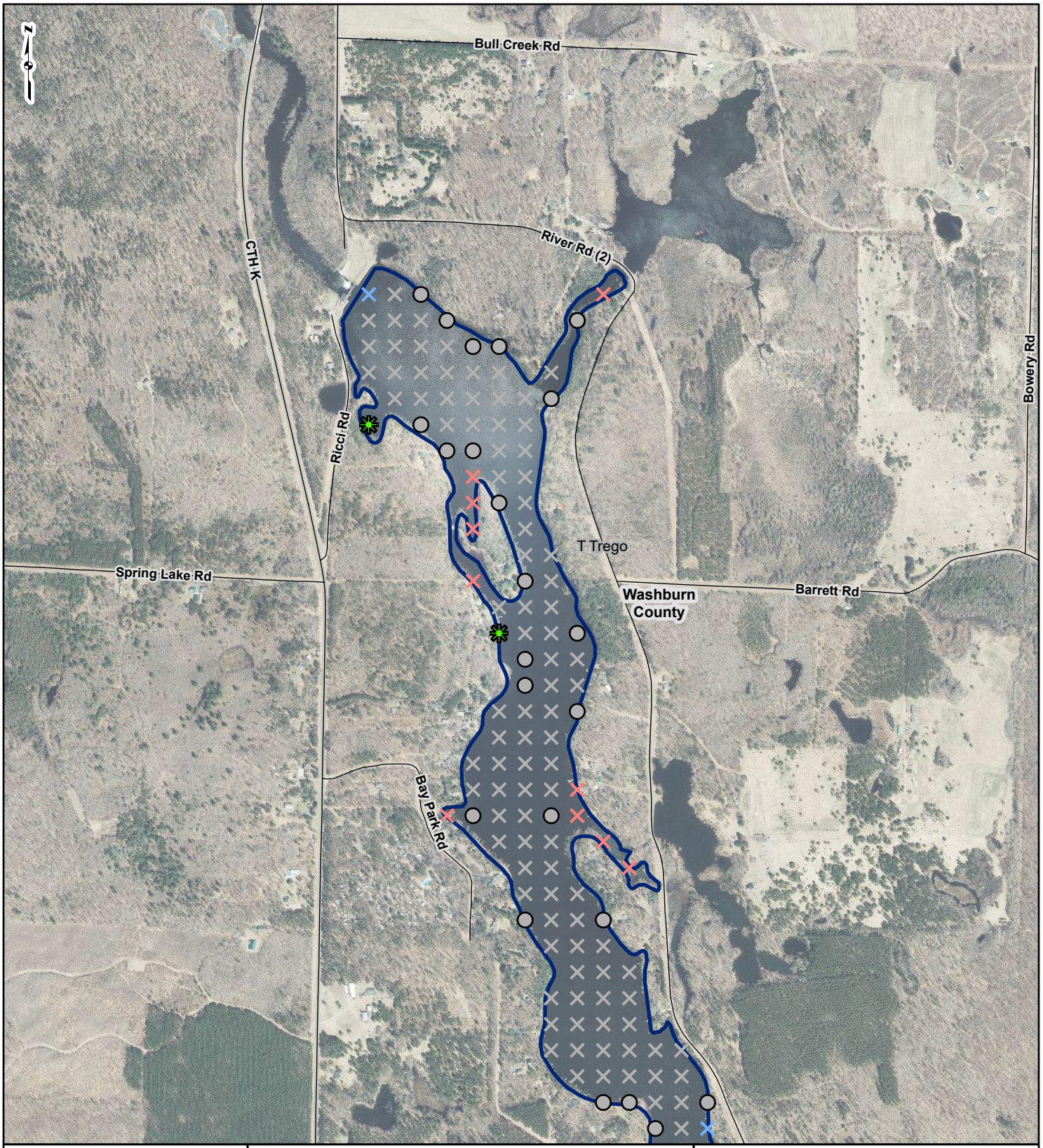
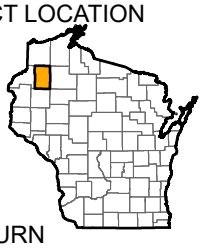
FIGURE 23
Trego July/Aug Aquatic Invasive Species



PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other
- No Invasives Present
- Curly-leaf pondweed
- Eurasian watermilfoil
- Point-Intercept Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 23
July/August
Aquatic Invasive Species
Sheet 1 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

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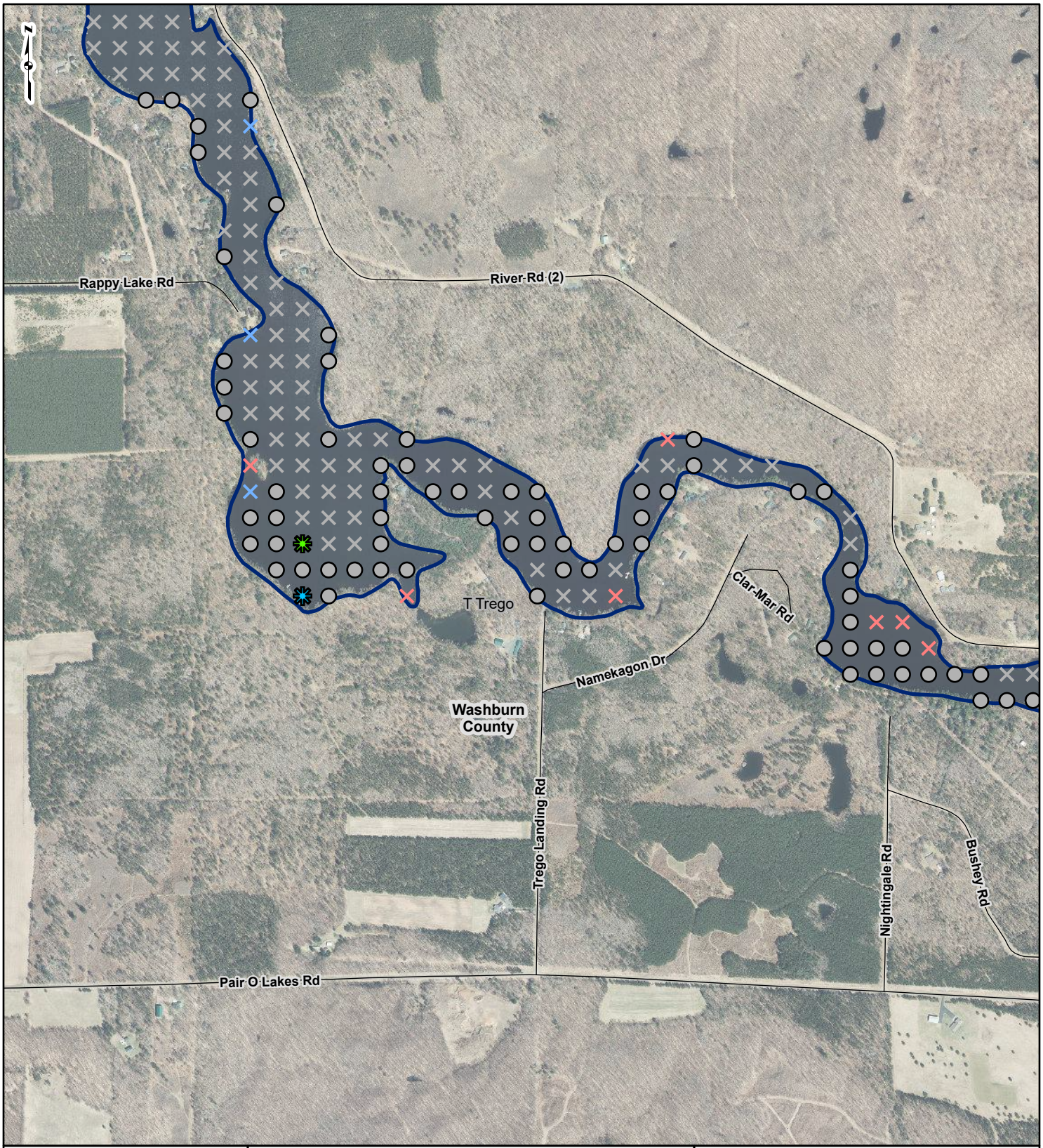

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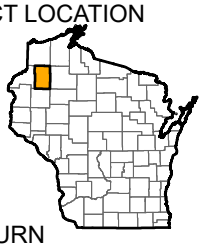

WASHBURN
COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
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- No Invasives Present
- Curly-leaf pondweed
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- Point-Intercept Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 23
July/August
Aquatic Invasive Species
Sheet 2 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

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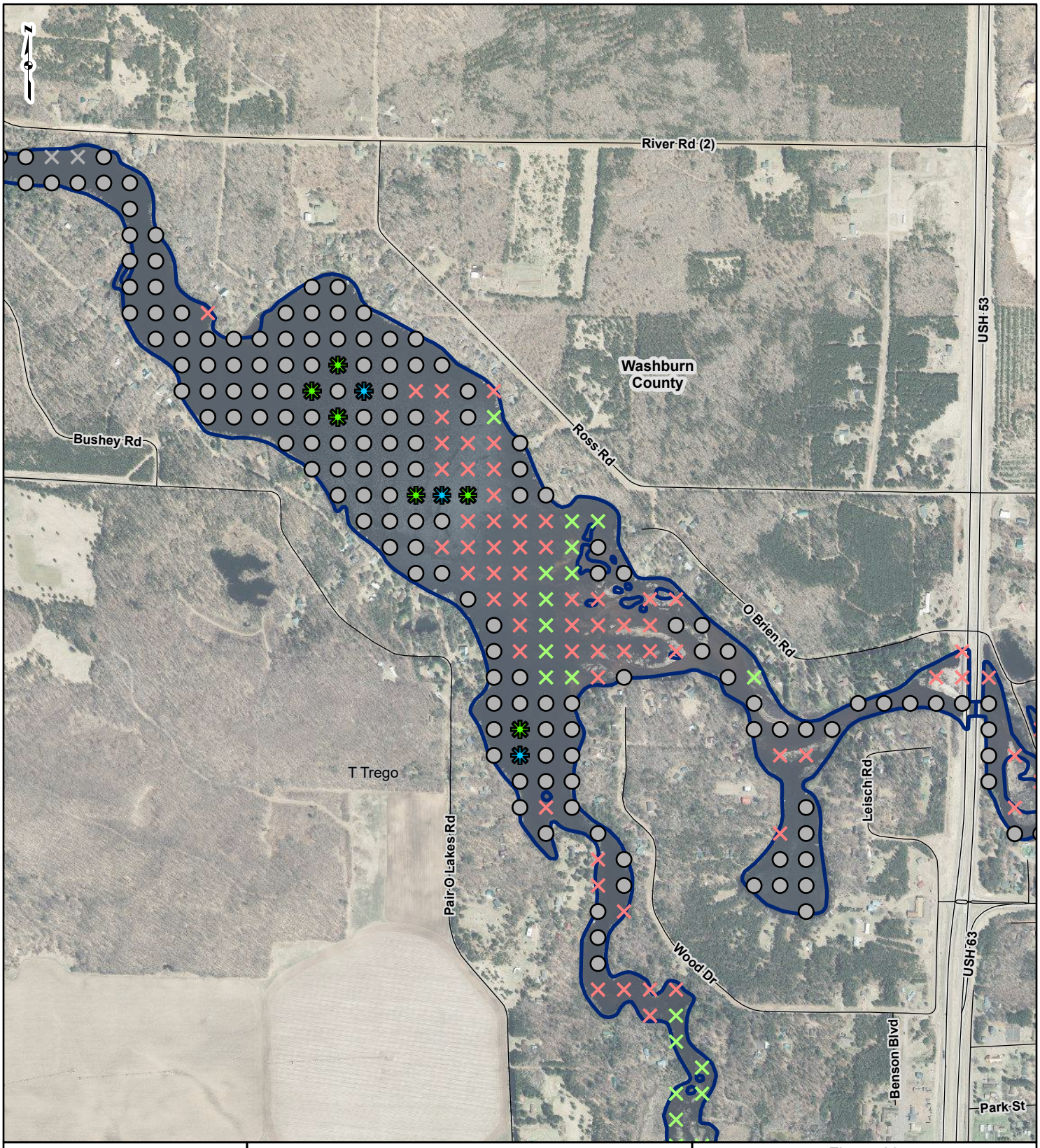

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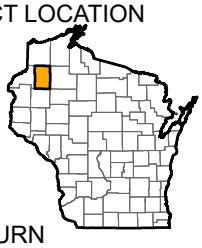

WASHBURN COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
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- County Boundary

0 500 1,000 2,000 Feet

Figure 23
July/August
Aquatic Invasive Species
Sheet 3 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

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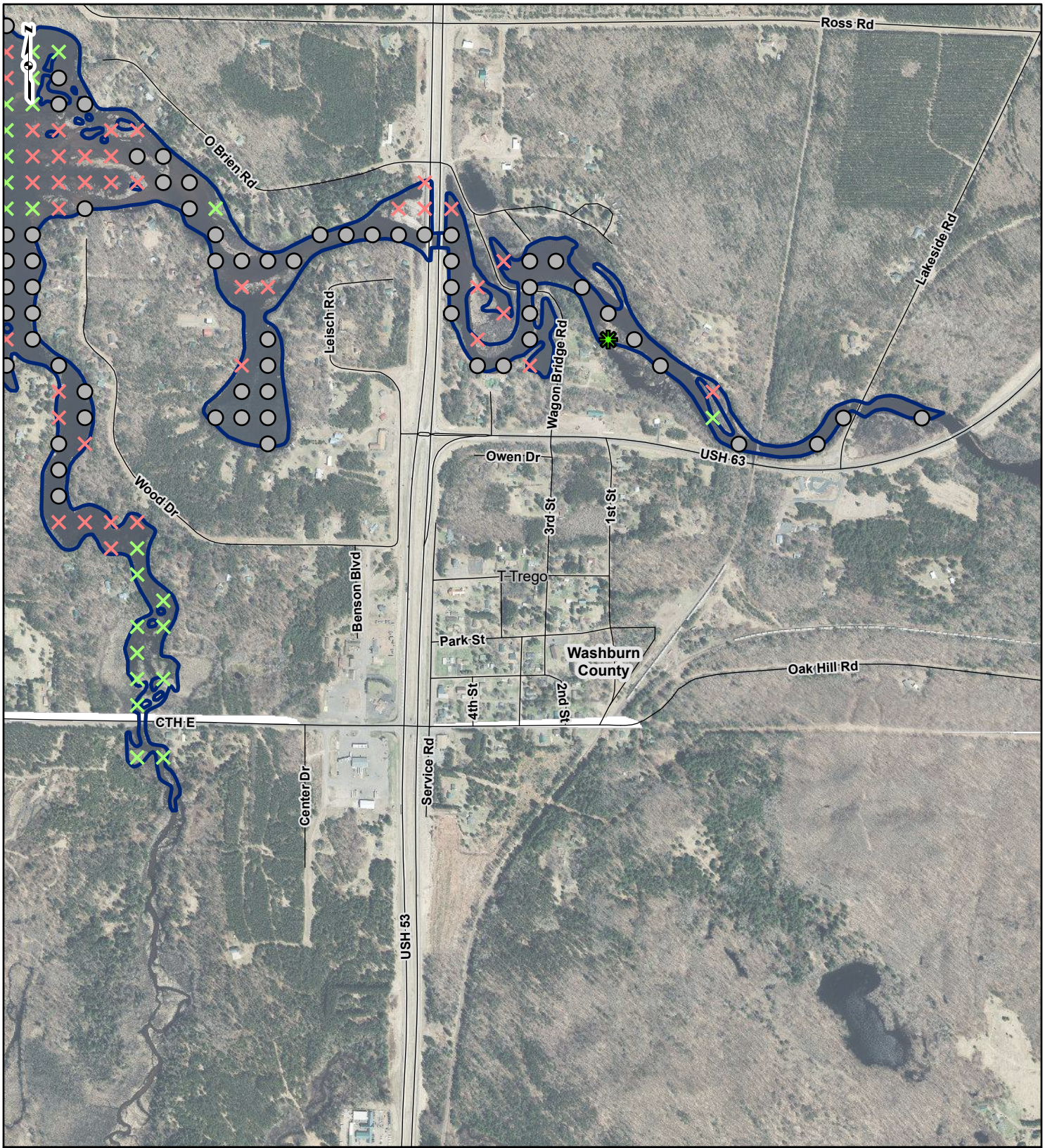
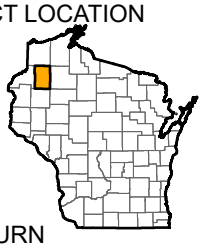


PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other
- No Invasives Present
- Curly-leaf pondweed
- Eurasian watermilfoil
- Point-Intercept Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 23
July/August
Aquatic Invasive Species
Sheet 4 OF 4

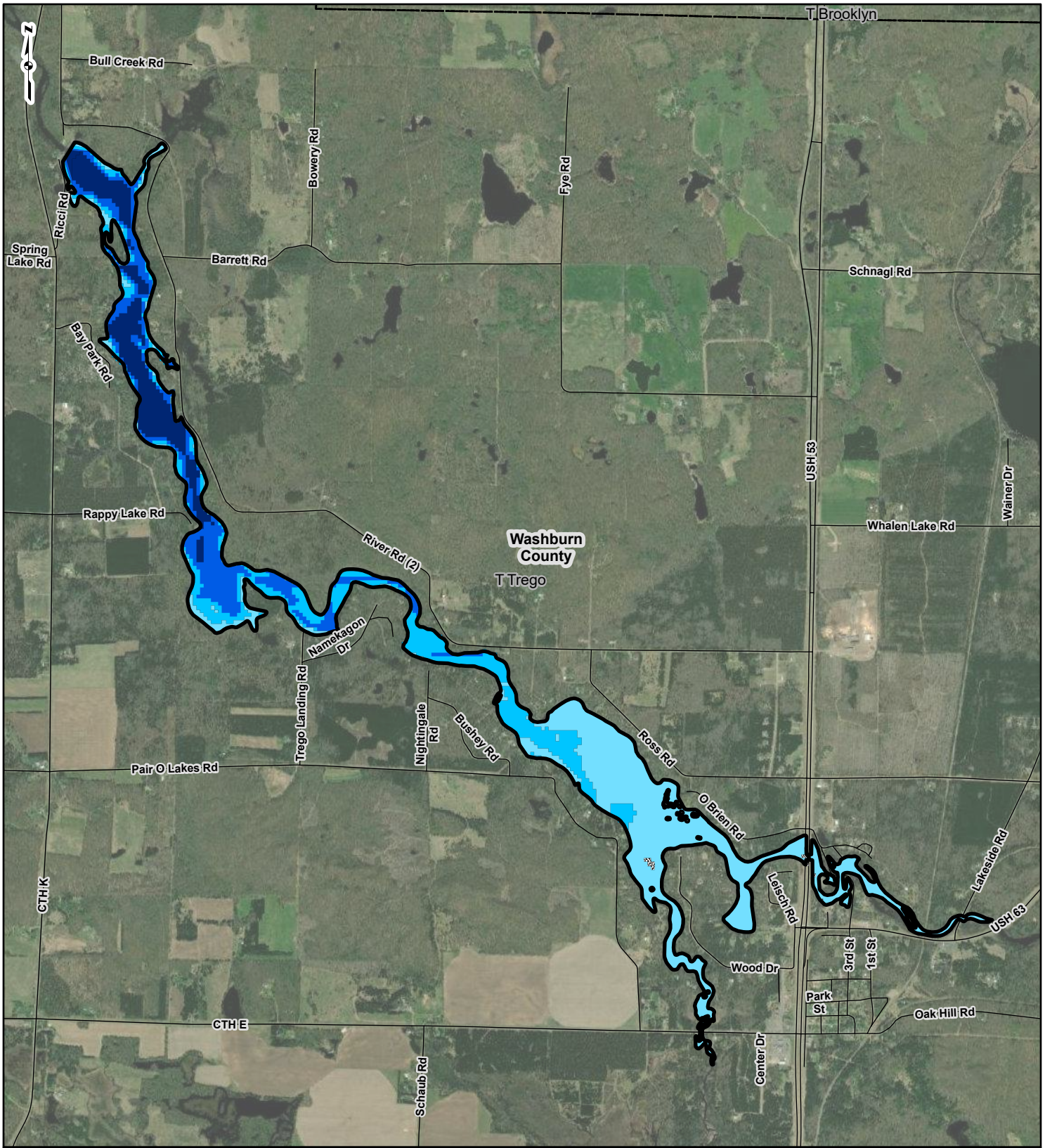
Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

DRAWN BY: EMW DATE: 10/27/2022
CHECKED: TDB APPROVED: LLS

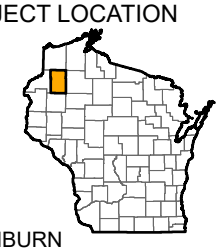
REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Trego\R220323_00_Trego_Inv_Mapping\R220323_00_Trego_Inv_Mapping.aprx

FIGURE 24
Trego Bathymetric Map



PROJECT LOCATION



WASHBURN
COUNTY, WISCONSIN

LEGEND

Depth
- 0 - 5 ft
- 5 - 10 ft
- 10 - 15 ft
- >15 ft

- Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 1,375 2,750 5,500 Feet

Figure 24
Trego Bathymetric Map

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

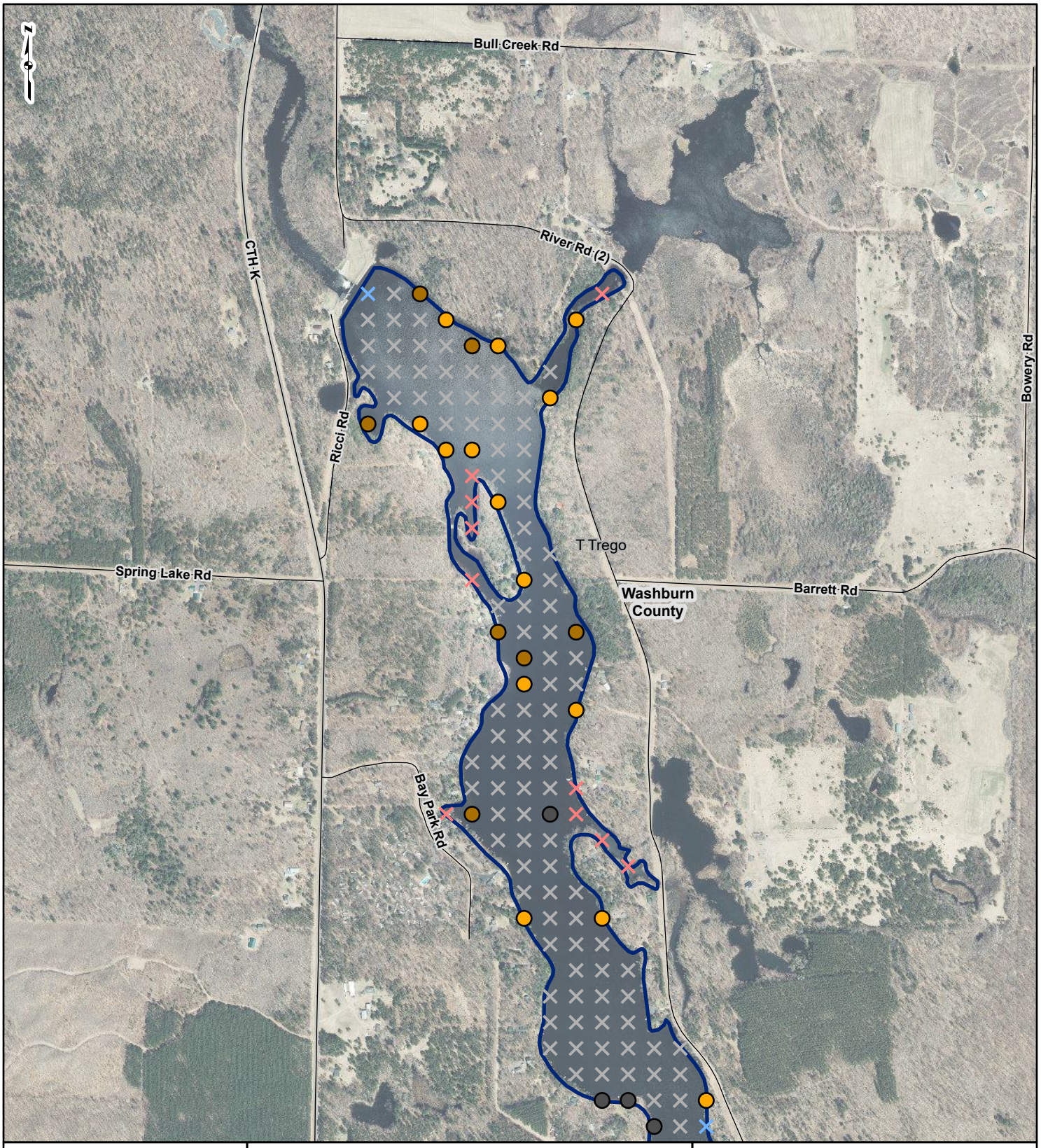
Mead & Hunt

DRAWN BY: EMW DATE: 10/27/22
CHECKED: TDB APPROVED: LLS

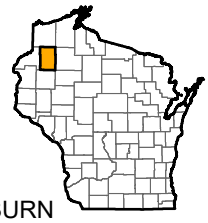
REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Depth_Mapping\R220323_Trego_Depth_Mapping\Depth\R220323_00_Trego_Depth_2022_10_27.aprx

FIGURE 25
Trego Substrate Types



PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

Deeper than Plant Growth
Non-Navigable Vegetation
Non-Navigable Terrestrial/ Shallow
Other

Dominant Substrate
Boulder
Cobble
Gravel
Organic
Sand
Silt

Pnt-Int. Proj Boundary
Road Centerline
Community Boundary
County Boundary

0 500 1,000 2,000 Feet

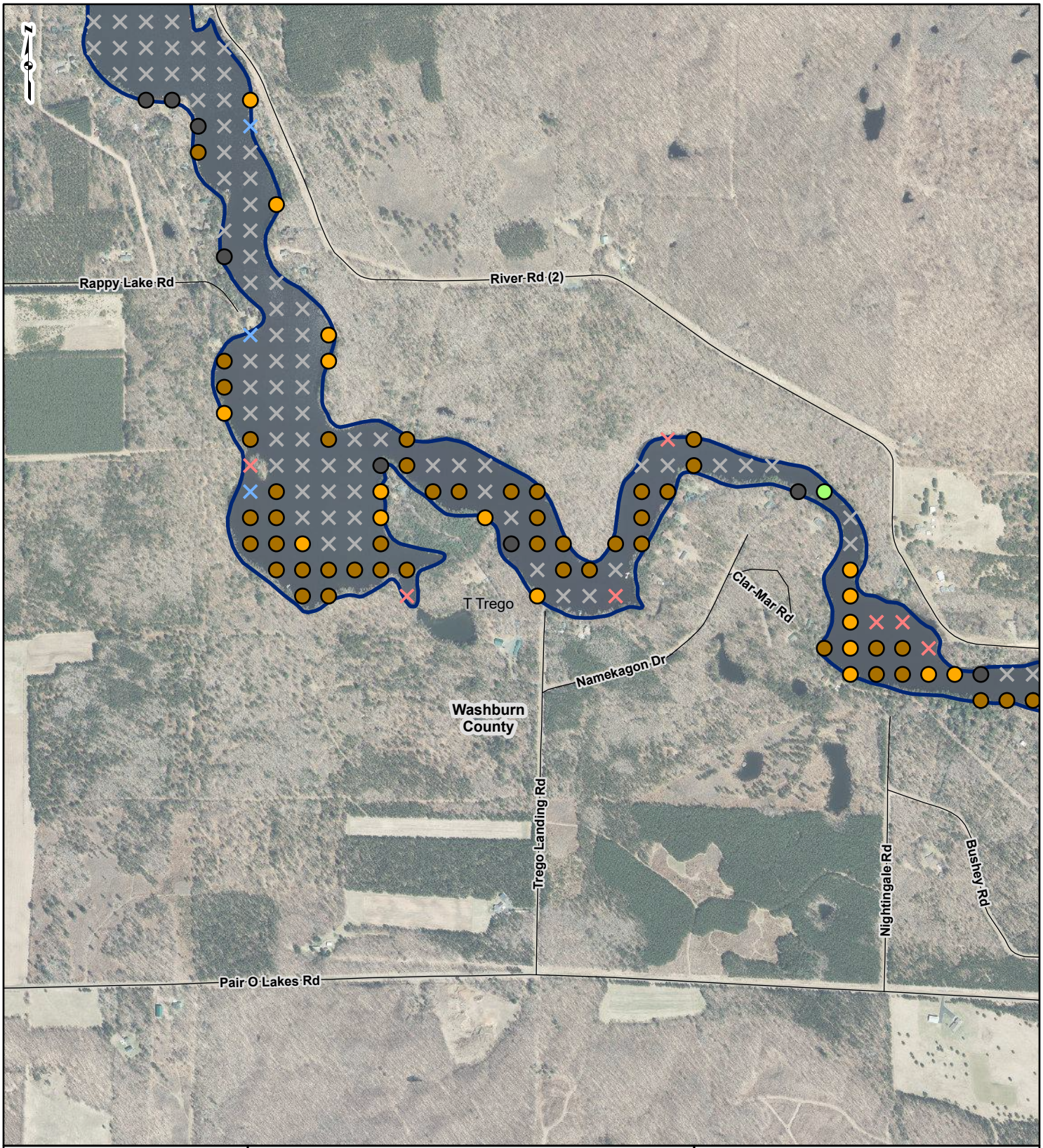
Figure 25
Substrate Types
Sheet 1 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

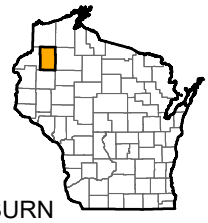
DRAWN BY: EMW DATE: 10/27/2022
CHECKED: TDB APPROVED: LLS

REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Trego\R220323_00_Trego_Inv_Mapping\R220323_00_Trego_Inv_Mapping.aprx



PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

Deeper than Plant Growth
Non-Navigable Vegetation
Non-Navigable Terrestrial/ Shallow
Other

Dominant Substrate
Boulder
Cobble
Gravel
Organic
Sand
Silt

Pnt-Int. Proj Boundary
Road Centerline
Community Boundary
County Boundary

0 500 1,000 2,000 Feet

Figure 25
Substrate Types
Sheet 2 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

DRAWN BY: EMW DATE: 10/27/2022
CHECKED: TDB APPROVED: LLS

REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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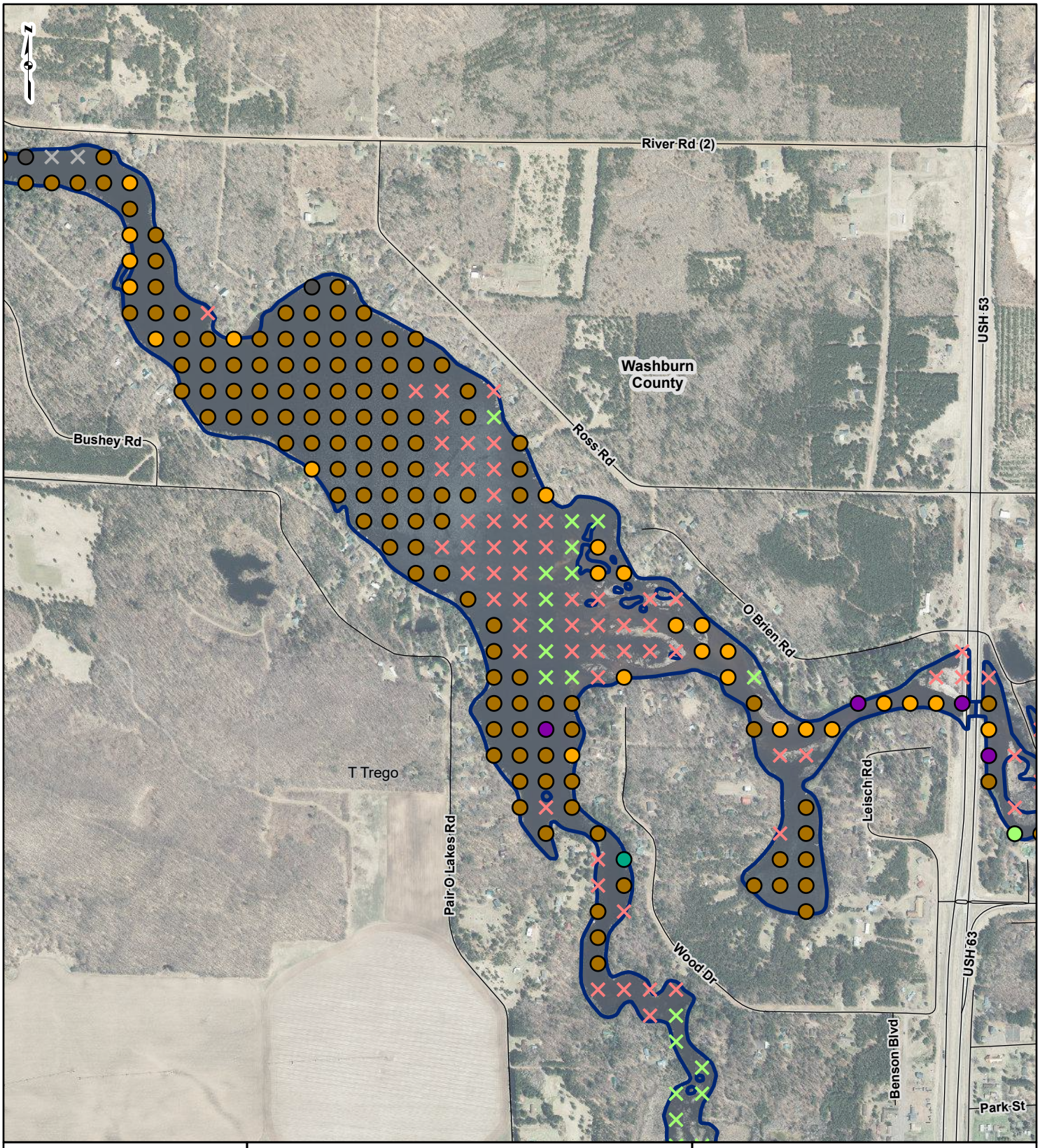
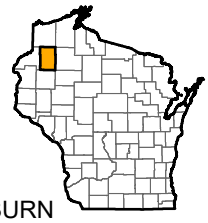


PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other

Dominant Substrate

- Boulder
- Cobble
- Gravel
- Organic
- Sand
- Silt

- Pnt-Int. Proj Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

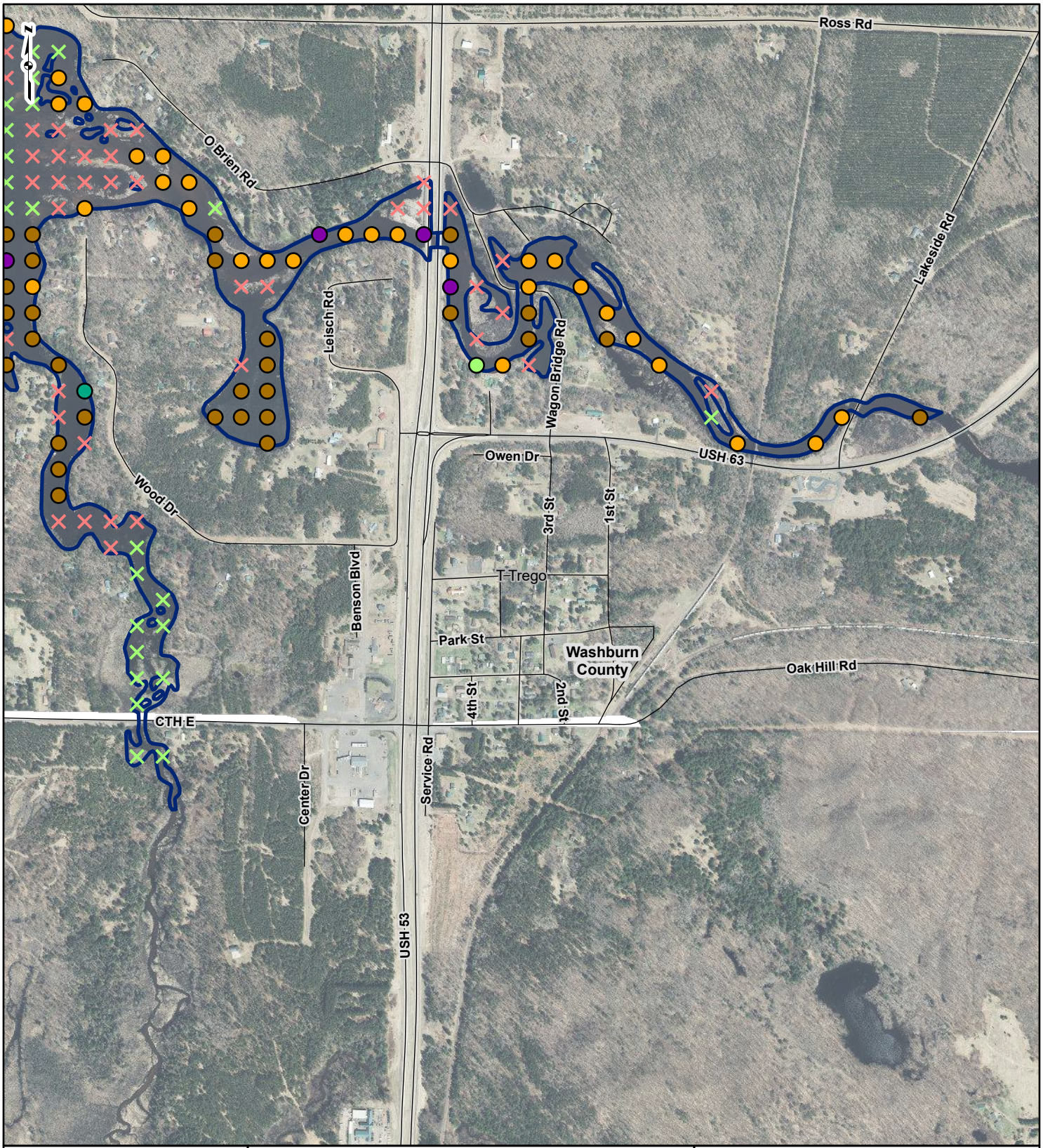
Figure 25
Substrate Types
Sheet 3 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

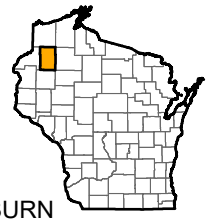
DRAWN BY: EMW DATE: 10/27/2022
CHECKED: TDB APPROVED: LLS

REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Trego\R220323_00_Trego_Inv_Mapping\R220323_00_Trego_Inv_Mapping.aprx



PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

Deeper than Plant Growth
Non-Navigable Vegetation
Non-Navigable Terrestrial/ Shallow
Other

Dominant Substrate
Boulder
Cobble
Gravel
Organic
Sand
Silt

Pnt-Int. Proj Boundary
Road Centerline
Community Boundary
County Boundary

0 500 1,000 2,000 Feet

Figure 25
Substrate Types
Sheet 4 OF 4

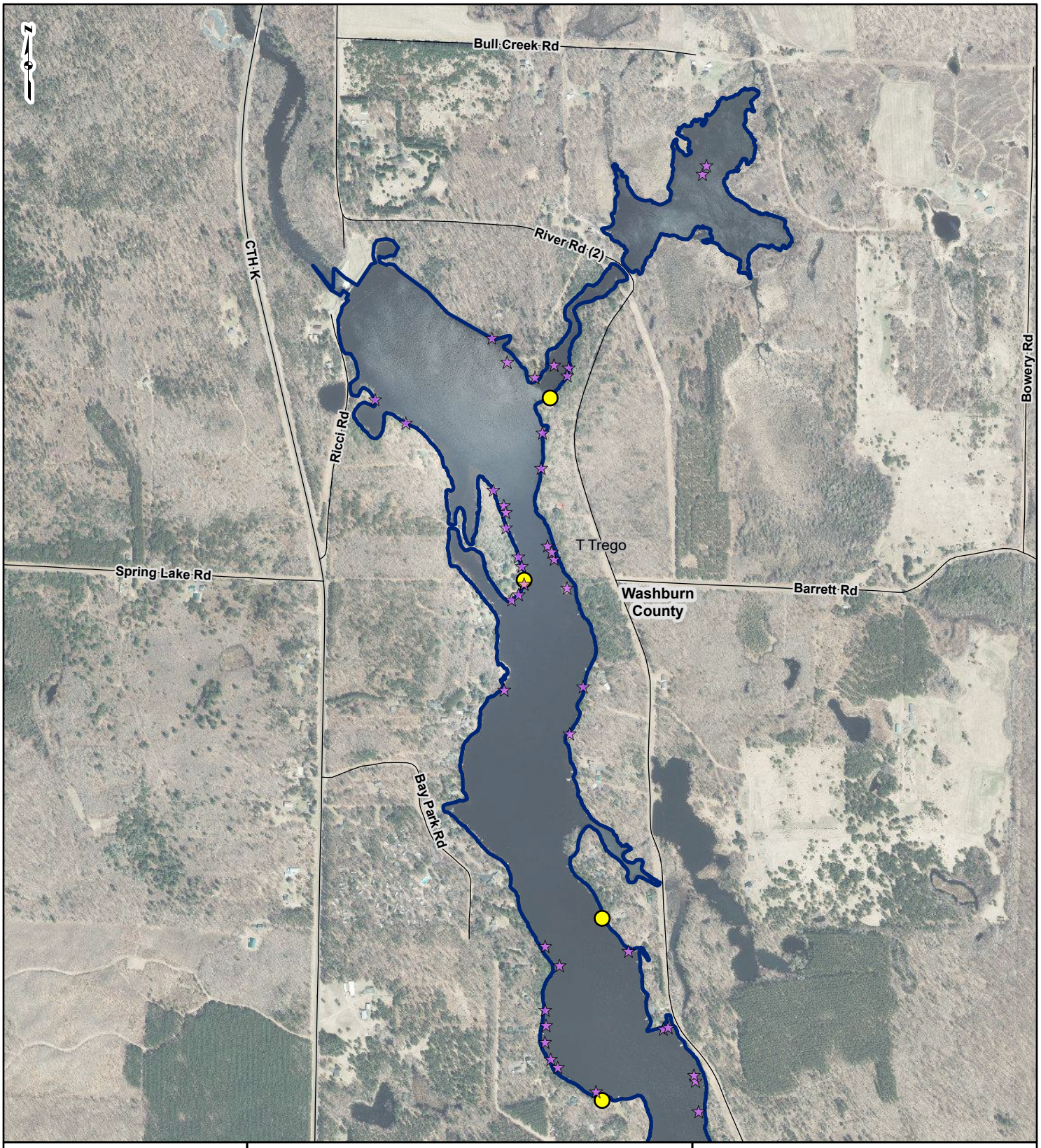
Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

DRAWN BY: EMW DATE: 10/27/2022
CHECKED: TDB APPROVED: LLS

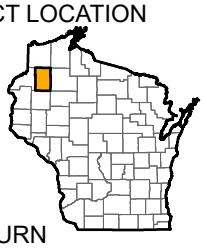
REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Trego\R220323_00_Trego_Inv_Mapping\R220323_00_Trego_Inv_Mapping.aprx

FIGURE 26
Trego Coarse Woody Debris/Habitat Map



PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

- Coarse Woody Habitat
- Coarse Woody Debris Present
- Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

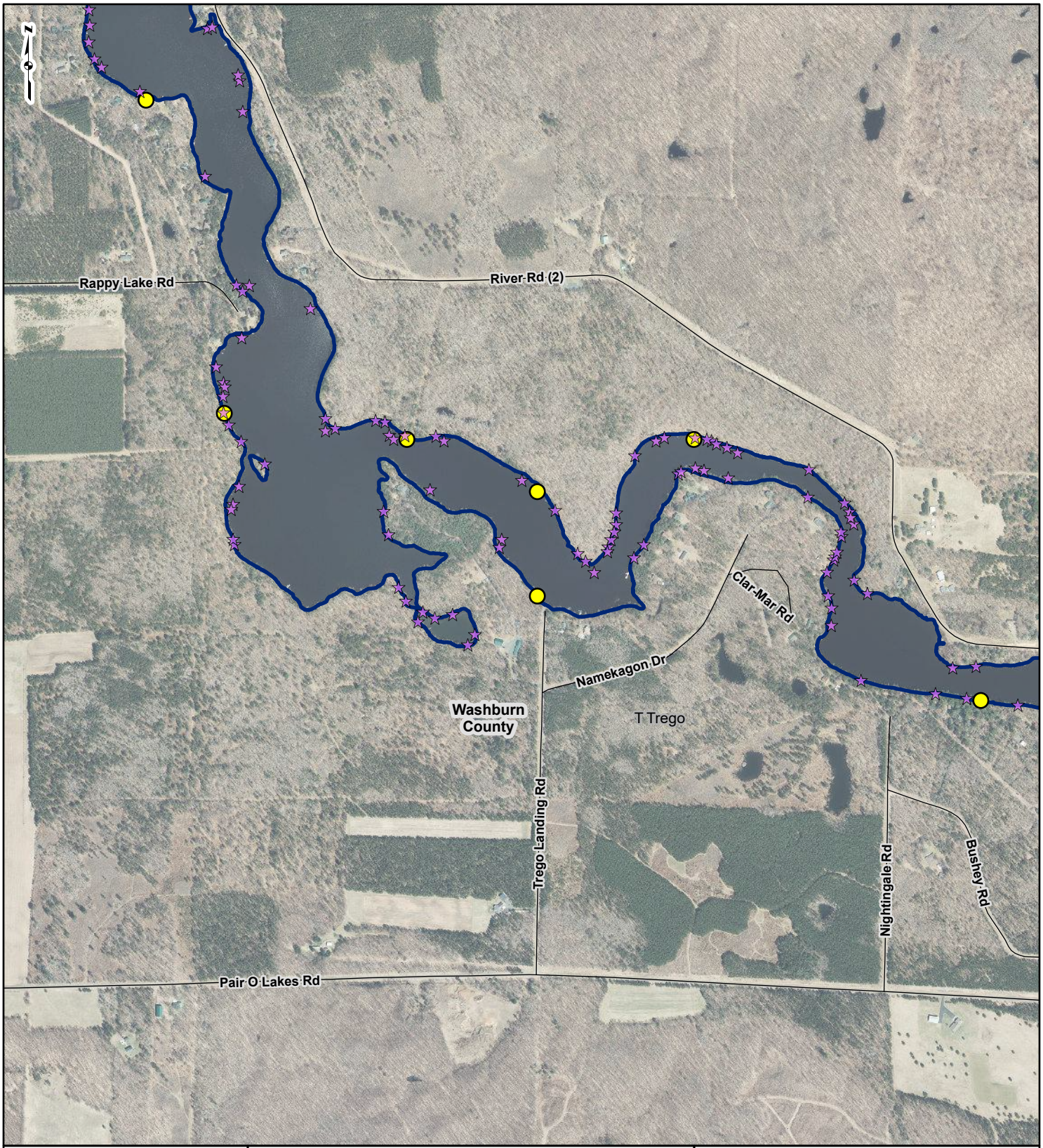
Figure 26
Coarse Woody Debris/Habitat
Sheet 1 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

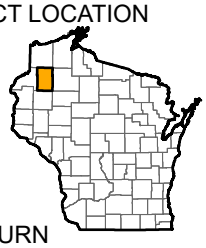
DRAWN BY: EMW DATE: 10/31/2022
CHECKED: TDB APPROVED: LLS

REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/31/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Trego\R220323_00_Trego_Inv_Mapping\VOID\R220323_00_Trego_Inv_Mapping_2022_10_30.aprx



PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

- Coarse Woody Habitat
- Coarse Woody Debris Present
- Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 26
Coarse Woody Debris/Habitat
Sheet 2 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

DRAWN BY: EMW DATE: 10/31/2022
CHECKED: TDB APPROVED: LLS

REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/31/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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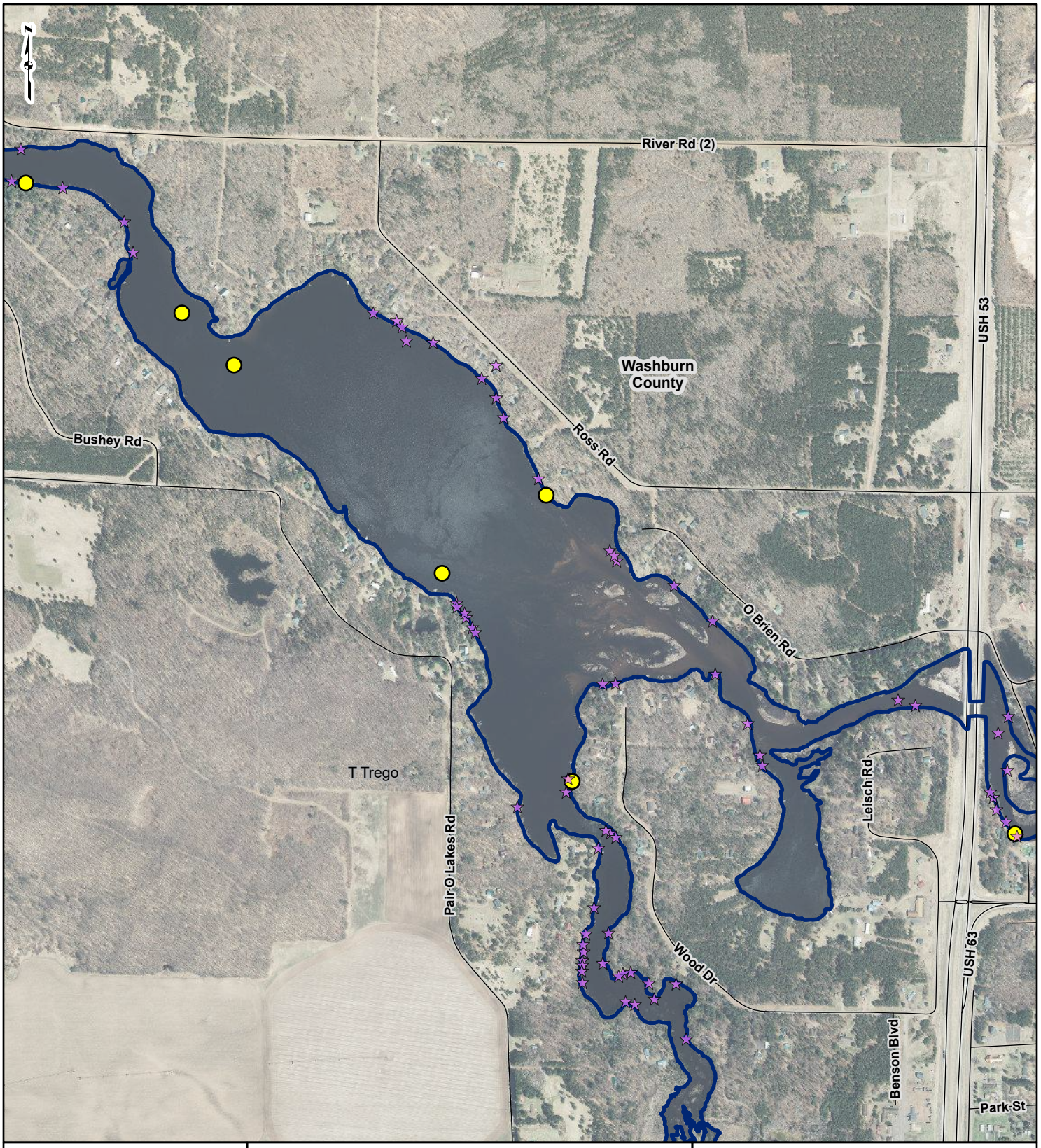

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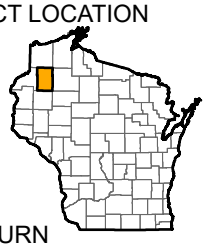


WASHBURN COUNTY, WISCONSIN

LEGEND

- Coarse Woody Habitat
- Coarse Woody Debris Present
- Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 26
Coarse Woody Debris/Habitat
Sheet 3 OF 4

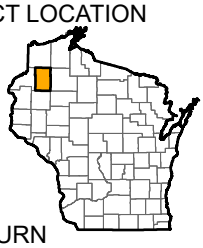
Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

DRAWN BY: EMW DATE: 10/31/2022
CHECKED: TDB APPROVED: LLS

REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/31/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Trego\R220323_00_Trego_Inv_Mapping\VOID\R220323_00_Trego_Inv_Mapping_2022_10_30.aprx

PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

- Coarse Woody Habitat
- Coarse Woody Debris Present
- Project Boundary
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

Figure 26
Coarse Woody Debris/Habitat
Sheet 4 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

Mead & Hunt

DRAWN BY: EMW DATE: 10/31/2022
CHECKED: TDB APPROVED: LLS

REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/31/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Trego\R220323_00_Trego_Inv_Mapping\VOID\R220323_00_Trego_Inv_Mapping_2022_10_30.aprx

ATTACHMENT A

Hayward Point-Intercept/AIS Survey
Field Data Sheets - June

yellow iris - many indiv and clumps of plant along shoreline.

freshwater sponge

Filamentous Algae

Waterbody/Project: Hayward

Date: 6/7/2022

Crew: Laura Sass, Heather Lutzow, ~~[illegible]~~

Sampling Point	Depth (ft)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	coarse woody debris (Y/N)	Ceratophylum demersum	Myriophylum sibiricum	Myriophylum spicatum	Sparganium eurycarpum	Potamogeton Richardsonii	Nymphaea odorata	Potamogeton ~~fresii~~ gramineus	Potamogeton zosteriformis	Potamogeton Robinsonii	Elodea Canadensis	~~Bidens Beckii~~ Valisneria Americana	Nuphar variegata	Lemna Trisulca	~~Nitella~~ Chara	P. crispus	Heteranthera dubia
254	>10	—	—	—	—	—																
285	5.5	R	R	Cobble	0	N																
286	>10	—	—	—	—	—																
317	past dam	bouy's		—	—	—																
318	4	S	R	sand	0	wood pilings	note - Lots Chinese mystery snails															
255	>10	—	—	—	0	—																
256	9.6	R	R	Gravel	0																	
224	>10	—	R	—	—	—																
197	5.6	S	R	sand	0	N																
288	>10	—	—	—	—	—																
199	2.0	S	R	sand	1	N	1	1	V	1	V											
142	too deep		—	—	—	—																
170	Terrestrial		—	—	—	—																
143	too deep		—	—	—	—																
147	5.2	S	R	Sand	0	Y Logs																
119	3.0	S	R	Sand	0	Y small stuff						V	N									
120	7.5	S	R	Sand	0	Y																
104	0.5	S	R	Sand	0	N																
97	5.0	S	R	Sand	1	N					1											
76	5.0	M	R	org	1	N			V					V	1	1	1					
105	4.0	M	R	org	1	N			V				1	1	1	1		V	1	1	1	1
75	1.9	S	R	sand	1	N				V	V	V		1	1	V						1
64	4.4	M	R	org	1	N			V							1						1
55	5.5	M	R	org	2	N	1			1			1	1	1	1	1					
45	8.0	M	R	org	2	N	1		2							2					1	
46	8.5	M	R	org	2	N	2		1					1		1						
47	9.0	M	R	org	3	N														3		
37	10.0	M	R	org	3	N														3		

Lake association
Todd Heidi
President Sec/Treas
815-621-0347

PI done last year

Waterbody/Project: Hayward Date: 6/7/2022
Crew: Laura Sass + Heather Lutzow

Sampling Point	Depth (ft) CWD Y/N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Ceratophyllum demersum / Myriophyllum spicatum	M. sibiricum / Potamogeton crispus	Elodea canadensis / Nitella	Heteranthera dubia / P. zosteriformis	Nymphaea odorata / Nuphar variegata	P. Robinsii / P. amplifolius	Lemna trisulca / Bidens beckii	P. praelongus / Sagittaria spp	P. epihydrus / P. friesii	P. gramineus / Chara	Vallisneria americana						
239	7.5 Y	M	R	muck	1				1							1						
240	1.5 N	S	R	muck	1				1													
329	6.0 N	M	R	muck	1				1			1				1						
330	7.0 N	M	R	muck	1				1			1				1						
273	11.0 N	M	R	muck	Ø																	
241	5.5 N	M	R	muck	2			1	2													
213	6.5 N	M	R	muck	2	2 1			1													
186	6.5 N	M	R	↓	1	1			1													
185	4.5 N	M	R		3	3					1											
159	3.5 N	M	R		2	1		2	1						1							
135	2.8 N	M	R		1	1			1	V												
160	6.8 N	M	R	↓	2	1					1											
159	2.5 N	M	R	muck	1	1 1	1	1			1	1										
161	4.9 N	M	R		3	1 1		1	1	V	3											
162	4.5 N	M	R		3	2		1		V	3											
137	2.7 N	M	R		1				1	V					1							
163	4.5 N	M	R		3	3		1	2	V												
164	3.4 N	M	R		3	1			1		3	1										
191	4.5 N	M	R		3			3	1		1	1										
190	5.3 N	M	R		3	3		1	1		1											
189	5.4 N	M	R		3	2		3	1		3											
188	6.5 N	M	R	↓	3	2 V		2	1		2											
187	5.9 N	M	R	muck	2	2		1			2	1										
214	5.6 N	M	R	muck	2	2		1			1											
242	6.5 N	M	R	muck	2	1 2			1													
274	10.1 N	M	R	muck	Ø																	
306	11.0 N	M	R	muck	Ø																	
349	6.3 Y	M	R	muck	1		1	1				1				1						

Waterbody/Project: Hayward Date: 6/7/2022
Crew: Laura Sass Heather Lutzow

Sampling Point	Depth (ft) CWD Y/N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic) muck	Total Rake Fullness	Ceratophyllum demersum	Myriophyllum sibericum	M. spicatum	Potamogeton crispus	Elodea canadensis	Nitella	Heteranthera dubia	P. zosteriformis	Nymphaea odorata	Nuphar variegata	P. Robinsii	P. amplifolius	Lemna trisulca	Bidens beckii	P. praelongus	Valisneria americana	P. epihydrus	P. fresii	P. graminea	Equisetum spp	Sparganium eurycarpum	Chara	Utricularia vulgaris	Brasenia schreberi	P. Richardsonii	Saggitaria spp
183	8.0 N	M	R	muck	1	1	1				1																				
182	8.6 N	M	R	muck	2	2							1					1		1											
181	9.0 N	M	R	muck	Ø																										
180	10.0 N	M	R	muck	1						1																				
179	10.4 N	M	R	muck	1						1																				
178	10.4 Y	S	R	sand	Ø																										
175	6.5 N	S	R	Sand	Ø																										
174	2.0 N	S	R	sand	1		1											1						1	1						
173	1.5 N	S	R	sand	1		V							V												1					
172	2.5 N	S	R	Sand	2							1									1						2				
149	3.5 N	M	R	muck	2	1										1															
148	2.8 N	M	R	muck	1	1								1			1	1													
171	1.5 Y	S	R	sand	1							1		1														1	✓		
200	1.5 Y	S	R	sand	1		1				1	1																			
201	4.4 N	S	R	Sand	1	1							1					1			1										
207	10.5 N	M	R	muck	1						1																				
208	7.6 N	M	R	muck	1								1							1											
209	8.5 N	M	R	muck	3	3				2			1																		
210	7.5 N	M	R	muck	1		1					1	1																		
211	8.1 N	M	R	muck	2						2																				
212	1.4 Y	S	R	sand	1																									1	
237	7.6 N	M	R	muck	1	1				1	1		1					1													
236	7.0 N	M	R	muck	1					1			1					1		1											
235	8.3 N	M	R	Muck	1						1		1																		
234	9.3 Y	M	R	muck	1								1																		
252	5.5 N	M	R	Muck	1		V									!															
226	2.5 N	M	R	muck	1							1		1		1		1													1
227	4.0 N	M	R	Sand	1	1							1					1									1				

Waterbody/Project: Hayward

Date: 6/7/2022

Crew: Laura Sass Heather Lutzow

Sampling Point	Depth (ft) / CWD Y/N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Ceratophyllum demersum / Myriophyllum spicatum	M. sibiricum / Potamogeton crispus	Elodea canadensis / Nitella	Heteranthera dubia / P. zosteriformis	Nymphaea odorata / Nuphar variegata	P. robbinsii / P. amplifolius	Lemna trisulca / Bidens beckii	P. praelongus / Vallisneria Americana	P. epihydrus / P. friesii	P. gramineus / Chara	Sagittaria spp / Eleocharis acicularis						
260	4.0 N	M	R	muck	1					V	1	1			1	1						
291	4.0 N	S	R	sand	1	1 1				V		1										
290	8.0 N	M	R	muck	1						1											
289	8.2 N	M	R	muck	1			1				1			1 1	1						
259	4.5 N	S	R	sand	1										1							
319	9.2 N	M	R	muck	2			2			1	L										
346	2.9 Y	M	R	muck	1	1		1			1											
292	2.2 N	S	R	sand	1				1						1	1						
293	3.4 N	S	R	sand	1	1								1	1							
294	4.4 N	M	R	muck	2			2	1							1						
320	2.6 N	S	R	sand	Ø																	
321	6.0 N	M	R	muck	2	1					2	1										
327	4.0 N	S	R	sand	1				1			1 1		1		1						
369	3.5 N	M	R	muck	1							1					(filamentous)					
368	1.7 N	S	R	sand	1				1	V												
388	2.6 Y	S	R	sand				1						1		1						
387	3.0 Y	M	R	muck	1				1	V				1	1							
348	2.5 N	M	R	muck	1						1	1										
322	1.6 Y	S	R	sand	1											1						
295	9.5 Y	S	R	sand	Ø																	
324	3.4 N	S	R	sand	1				1			1			1							
323	2.5 Y	S	R	sand	Ø	filamentous																
296	10.0 N	M	R	muck	Ø																	
299	3.5 N	S	R	sand	1										1							
326	2.8 Y	S	R	sand	Ø																	
328	8.5 N	S	R	sand	Ø																	
238	8.7 N	M	R	muck	1				1													
270	7.2 N	M	R	muck	1				1				1			1						

Waterbody/Project: Hayward

Date: 6/7/2022

Crew: Laura Jass + Heather Lutzow

Sampling Point	Depth (ft)		Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Ceratophyllum demersum	Myriophyllum spicatum	M. Sibiricum	Potamogeton Crispus	Elodea canadensis	Nitella	Heteranthera dubia	P. zosteriformis	Nymphaea Odorata	Nuphar Variegata	P. Robinsonii	P. amplifolius	Lemna trisulca	Bidens Beckii	P. praelongus	Valisneria Americana	P. epihydrus	P. friesii
125	8.3	N	M	R	Muck	1	1	1						1					1					
95	7.2	N	M	R		1																		
97	9.5	N	M	R		1						1												
96	9.8	N	M	R		1		1				1		1							1	1		
109	8.4	Y	M	R		1								1										
110	10	N	M	R		1						1												
111	8.4	N	M	R		1								1										
110	9.0	M	M	R		3						3												
98	8.5	N	M	R		3	3							1										
99	2.0	Y	S	R	sand	1								1										
113	4.5	N	S	R	sand	2	1				1								1				1	
114	3.2	N	M	R	muck	Ø																		
134	1.5	N	S	R	sand	1																1		1
133	4.6	N	S	R	sand	2			1		1			1						1				
132	9.4	N	M	R	muck	3					1	3												
131	9.0	N	M	R	muck	2		2						1										
130	9.0	M	M	R	muck	2	2				1			1										
129	8.5	N	M	R	muck	1		1			1			1										
128	9.5	Y	S	R	sand	Ø																		
150	4.3	N	S	R	sand	Ø																		
152	9.4	Y	S	R	sand	Ø																		
153	6.9	N	M	R	muck	2		2		1				1					1		1			
154	10	Y	M	R	muck	Ø																		
155	9	N	M	R		1	1	1				1		1							1			
156	7.5	M	M	R		2	2	1			1		1								1			
157	9.9	N	M	R		1					1	1		1										
158	5.6	N	S	R	Sand	1	1							1										
184	1.0	N	S	R	sand	Ø																		

69°
Partly Cloudy

Waterbody/Project: Hayward Date: 6/7/2022
Crew: Laura Sass Heather Lutzow

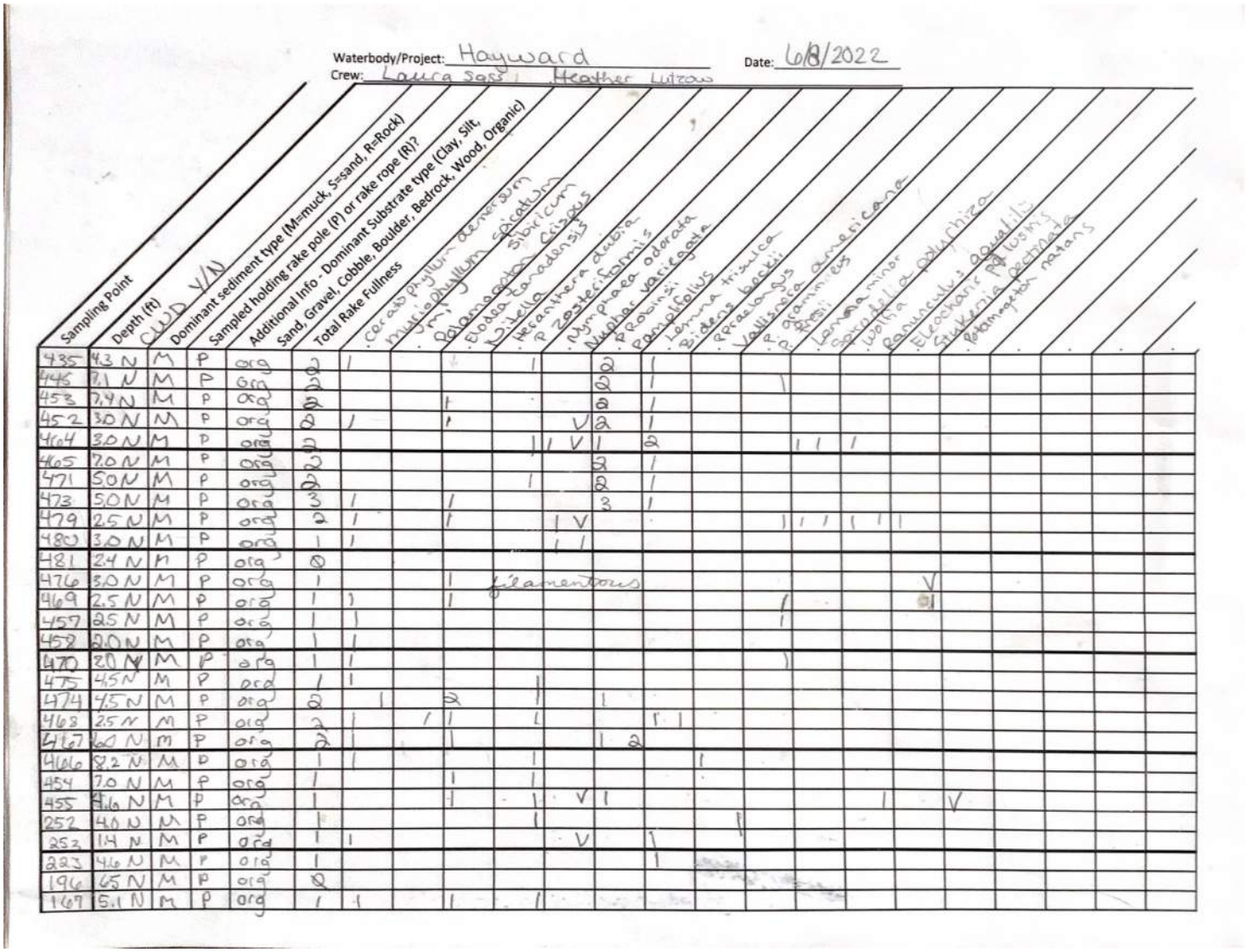
Sampling Point	Depth (ft)	CWD Y/N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Ceratophyllum demersum	Myriophyllum sibiricum	M. spicatum	Potamogeton crispus	Elodea canadensis	Nitella	Heteranthera dubia	P. zosteriformis	Sparganium	Nymphaea odorata	Nuphar variegata	P. Robbinsii	P. amplifolius	Lemna trisulca	Bidens Beckii	P. gramineus	Utricularia minor	Vallisneria Americana	P. praelongus	P. Spirillus	
32	6.5	N	M	R	org	3				1				1				3		1							
39	7.9	N	M	R	↓	2	2			1				1													
40	8.4	N	M	R		2				2		1															
48	9.4	N	M	R		2						2															
34	5.5	N	M	R		2	1											2	1								
42	4.4	N	M	R		1					1			1				1		1							
52	4.5	N	M	R		1	1				1							1		1							
51	9.0	N	M	R		1		1						1				1									
41	7.5	N	M	R		2		2		1																	
50	8.5	N	M	R		2	1	1						1				1									
49	9.1	N	M	R		1					1	1															
58	10.6	N	M	R	↓	Ø																					
90	4.5	N	S		sand	Ø																					
59	10.5	Y	S		sand	1	1																				
60	10.5	Y	S		sand	Ø																					
61	10.0	Y	S		sand	2						2															
62	9.5	Y	M		muck	1		1				1															
63	6.0	Y	S		sand	1																1	1				
74	5.9	Y	S		sand	1	1							1										1			
73	8.5	Y	S		sand	1		1		1				1										1			
72	7.8	Y	M		muck						1			1											1	1	
71	>11		-	-	-																						
36	4.0	Y	S		sand	1	1				1			1										1			1
85	8.5	N	M			1								1													
84	10	N	M		org							1		1													
83	11	Y	M		org	Ø																					
91	10.4	Y	S		sand	Ø																					
106	6.5	Y	S		sand	1		1		1			1	1	1									1		1	

Waterbody/Project: Howard

Date: 6/7/2022

Crew: Laura Jass, Heather L.

Sampling Point	Depth (ft)	CLP Y/N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Ceratophyllum demersum	Myriophyllum spicatum	Myriophyllum sibiricum	Potamogeton crispus	Elodea canadensis	Nitella	Heteranthera dubia	Potamogeton zosteriformis	Sparganium fluitans	Nymphaea odorata	Nuphar variegata	Potamogeton robbinsii	Potamogeton amplifolius	Lemna trisulca	Bidens beckii	Utricularia minor	Potamogeton friesii	Sparganium fluctuans	Potamogeton gramineus
56	9.7	N	M	R	org	3						3													
54	1.5	N	S	R	sand	2																			
53	1.2	N	S	R	sand	1							1	1	V	V									
43	2.1	N	S	R	Sand	1							1												
44	6.4	N	S	R	sand	2	1			1	2														
35	6.1	N	M	R	org	1					1						1								
36	6.5	N	M	R	org	2	2			1				1											
37	7.4	N	M	R	org	3	3			2															
38	8.3	N	M	R	org	2		2		1		1		1											
31	6.5	N	M	R	org	2	+	2			1			1				1							
30	5.9	N	M	R	org	2	2				1			1											
29	5.0	N	M	R	org	2	1	V			2							1							
28	2.8	N	M	R	org	2	1										1	1	1	1	1				
22	2.5	M	M	R	org	1	1										1				1				
23	4.0	N	M	R	org	3		1										3							
24	4.8	N	M	R		3	1				1							3							
19	3.5	N	M	R		3	2			1	1			1				3	1						
18	3.4	N	M	R		3					1							3			1				
17	2.3	N	M	R		3											1	3			1				
13	2.9	N	M	R		2	1		1		1					1		1	1	1		1			
14	2.5	N	M	R		3					1							3							
15	2.5	N	M	R		2		2		1	1			1									1	1	
21	3.0	N	M	R		2												2							
20	3.5	N	M	R		2	1				1			1											
25	5.0	N	M	R		2			1		2			1											
26	3.0	N	M	R		2			1		1			1				1							
27	4.2	N	M	R		1												1							
33	2.5	N	M	R		2	1	V		1				1											1



Waterbody/Project: Hayward Date: 6/8/2022
Crew: Laura Sass, Heather Lutzow

Sampling Point	Depth (ft)	CWD Y/N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Ceratophyllum demersum	Myriophyllum sibiricum	Myriophyllum spicatum	Potamogeton crispus	Elodea canadensis	Najas flexilis	Vallisneria americana	Nymphaea odorata	Nuphar variegata	Potamogeton richardsonii	Potamogeton pusillus	Lemna trisulca	Brasenia schreberi	Vallisneria americana	P. gramineus	P. praelongus	Lemna minor	Spirodela polyrhiza	Wolffia	Ranunculus aquatilis	Eleocharis palustris	Stuckenia pectinata	Potamogeton natans				
435	4.3 N	M	P	org		2	1							2	2	1																	
446	9.1 N	M	P	org		2				1				2		1				1													
453	7.4 N	M	P	org		2			1					2		1																	
452	3.0 N	M	P	org		2	1		1				V	2		1																	
464	3.0 N	M	P	org		2				1		V	V	1	2						1	1	1										
465	7.0 N	M	P	org		2								2		1																	
471	5.0 N	M	P	org		2				1				2		1																	
473	5.0 N	M	P	org		3	1		1					3		1																	
479	2.5 N	M	P	org		2	1		1				V								1	1	1		1	1							
480	3.0 N	M	P	org		1	1						1																				
481	2.4 N	M	P	org		0																											
476	3.0 N	M	P	org		1				1	filamentous															V							
469	2.5 N	M	P	org		1	1			1											1					1							
457	2.5 N	M	P	org		1	1														1											
458	2.0 N	M	P	org		1	1																										
470	2.0 N	M	P	org		1	1														1											
475	4.5 N	M	P	org		1	1																										
474	4.5 N	M	P	org		2		1		2		1		1																			
468	2.5 N	M	P	org		2	1		1	1		1				1	1																
467	2.0 N	M	P	org		2	1			1				1	2																		
466	8.2 N	M	P	org		1	1				1						1																
454	7.0 N	M	P	org		1			1		1																						
455	9.6 N	M	P	org		1			1		1		V	1									1			V							
252	4.0 N	M	P	org		1					1							1															
253	1.4 N	M	P	org		1	1						V			1																	
223	4.6 N	M	P	org		1										1																	
196	6.5 N	M	P	org		2																											
469	5.1 N	M	P	org		1	1			1		1																					

Waterbody/Project: Hayward Date: 6/8/2022

Crew: Laura Sass Heather Ludrow

Sampling Point	Depth (ft)	CLOD Y/N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Ceratophyllum demersum	Myriophyllum spicatum	Potamogeton crispus	Elodea canadensis	Vallisneria americana	Heteranthera dubia	Najas flexilis	Nymphaea odorata	Nuphar variegata	P. zosteriformis	P. pusillus	P. amplifolius	Lemna trisulca	P. praelongus	P. gramineus	P. foliosus	Lemna minor	Spirodela polyrhiza	Wolffia	Sparganium eurycarpum	P. richardsonii	P. natans					
141	2.0	N	M	P	org	2			2																								
118	0.8	N	M	P	org	1																											
101	2.0	Y	M	P	org	1																											
100	3.3	N	M	P	org	1			1		1																						
115	2.5	Y	M	P	org	1					1																						
139	2.4	N	M	P	org	1																											
140	3.2	N	M	P	org	1			1		1																						
116	7.5	N	S	P	sand	0																											
117	4.1	N	M	P	sand	0	1		2		1																						
116c	7.2	N	M	P	org	0																											
165	6.5	N	M	P	org	0																											
222	5.5	N	M	P	org	1					1																						
221	1.8	V	S	P	sand	1															1				1								
251	3.5	N	M	P	org	1					1			1																			
250	3.0	N	M	P	org	1												1															
581	4.0	N	M	P	org	1	1		1		1																						
315	9.5	N	M	P	org	0																											
436	6.4	N	M	P	org	1									1																		
437	2.9	N	M	P	org	2		1	1		V	V	2																				
438	4.0	N	M	P	org	2	1		1				2														1						
439	3.5	N	M	P	org	2	2		1				1		1												1						
437	6.5	N	M	P	org	1				1			1																				
448	2.6	N	M	P	org	2	1				1	V	1		1																		
447	5.0	N	M	P	org	2	1		2																								
446	9.6	N	M	P	org	1	1														1												

Waterbody/Project: Hayward Date: 6/8/2022
Crew: Laura Sass Heather Lutzow

Sampling Point	Depth (ft)	CLDP Y/N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Ceratophyllum demersum / Myriophyllum spicatum	M. sibiricum / Potamogeton crispus	Elodea canadensis / Nitella	Heteranthera dubia / P. zosteriformis	Nymphaea odorata / Nuphar variegata	P. robinsii / P. amplifolius	Lemna trisulca / Bidens beckii	P. praelongus / Vallisneria americana	Repifhydrus / P. friesii	P. gramineus / Sparganium eurycarpum						
374	5.6	N	M	R	org	1	1						1			1						
354	9.1	N	M	R	org	Ø																
336	9.5	N	M	R	org	Ø																
279	4.6	N	M	R	org	1	1		1	1				1								
380	4.0	N	M	R	org	1			1	1		1	1									
312	10.8	N	M	R	org	Ø																
337	10.0	N	M	R	org	1	1		1					1								
355	4.8	N	M	R	org	Ø																
375	4.8	N	M	R	org	1			1						1							
389	5.1	N	M	R	org	2			1	1		2										
403	4.9	N	M	R	org	2			1			2	1		1							
406	3.9	Y	S	R	Sand	1	1		1	1			1	1								
404	3.5	N	M	R	org	3			3	1												
390	10.5	N	M	R	org	Ø																
376	9.0	N	M	R	org	1	1								1							
356	9.1	N	M	R	org	Ø																
338	9.6	N	M	R	org	Ø																
339	5.0	N	M	R	org	3			3													
357	8.5	N	M	R	org	Ø																
377	7.9	N	M	R	org	Ø																
391	9.6	N	M	R	org	1							1									
405	5.8	N	M	R	org	1	1 V		1				1	1								
417	5.1	N	M	R	org	2	1		1	1		2	1 1									
430	1.3	N	S	R	sand	1					V		1				1					
418	5.0	N	M	R	org	2				1		2	1									
406	7.3	N	M	R	org	1				1												
392	8.1	N	M	R	org	Ø																
378	8.4	N	M	R	org	Ø																

Waterbody/Project: Hayward

Crew: Laura Sass Heather Lutzow

Date: 6/8/2022

Sampling Point	Depth (ft)	CWD Y/N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Ceratophyllum demersum	Myriophyllum spicatum	M. sibiricum	Potamogeton crispus	Elodea canadensis	Nitella	Heteranthera dubia	P. zosteriformis	Nymphaea odorata	Nuphar variegata	P. Robinsii	P. Amplifolius	Lemna trisulca	Bidens beckii	P. praelongus	Vallisneria Americana	P. epihydrus	P. friesii	P. pusillus	
270	23	Y	S	R	sand	1		1			1			1			1		1							
350	11.0	N	M	R	org	Ø																				
332	10.8	N	M	R	org	Ø																				
307	10.3	N	M	R	org	1						1							1							
275	10.1	N	M	R	org	1						1														+filamentous algae
243	8.5	N	M	R	org	1																			1	
215	7.5	N	M	R	org	2	1	2			1			1												
216	5.4	N	M	R	org	3	1	1			2			1												
244	7.9	M	M	R	org	2	2				1			1					1							
276	9.5	N	M	R	org	1													1							
308	9.6	N	M	R	org	Ø																				
333	10.3	N	M	R	org	Ø																				
351	10.8	N	M	R	org	Ø																				
375	2.1	Y	S	R	sand	1	1							1					1							
372	4.0	N	S	R	sand	1	1										1		1	1		1		1		
334	10.0	N	M	R	org	Ø																				
209	5.5	N	M	R	org	1	1	1			1			1			1		1			1				
277	5.5	N	M	R	org	1					1			1			1		1			1				
245	7.1	N	M	R	org	2				2	2			1					1							
217	5.4	N	M	R	org	1	1	1						1					1							
218	5.2	N	M	R	org	2	1	1			2			1			2		1							
219	4.0	N	M	R	org	2	1				2						1		1							
212	1.8	N	M	R	org	2								1			1		2							
248	3.0	N	M	R	org	1													1			1				
247	6.3	N	M	R	org	3	3	V									2		1							
246	5.1	N	M	R	org	2		1			1			1			1	1	1			1				
278	5.6	N	M	R	org	1					1			1					1			1				
375	4.4	N	M	R	org	1	1				1			1			1		1							

Calla palustris growing along shore

Waterbody/Project: Hayward

Date: 6/8/2022

Crew: Laura Sass Heather Lutzow

Sampling Point	Depth (ft)	CWD Y/N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole [redacted] (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Ceratophyllum demersum	Myriophyllum spicatum	M. sibiricum	Potamogeton crispus	Elodea canadensis	Nitella	Heteranthera dubia	P. zosteriformis	Nymphaea odorata	Nuphar variegata	P. robbinsii	P. amplifolius	Lemna trisulca	Bidens beckii	P. praelongus	Vallisneria americana	Lemna minor	Spirodela polyrhiza	Wolffia spp.	Sparganium eurycarpum	Sparganium spp.	Ranunculus aquatilis	P. Rissii					
358	8.8	N	M	R	org	Ø																												
340	4.4	N	M	R	org	1					1																							
314	1.1	N	S	R	sand	2											1		2	1			1	1	1	1								
341	5.3	N	M	R	org	1		1			1			1					1															
359	8.6	N	M	R	org	Ø																												
379	6.0	N	M	R	org	1					1																							
393	6.1	N	M	R	org	1							1	1					1															
407	7.1	N	M	R	org	1													1			1												
419	4.8	N	M	R	org	1								1					1			1												
431	5.2	N	M	R	org	2					2			1			2																	
441	1.9	N	M	R	org	2								1	1		2			1								1						
442	1.5	N	S	R	sand	1													1															
432	5.0	N	M	R	org	2	1				2						2																	
420	6.3	N	M	R	org	1	1												1			1												
408	6.5	N	M	R	org	Ø																												
394	5.1	N	M	R	org	2	1			1	1			2																				
380	6.4	N	M	R	org	Ø																												
360	8.5	N	M	R	org	1																							1					
342	4.9	N	M	R	org	2	1							1			1		1															
361	7.8	N	M	R	org	Ø																												
381	5.8	N	M	R	org	1							1	1					1															
395	4.6	N	M	R	org	1								1					1															
409	7.0	N	M	R	org	2						2																						
421	4.8	N	M	R	org	3	1				3																		1					
433	4.8	N	M	R	org	3	1							1			3		1															
447	1.5	N	M	R	org	2	1						1	1	1		1		1			1												
434	1.5	Y	S	R	sand	2											1		2															
422	2.1	N	S	R	sand	2							1	1			1		1															

Waterbody/Project: Hayward Date: 6/8/2022

Crew: Laura Sass Heather Lutzow

Sampling Point	Depth (ft)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Ceratophyllum demersum	Myriophyllum sibiricum	Myriophyllum spicatum	Potamogeton crispus	Elodea canadensis	Najas	Heteranthera dubia	P. zosteriformis	Nymphaea odorata	Nuphar variegata	P. Robbinsii	P. amplifolius	Lemna minuta	Bidens beckii	P. praelongus	Vallisneria americana	P. strictifolius	Lemna minor									
410	4.8 N	M	P	org	3	1			3																							
396	5.5 N	M	P	org	1				1	1						1		1														
382	5.5 N	M	P	org	0																											
362	8.0 N	M	P	org	0																											
363	6.5 N	M	P	org	0																											
383	7.0 N	M	P	org	0																											
397	4.0 N	M	P	org	1	1					1	1		1																		
311	4.9 N	M	P	org	3	1			2					3		1																
398	8.0 N	M	P	org	1		1		1					1		1																
384	10.0 N	M	P	org	1				1	1						1																
364	10.0 N	M	P	org	0																											
343	3.5 N	M	P	org	1															1												
344	6.3 N	M	P	org	1											1																
5165	5.8 N	M	P	org	1				1	1						1																
385	6.5 N	M	P	org	1	1			1																							
399	8.3 N	M	P	org	0																											
413	6.8 N	M	P	org	2	2				1			1																			
424	6.4 N	M	P	org	3	3			1				2	1																		
282	7.0 N	M	P	org	0																											
316	3.6 N	M	P	org	1	1				1						1				1												
345	6.9 N	M	P	org	1	1			1							1				1												
346	6.8 N	M	P	org	3				3	1																						
386	5.6 N	M	P	org	1	1			1	1			1	1																		
400	5.0 N	M	P	org	1								1	1																		
401	3.0 N	M	P	org	1	1				1	1									1												
414	9.0 N	M	P	org	1	1								1																		
405	7.3 N	M	P	org	2	1			2		2			1																		
436	7.5 N	M	P	org	2	2			1		1																					

ATTACHMENT B

Hayward Point-Intercept/AIS Survey
Field Data Sheets – August

Waterbody/Project: Hayward Lake Date: 8/2/2022

Crew: Laura Sass, Heather Ludlow

Sampling Point	Depth (ft)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	EWM: Myriophyllum spicatum	CLP: Potamogeton crispus	Brasenia schreberi	Ceratophyllum demersum	Chara sp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton epihydrus	Potamogeton friesii	Potamogeton gramineus	Potamogeton natans	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	P. zosteriformis	Ranunculus aquatilis	Sagittaria sp.	Sparganium eurycarpum	Sparganium fluctuans	Sparganium spp.	Spirodela polyrhiza	Stuckenia pectinata	Utricularia minor	Utricularia vulgaris	Vallisneria americana	Filamentous algae	Equisetum sp.	Wolffia sp.
147	7.6	S	P	Sand	0																																				
146	10.6	-	-	-	-																																				
145	18.8	-	-	-	-																																				
144	16.3	-	-	-	-																																				
170	1.8	M	P	org	1														1										1													
169	14.4	S	P	Sand	0																																				
199	1.8	M	P	org	1				1															1				1								1					
198	17.1	-	-	-	-																																				
225	17.8	-	-	-	-																																				
257	16.4	-	-	-	-																																				
288	6.0	S	P	Sand	1																																	1			
218	2.5	S	P	Sand	1				1																				1	1							1				
317	NN - past	boats			-																																				
287	17.6	-	-	-	-																																				
226	10.5	-	-	-	-																																				
285	NN - past	boats			-																																				
254	16.3	-	-	-	-																																				
255	6.0	S	P	Sand	0																																				
256	9.8	S	P	Sand	0																																				
224	10.4	S	P	Sand	0																																				
197	2.8	S	P	Sand	1							1																										1			
168	17.6	-	-	-	-																																				
142	13.1	S	P	Sand	0																																				
143	15.7	-	-	-	-																																				
119	NN + heavy	algae - fishing people																																							
120	6.3	M	P	org	1																																		1			
121	15.2	-																																							
122	16.2	-																																							
102	15.5	-																																							
103	14.5	S	P	Sand	0																																				
82	15.3	-	-	-	-																																				
87	3.5	S	P	Sand	1			1																														1			
76	5.5	M	P	org	2				1			3							1				1				1	1								2				
75	1.7	M	P	org	1				1			1	1				1		1		1									1							2			
104	4.0	M	P	org	2				1			1	1				1																				2			

entered HL 8/24/22

Waterbody/Project: Hayward Lake Date: 8/2/2022

Crew: Laura Sass, Heather Ludzow

CLOUDY/ND

Sampling Point	Depth (ft)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	EWM- Myriophyllum spicatum	CLP- Potamogeton crispus	Bidens beckii - Nias flexilis	Brasenia schreberi	Ceratophyllum demersum	Chara sp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton epihydrus	Potamogeton friesii	Potamogeton gramineus	Potamogeton natans	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	P. zosteriformis	Ranunculus aquatilis	Sagittaria sp.	Spargonium eurycarpum	Spargonium fluctuans	Spargonium sp.	Stuckenia pectinata	Utricularia minor	Utricularia vulgaris	Vallisneria americana	Filamentous algae	Equisetum sp.	Wolffia sp.
105	5.5	M	P	Org	2							2	1													1	1														
89	15.3	-	-	-	-																																					
88	13.2	S	P	Sand	0																																					
77	12.2	M	P	Org	1												1																									
106	11.3	M	P	Org	1												1																									
103	10.5	M	P	org	0																																					
108	11.8	M	P	wood	0																																					
58	10.5	M	P	org	1		1										1		1																							
57	10.0	M	P	Org	3												3																									
56	9.5	M	P	Org	2												2																									
55	1.6	S	P	Sand	1		1			1																	1										1				
54	1.5	S	P	Sand	0																																					
44	2.4	S	P	Sand	0																																					
43	2.5	M	P	Org	2				1			1															1									2					
53	NN-	Temp	Obstr		-																																					
35	3.5	M	P	Org	2		1					1	1				1																									
34	7.0	M	P	Silt	2				2																		1	1									1				
45	8.0	M	P	Silt	3	1			3																		1														
33	4.0	M	P	Silt	3				1			1															1														
50	3.0	M	P	Silt	2	1			1			1							1								1														
29	5.5	M	P	Silt	3							3															1														
28	4.6	M	P	Silt	2				1	1		1							1								1	1													
30	5.0	M	P	Silt	2							3															1														
24	4.5	M	P	Silt	3							3															3														
18	3.5	M	P	Silt	3				2			3	1														2									1					
19	3.6	M	P	Silt	3							3															2														
20	2.5	M	P	Silt	2	1						3															2														
21	3.5	M	P	Silt	2																						2														
25	5.0	M	P	Silt	3							3															2														
26	4.5	M	P	Silt	3				1	1		3															1														
29	4.2	M	P	Silt	2				1			2												1			1														
34	16.5	M	P	Silt	3	2			2																		1	1									1				
33	7.7	M	P	Silt	3	1			2																		3	2													
32	16.5	M	P	Silt	3				1																			2													
31	6.5	M	P	Silt	3				2																			2													

entered - HC 8/24

Waterbody/Project: Hayward Lake Date: 8/2/2022

Crew: Laura Joss, Heather Hintzen

CWD Y/N

Sampling Point	Depth (ft)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	EWM: Myriophyllum spicatum	CLP: Potamogeton crispus	Bidens beckii	Brasenia schreberi	Ceratophyllum demersum	Chara sp.	Elatine sp.	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton epihydrus	Potamogeton friesii	Potamogeton gramineus	Potamogeton natans	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	P. zosteriformis	Ranunculus aquatilis	Sagittaria sp.	Sparganium eurycarpum	Sparganium fluctuans	Sparganium sp.	Spirodela polyrhiza	Stuckenia pectinata	Utricularia minor	Utricularia vulgaris	Vallisneria americana	Filamentous algae	Equisetum sp.	Wolffia sp.
37	7.5	M	P	S-Org	3	1																																				
38	8.0	M	P	S-Org	2	1			3																			2															
46	2.5	M	P	S-Silt	3				2								1											1															
47	9.0	M	P	S-Silt	2												3																										
48	9.0	M	P	S-Silt	2												2											1															
39	9.5	M	P	S-Org	3	3																																				
40	8.5	M	P	S-Silt	2	2											1											1															
41	8.0	M	P	S-Silt	3				3																			1															
42	3.0	M	P	S-Silt	3			2	2		1																	1											2			
49	9.5	M	P	S-Silt	2				1								2																									
50	8.5	M	P	S-Silt	3	3			1																			1															
51	6.0	M	P	S-Silt	2	2											1		1				1																				
52	4.5	M	P	S-Silt	2							2																															
106	8.0	M	P	S-Silt	2															2																				2	2		
125	7.5	M	P	S-Org	2	2			1			1					1						1																			
123	9.3	M	P	S-Silt	1												1																									
127	15.0	-	-	-																																					
191	14.1	M	P	S-Org	0																																					
150	3.0	S	P	Sand	1						1		1										1																			
195	8.0	M	P	S-Org	2																																					
174	1.8	M	P	org	2				2								1		1			1							1										2			
173	1.5	M	P	org	1																																					
149	4.5	M	P	org	3			1				1															3											2			
172	2.0	M	P	org	2			1				1	1		1				1									1										1			
200	2.0	M	P	org	1			1				1			1				1																							
201	5.0	M	P	S-Org	2							1			2		1										1	1														
202	10.0	M	P	S-Org	2	1			2								1																									
227	1.8	S	P	Sand	1							1																							1				1			
260	3.10	M	P	S-Org	2							1			1		1																						1			
259	5.3	S	P	Sand	1							1			1																								1			
258	5.9	M	P	S-Org	2										1												2												1			
289	4.0	M	P	org	2			1							1												2												1			
290	8.0	M	P	S-Org	2	1									1												2															
291	5.0	M	P	S-Org	2			1							1												2															
219	2.0	M	P	S-Org	2			1				1																														

entered HL 8/24

Waterbody/Project: Hayward Lake Date: 8/2/2022
Crew: Laura Sass Heather Lutzow

CWD Y/N	Sampling Point	Depth (ft)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	EWM: Myriophyllum spicatum	CLP: Potamogeton crispus	Bidens beckii	~~Brasenia schreberi~~ Najas flexilis	Ceratophyllum demersum	Chara sp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton epihydrus	Potamogeton friesii	Potamogeton gramineus	Potamogeton natans	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	P. zosteriformis	Ranunculus aquatilis	Sagittaria sp.	Sparganium eurycarpum	Sparganium fluctuans	Sparganium spp.	Spirodela polyrhiza	Stuckenia pectinata	Utricularia minor	Utricularia vulgaris	Vallisneria americana	Filamentous algae	Equisetum sp.	Wolffia sp.
N	346	2.0	M	P	org	2																			1				1		1										2			
N	292	2.0	S	P	sand	1				1																															1			
N	293	5.0	M	P	org	2	1				1			2			1												1															
N	320	2.0	S	P	sand	1	1							1																														
N	347	4.0	M	P	org	1			1		1						1												1												1			
N	369	4.0	M	P	org	1	1				1			1			1								1																1			
N	388	2.0	S	P	sand	1																																			1			
N	402	3.6	M	P	org	2	1		1					1								1							2															
N	387	2.7	M	P	org	1	1				1			1	1										1																1			
N	321	5.5	M	P	org	2					1						1												2															
N	294	4.5	M	P	org	2			1					1																											2			
N	261	11.8	M	P	org	0																																						
N	229	14.6	M	P	org	0																																						
Y	228	10.5	S	P	sand	0																																						
N	203	14.5	M	P	org	0																																						
–	176	15.0	–	–	–	–																																						
N	104	2.8	S	P	sand	1																																			1			
N	90	8.0	M	P	org	1	1							1																											1			
N	91	11.5	M	P	org	0																																						
N	80	14.2	M	P	org	0																																						
–	79	16.9	–	–	–	–																																						
–	109	17.0	–	–	–	–																																						
N	59	10.5	M	P	org	1													1																									
N	100	11.0	M	P	org	2													2																									
N	101	10.5	M	P	org	2													2																									
N	62	10.0	M	P	org	2													2																									
Y	63	8.2	M	P	org	2					1																														2			
N	74	7.8	M	P	org	2	1				2																																	
N	73	8.5	M	P	org	1	1												1									1			1										1			
N	72	8.0	M	P	org	2	1				1			1			1		1								2				1													
Y	71	10.0	M	P	wood	1													1																									
N	81	13.3	M	P	org	0																																						
–	82	15.2	–	–	–	–																																						
	83	6.0	M	P	org	2								1			1										1														2			
	84	9.5	M	P	org	3					2						1		2																									

entered-HL 8/24

Waterbody/Project: Hayward Lake
Crew: Laura
Date: 8/3/2022

CWD Y/N	Sampling Point	Depth (ft)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	EWM: Myriophyllum spicatum	CLP: Potamogeton crispus	Bidens beckii	Brasenia schreberi	Ceratophyllum demersum	Chara sp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton epihydrus	Potamogeton friesii	Potamogeton gramineus	Potamogeton natans	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	P. zosteriformis	Ranunculus aquatilis	Sagittaria sp.	Sparganium eurycarpum	Sparganium fluctuans	Sparganium spp.	Najas flexilis	Stuckenia pectinata	Utricularia minor	Utricularia vulgaris	Vallisneria americana	Filamentous algae	Equisetum sp.	Wolffia sp.
N	85	8.5	M	P	Si+org	1	1				1						1		1												1													
N	86	7.2	M	P	Si+org	2					2						1														1										2			
Y	98	7.0	M	P	org	2					2						1														1										1			
Y	99	1.5	S	P	sand	1								1																														
N	97	8.7	M	P	org	2	2																																					
N	96	9.5	M	P	Si+org	2					2						1																											
N	95	7.8	M	P	Si+org	3	1				1			1													2				1													
–	94	15.5	–	–	–	–																																						
N	93	12.3	M	P	org	0																																						
N	92	12.8	M	P	org	0																																						
N	107	12.4	M	P	org	0																																						
–	108	15.0	–	–	–	–																																						
N	109	9.5	M	P	org	1	1							1					1																						1			
Y	110	9.5	M	P	org	1	1										1		1												1													
N	111	8.2	M	P	org	2	2										1		1												2													
N	112	9.2	M	P	Si+org	2													2																									
N	113	4.3	M	P	org	2	1				2			1			1		1																						2			
Y	114	3.5	M	P	Si+org	2					1			1			1													1											2			
N	134	1.5	S	P	sand	1																												1			1							
N	133	5.0	M	P	org	2								2			1		1												1													
N	132	9.0	M	P	org	1													1												1													
N	131	8.5	M	P	org	2											1										1				2													
N	130	8.7	M	P	org	1	1																								1													
N	129	8.8	M	P	Si+org	2	1				2			1			1														1													
N	128	10.3	M	P	org	1											1		1																						1			
N	152	10.5	M	P	Si+org	1											1		1																									
N	153	10.5	M	P	Si+org	2								1			1										1				1										1			
N	154	10.0	M	P	Si+org	2													2								1				1													
N	155	9.0	M	P	org	2	1				2																																	
N	156	8.0	M	P	org	1					1			1			1										1				1													
N	157	8.0	M	P	org	2	1										1										1				1													
N	158	5.0	M	P	org	3	2				2																														2			
N	184	1.3	S	P	sand	1																															1							
N	183	7.8	M	P	org	1																																			1			
N	182	8.0	M	P	org	2					2			1																	1													

entered - HL 8/29/22

Waterbody/Project: Hayward Lake

Crew: Laura Jass, Heather Lutzow

Date: 8/3/2022

CWD? (Y/N)	Sampling Point	Depth (ft)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	EWM: Myriophyllum spicatum	CLP: Potamogeton crispus	Bidens beckii	~~Brasenia schreberi~~ Najas flexilis	Ceratophyllum demersum	Chara sp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton epihydrus	Potamogeton friesii	Potamogeton gramineus	Potamogeton natans	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	P. zosteriformis	Ranunculus aquatilis	Sagittaria sp.	Sparganium eurycarpum	Sparganium fluctuans	Sparganium spp.	Spirodela polyrhiza	Stuckenia pectinata	Utricularia minor	Utricularia vulgaris	Vallisneria americana	Filamentous algae	Equisetum sp.	Wolffia sp.
N	208	8.0	M	P	org	2					1																1				1													
N	209	8.9	M	P	org	2		1			1																																	
N	210	7.8	M	P	silt/org	3													2																									
N	211	8.5	M	P	silt/org	1					2			1													2				1										1			
N	212	1.0	S	P	sand	1	1			1							1		1																						1			
N	237	7.0	M	P	silt/org	1					1																																	
N	236	7.2	M	P	silt/org	1																									1										1			
N	235	8.0	M	P	silt/org	3					3			1			1														1										1			
N	268	10.5	M	P	silt/org	1													1									1			1										1			
N	269	9.0	M	P	org	2													1																									
N	302	12.8	M	P	silt/org	0																									1										2			
N	270	10.8	M	P	silt/org	2								1			1										1														2			
N	238	8.0	M	P	silt/org	1											1																								1			
N	239	2.0	S	P	sand	1																																			1			
N	271	13.4	M	P	silt/org	0																																						
N	303	11.0	M	P	org	1					1						1														1													
N	329	5.0	M	P	silt/org	2								1			1																								2			
N	304	11.9	M	P	silt/org	0																																						
N	272	14.1	M	P	org	0																																						
N	240	2.0	S	P	sand	0																																						
Y	241	4.0	M	P	org	2	1		1		1			1									1								1										1			
N	213	6.0	M	P	silt/org	3					2			2															1		1													
N	252	3.5	M	P	silt/org	1								1	1						1										1													
N	223	4.5	M	P	org	0																																						
N	222	5.5	M	P	org	2								1																	1										1			
N	196	6.5	M	P	org	1								1																														
N	167	5.5	M	P	silt/org	2								2																											1			
N	140	5.5	M	P	silt/org	3																																			2			
N	116	7.2	S	P	sand	0																																						
N	100	3.5	M	P	silt/org	1	1				1						1																				V				1			
N	101	2.5	M	P	silt/org	1								1			1																											
N	117	3.5	M	P	silt/org	3								3																														
Y	118	1.0	M	P	org	1					1			1			1																								1			
N	141	2.8	M	P	silt/org	3								2																														
Y	139	2.5	M	P	silt/org	3								2																	2										1			

entered 8/29 - HL

Waterbody/Project: Hayward Lake Date: 8/3/2022

Crew: Laura Sass Heather Hilgendorf

Sampling Point	Depth (ft)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	EWM: Myriophyllum spicatum	CLP: Potamogeton crispus	Bidens beckii	Brasenia schreberi	Ceratophyllum demersum	Chara sp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton epihydrus	Potamogeton friesii	Potamogeton gramineus	Potamogeton natans	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	P. zosteriformis	Ranunculus aquatilis	Sagittaria sp.	Sparganium eurycarpum	Sparganium fluctuans	Sparganium sp.	Spirodela polyrhiza	Stuckenia pectinata	Utricularia minor	Utricularia vulgaris	Vallisneria americana	Filamentous algae	Equisetum sp.	Wolffia sp.
116	7.0	M	P	org	2																																					
195	6.8	M	P	org	2																																							
221	0.5	R	P	gravel	0																																						
251	6.4	M	P	org	0																																						
282	7.4	M	P	org	0																																						
316	4.0	M	P	org, Silt+	2																																						
315	5.0	M	P	Si/+	2																																						
343	0.4	M	P	Si/+	2																																						
344	7.0	M	P	Si/+	0																																						
345	7.0	M	P	Si/+	1																																						
316	7.0	M	P	Si/+	3																																						
316	6.5	M	P	Si/+	3																																						
400	4.0	M	P	Si/+	2																																						
401	4.1	M	P	Si/+	3																																						
414	9.0	M	P	Si/+	1																																						
425	7.5	M	P	Si/+	3																																						
426	5.5	M	P	Si/+	2																																						
438	4.5	M	P	Si/+	2																																						
441	3.0	M	P	Si/+	2																																						
447	5.0	M	P	Si/+	3																																						
455	5.5	M	P	Si/+	3																																						
467	6.5	M	P	Si/+	3																																						
474	5.5	M	P	org	3																																						
473	5.5	M	P	org	2																																						
466	2.5	M	P	org	1																																						
460	6.0	M	P	org	3																																						
471	6.0	M	P	org	3																																						
454	7.0	M	P	org	3																																						
453	10.3	M	P	org	3																																						
445	6.5	M	P	org	2																																						
446	9.0	M	P	org	1																																						
436	6.5	M	P	org	3																																						
435	5.3	M	P	org	2																																						
424	10.8	M	P	org	2																																						
413	8.3	M	P	org	1																																						

Entered 8/29 - HL

Waterbody/Project: Hayward Lake Date: 8/3/2022

Crew: Laura Sass Heather Lutzow

CLOUDY/N

Sampling Point	Depth (ft)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	EWM: Myriophyllum spicatum	CLP: Potamogeton crispus	Bidens beckii	Brasenia schreberi	Ceratophyllum demersum	Chara sp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum alterniflorum	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton epihydrus	Potamogeton friesii	Potamogeton gramineus	Potamogeton natans	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	P. zosteriformis	Ranunculus aquatilis	Sagittaria sp.	Sparganium eurycarpum	Sparganium fluctuans	Sparganium sp.	Spirodela polyrhiza	Stuckenia pectinata	Utricularia minor	Utricularia vulgaris	Vallisneria americana	Filamentous algae	Equisetum sp.	Wolffia sp.
181	9.0	M	P	org	2						2					1		1																								
180	10.0	M	P	org	1	1										1		1																									
179	10.8	M	P	org	1													1																								
178	10.9	M	P	org	1													1																								
177	13.3	M	P	org	0																																				
204	14.6	M	P	org	0																																				
205	12.2	M	P	org	0																																				
206	12.4	M	P	org	0																																				
207	10.5	M	P	org	1	1										1																									
533	12.8	M	P	org	0																																				
546	12.8	M	P	org	0																																				
298	13.7	M	P	org	0																																				
297	12.2	M	P	org	0																																				
296	10.4	M	P	org	0																																				
293	8.5	M	P	org	1	1							1			1	1							1																	
322	2.5	S	P	sand	1												1																								
262	12.6	M	P	org	0																																				
230	14.5	M	P	org	0																																				
231	[illegible]	—	—	—	—																																				
263	13.5	M	P	org	0																																				
264	13.9	M	P	org	0																																				
263	13.2	M	P	org	0																																				
324	1.5	S	P	sand	1										1		1																								
325	2.2	S	P	sand	1						1				1		1																								
326	2.5	S	P	sand	1						1																														
326	2.3	S	P	sand	1	1																																			
327	13.6	S	P	sand	0																																				
328	1.0	S	P	sand	1						1																														
301	11.0	M	P	org	1	1					1			1				1																								
300	11.5	M	P	org	0																																				
399	12.9	M	P	org	0						1																														
265	14.3	M	P	org	0																																				
267	11.4	M	P	org	0																																				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]																																				
234	9.6	M	P	org	1												1																								

entered 8/29 - HL

Waterbody/Project: _____ Hayward Lake _____ Date: 8/31/22

Crew: Laura Sass Heather Lutzow

CWD (Y/N)

Sampling Point	Depth (ft)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	EWM- Myriophyllum spicatum	CLP- Potamogeton crispus	Bidens beckii	Brasenia schreberi	Ceratophyllum demersum	Chara sp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton epihydrus	Potamogeton friesii	Potamogeton gramineus	Potamogeton natans	Potamogeton praelongus	Potamogeton pusillus	P. richardsonii	P. zosteriformis	Ranunculus robbinsii	Sagittaria sp.	Sparganium eurycarpum	Sparganium fluctuans	Sparganium sp.	Spirodela polyrhiza	Stuckenia pectinata	Utricularia minor	Utricularia vulgaris	Vallisneria americana	Filamentous algae	Equisetum sp.	Wolffia sp.
399	2.6	M	P	org	2					2																	1															
385	6.5	M	P	org	2					1			2		1																											
395	5.5	M	P	org	2					1			3														1															
384	8.5	M	P	org	2					1																															
398	4.5	M	P	org	1					1			1		1						1			1																	
397	3.5	M	P	org	3					1			3														1															
411	4.0	M	P	org	3					1			3	1													1															
422	3.0	M	P	org	3		1			1			3		1											2															
421	4.5	M	P	org	3					1			3	1	1											1	2														
433	5.0	M	P	org	2		1			2			1													2	2														
432	5.0	M	P	org	3								3														1														
412	3.5	S	P	sand	2					2			1	1	2											1	1	1													
431	5.0	M	P	org	3		3			1																														
416	3.0	M	P	org	3			1		2			2		1											1	1														
417	5.0	M	P	org	3		1			2			3	1												1	1														
418	5.0	M	P	org	3					2			2		1											1	1														
419	4.8	M	P	org	3					2			3													1															
420	5.0	M	P	org	3					2			1																												
409	6.5	M	P	org	2											1													1												
410	4.5	M	P	org	2					1			2																												
396	5.5	M	P	org	3					1			1	1	1											1	3	2													
392	5.5	M	P	org	2					1			1																												
393	8.0	M	P	org	1					1																															
402	3.0	M	P	org	0					1																															
401	8.0	M	P	org	1					1			1																												
381	5.0	M	P	org	1					1																															
395	5.0	M	P	org	3					1																	2														
408	7.0	M	P	org	1					1					1																										
394	5.0	M	P	org	2					1																	2														
380	6.5	M	P	org	2																						1														
340	8.5	M	P	org	0					1					1												1														
342	4.5	M	P	org	1																																				
341	4.5	M	P	org	1										1		1																									

entered 11/8/30

Waterbody/Project: Hayward Lake Date: 8/3/2022
Crew: Laura Sass Heather Lutzow

CWD (Y/N)	Sampling Point	Depth (ft)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	EWM: Myriophyllum spicatum	CLP: Potamogeton crispus	Bidens beckii	~~Brasenia schreberi~~ Potamogeton illinoensis	Ceratophyllum demersum	Chara sp.	~~Eleocharis acicularis~~ Najas flexilis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton epihydrus	Potamogeton friesii	Potamogeton gramineus	Potamogeton natans	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	P. zosteriformis	Ranunculus aquatilis	Sagittaria sp.	Sparganium eurycarpum	Sparganium fluctuans	Sparganium spp.	Spirodela polyrhiza	Stuckenia pectinata	Utricularia minor	Utricularia vulgaris	Vallisneria americana	Filamentous algae	Equisetum sp.	Wolffia sp.
N	359	8.5	M	P	org	0																																							
N	379	7.5	M	P	org	1								1			1		1																						1			
N	393	6.2	M	P	org	3					1			1																	2													
N	407	7.5	M	P	org	1								1			1																											
N	406	7.5	M	P	org	1													1																									
N	392	7.5	M	P	org	1	1										1																											
N	378	8.0	M	P	org	1											1		1																									
N	358	8.5	M	P	org	1																									1													
N	340	4.0	M	P	org	2								2																														
N	339	5.0	M	P	org	2				1	1			1					1												1										2			
N	367	8.3	M	P	org	0																																						
N	377	8.5	M	P	org	0																																						
N	390	8.5	M	P	org	1					1			1			1																								1			
N	391	9.0	M	P	org	1					1						1																											
N	405	5.5	M	P	org	3	2				3						1														1													
N	404	3.5	M	P	org	3								2	1													1																
N	403	3.5	M	P	org	2			1	1	2		1	1																	1										2			
N	338	9.5	M	P	org	0																																						
N	356	9.5	M	P	org	0																																						
N	276	9.5	M	P	org	1													1																									
N	289	5.5	M	P	org	2					1			1	1		1		1											1														
N	375	4.5	M	P	org	3					3			2			1													2														
N	255	6.0	M	P	org	2								1																	2										2			
N	237	9.5	M	P	org	1																									1													
N	312	10.0	M	P	org	1					1																																	
N	280	4.5	M	P	org	2								1			1																								2			
N	248	[illegible]	M	P	org	2	1							2							1																				1			
N	219	4.0	M	P	org	3			1		2			2																1	1										1			
N	247	6.5	M	P	org	1					1			1			1														1										1			
N	279	4.5	M	P	org	3								3																	1										1			
N	311	10.5	M	P	org	1					1			1																														
N	236	9.0	M	P	org	0																																						
N	354	6.0	M	P	org	2					2			1			1														1										1			
N	374	5.5	M	P	org	2								1																											2			
N	373	4.5	M	P	org	2					2			2																	1										1			

entered - HL 8/30

Waterbody/Project: Hayward Lake Date: 8/3/2022

Crew: Laura Sass Heather Lutzow

CWD (Y/N)	Sampling Point	Depth (ft)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	EWM: Myriophyllum spicatum	CLP: Potamogeton crispus	Bidens beckii	Brasenia schreberi	Ceratophyllum demersum	Chara sp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton epihydrus	Potamogeton friesii	Potamogeton gramineus	Potamogeton natans	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	P. zosteriformis	Ranunculus aquatilis	Sagittaria sp.	Sparganium eurycarpum	Sparganium fluctuans	Sparganium spp.	Spirodela polyrhiza	Stuckenia pectinata	Utricularia minor	Utricularia vulgaris	Vallisneria americana	Filamentous algae	Equisetum sp.	Wolffia sp.
N	353	11.5	M	P	org	1													1																									
N	335	11.4	M	P	org	0																																						
N	310	6.5	M	P	org	2								1			1					1									2										1			
N	278	6.5	M	P	org	1	1				1			1																	1										1			
N	246	5.5	M	P	org	2	2				1			1																	1										2			
N	218	5.5	M	P	org	3					3			1			1													1	1													
N	191	4.5	M	P	org	3			1		1			3	1																1													
N	190	5.5	M	P	org	3					3			2																														
N	164	3.5	M	P	org	3			1		2			1							1										2													
N	163	4.0	M	P	org	3			2					3																	1													
N	189	5.5	M	P	org	3	1				2			1													1			1	1													
N	216	5.8	M	P	org	3					1			1			1													3	1										1			
N	217	5.4	M	P	org	2					1						1														1										2			
N	246	7.5	M	P	org	2	1				2						1																											
N	277	4.5	M	P	org	2					1			1			1														1										2			
N	309	10.0	M	P	org	0																																						
N	334	10.0	M	P	org	0																																						
N	302	12.5	M	P	org	0																																						
N	372	6.5	M	P	org	2					1			1																											2			
N	371	13.1	M	P	org	0																																						
N	351	10.5	M	P	org	0																																						
N	333	10.0	M	P	org	1					1																														1			
N	308	9.7	M	P	org	1								1			1		1																									
N	276	7.8	M	P	org	2					2																				1										2			
N	241	3.0	M	P	org	2	2				1			1			1		1																									
N	215	7.3	M	P	org	3	3				2						1																											
N	188	6.9	M	P	org	3					3			1			1													2														
N	162	4.8	M	P	org	3					1			3																	1													
N	161	4.8	M	P	org	3	2				3			2																														
N	160	6.5	M	P	org	2	1				1			1																2	1													
N	159	2.3	M	P	org	1	1				1			1						V	1									3	1						1				1			
N	185	5.5	M	P	org	3					2			2			1														1													
N	186	6.0	M	P	org	3					1																			3	1													
N	187	6.0	M	P	org	3	1				3																																	
N	214	6.3	M	P	org	3	2				2			2																	1													

entered - HL 5/31

Waterbody/Project: Hayward Lake Date: 8/3/2022

Crew: Laura Sass Heather Lutzow

Sampling Point	Depth (ft)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	EWM: Myriophyllum spicatum	CLP: Potamogeton crispus	Bidens beckii	Brasenia schreberi	Ceratophyllum demersum	Chara sp.	Elocharis acicularis	Eladea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton epihydrus	Potamogeton friesii	Potamogeton gramineus	Potamogeton natans	Potamogeton praelongus	Potamogeton pusillus	P. richardsonii	P. zosteriformis	Ranunculus aquatilis	Sagittaria sp.	Sparganium eurycarpum	Sparganium fluctuans	Sparganium sp.	Spirodela polyrhiza	Stuckenia pectinata	Utricularia minor	Utricularia vulgaris	Vallisneria americana	Filamentous algae	Equisetum sp.	Wolffia sp.
242	10.5	M	P	org	3																																						
243	8.5	M	P	org	2	1						2				1																												
275	10.5	M	P	org	2											2																												
307	10.5	M	P	org	1											1																												
332	11.0	M	P	org	0																																						
350	12.4	M	P	org	0																																						
370	1.5	S	P	sand	1	1									1																												
349	7.5	M	P	org	1	1									1												1																
331	13.4	M	P	org	0																																						
306	11.0	M	P	org	0																																						
274	10.3	M	P	org	1										1		1																										
273	13.4	M	P	org	0																																						
305	12.4	M	P	org	0																																						
320	5.2	M	P	org	2							1			1								2				1																

entered - HL 9/31

ATTACHMENT C

Trego Point-Intercept/AIS Survey Field Data Sheets - June

(1)

Waterbody/Project: Trego

Date: 6/9/2022

Crew: Laura Sass Heather Lutzow

Sampling Point	Depth (ft)	CWD Y/N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Ceratophyllum demersum	Potamogeton crispus	Myriophyllum spicatum	Myriophyllum sibiricum	Potamogeton zosteriformis	Elodea canadensis	Nymphaea odorata	Nuphar variegata	Nitella	Lemna minor	Sparganium fluctuans	Vallisneria americana
31	2.0	N	M	P	org	Ø												
36	1.8	N	M	P	org	1	1				1							
37	3.4	N	M	P	org	Ø												
40	2.1	N	M	P	org	1	1					1						
35	1.5	N	M	P	org	1	1											
39	2.9	N	M	P	org	1	1				1	1			1			
42	2.1	N	M	P	sand	Ø								V		V		
43	3.9	N	M	P	org	1	1											
44	3.0	N	M	P	org	Ø												
45	2.5	N	S	P	sand	Ø												
51	3.5	N	M	P	org	2			1			2						
50	3.5	N	M	P	org	1			1		1	1						
49	3.3	N	M	P	org	1	1				1	1						
48	4.0	N	M	P	org	Ø												
56	4.3	N	M	P	org	1									1			
57	4.1	N	M	P	org	1	1											
67	4.0	N	M	P	org	1					1							
66	2.5	N	M	P	org	1											1	
76	49	N	M	P	org	1	1											1
77	3.0	N	M	P	org	1					1						1	
88	1.3	N	M	P	org	1											1	
87	3.9	N	M	P	org	1					1							
97	3.0	N	S	P	sand	1					1						1	
96	5.0	N	S	P	sand	1					1						1	
105	5.0	N	M	P	org	1					1							
104	4.8	N	M	P	org	1					1							1
113	5.5	N	M	P	org	1					1							
114	4.9	N	M	P	org	1											1	

(2)

Waterbody/Project: Trego Date: 6/9/2022

Crew: Laura SAS Heather Lutzow

Sampling Point	Depth (ft)	CWD Y/N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Ceratophyllum demersum	Potamogeton crispus	M. spicatum	M. sibiricum	P. zosteriformis	E. canadensis	N. odorata	N. variegata	N. flexilis	N. americana	Lemna trisulca	Lemna minor	Nitella	Ranunculus aquatilis	Potamogeton robbinsii									
123	4.9 N	M	P	org		1							1																	
122	7.6 N	M	P	org		1				1																				
132	4.0 N	M	P	org		1				1			1																	
133	5.4 N	M	P	org		1					1																			
142	7.4 N	M	P	org		0																								
141	4.6 N	S	P	sand		1							1	1	1															
150	3.5 N	M	P	org		1				1																				
164	5.0 N	M	P	org		2				2																				
163	9.7 N	M	P	org		0																								
162	5.0 N	M	P	org		0																								
161	3.5 N	M	P	org		3	1	3			1			1		1														
160	5.0 N	M	P	org		1	1							1																
172	6.8 N	S	P	sand		1	1							1																
173	4.5 N	M	P	org		0																								
174	6.5 N	M	P	org		0																								
175	6.8 N	M	P	org		0																								
176	5.0 N	M	P	org		2	1		1		1	1				1			1											
177	5.4 N	M	P	org		1	1		1		1	1			1	1														
178	5.4 N	M	P	org		1	1				1	1				1														
165	5.0 N	M	P	org		1										1			1											
191	5.4 N	M	P	org		1			1		1					1			1											
192	4.8 N	M	P	org		1	1	1			1					1														
179	4.5 N	M	P	org		3		3																						
166	4.3 N	M	P	org		1		1			1					1														
153	4.5 N	M	P	org		2		2	1		1			1						1										
152	1.0 N	M	P	org		0																								
143	4.5 N	M	P	org		2				1								2												
180	4.0 N	M	P	org		3	1	3	1	1																				

(3)

Waterbody/Project: Trego Date: 6/9/2022

Crew: Laura Glass Heather Lutzow

Sampling Point	Depth (ft)	CWD Y/N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Ceratophyllum demersum	R. crispus	M. spicatum	M. sibiricum	P. zosteriformis	E. canadensis	N. odorata	P. vaginata	S. fluctuans	nitella	V. americana	H dubia	L. trisulca	P Robbinsii	R. aquatilis	P Richardsonii										
181	3.0 N	M	P	Silt	3	3	V	V	1																					
193	4.0 N	M	P	silt	1	1	V	V																						
194	3.5 N	M	P	silt	1	1	V	V	1																					
195	3.5 N	M	P	silt	3	1	3	1																						
185	2.8 N	M	P	silt	2	1	2	1	1	1																				
171	2.5 N	M	P	silt	3		3																							
159	3.0 N	M	P	org	~~2~~ 1		1		1	1			1																	
148	3.0 N	M	P	org	~~0~~		V	V																						
149	5.0 N	M	P	org	1								1																	
139	1.8 N	M	P	org	1								1																	
~~206~~	3.1 Y	M	P	org	1								1	1																
205	4.0 N	M	P	org	1	1			1					1	1															
204	4.1 N	M	P	org	3	1	1		3																					
214	3.9 N	M	P	org	1				1						1	1														
218	3.8 N	M	P	org	1	1																								
213	4.3 N	M	P	org	2	2	1		1							1														
203	4.5 N	M	P	org	1	1			1					1	1															
202	4.6 N	M	P	org	1	1		1						1		1														
190	5.5 N	M	P	org	1									1	1															
189	5.5 N	M	P	org	1		1							1		1														
201	4.6 N	M	P	org	1	1									1															
212	4.1 N	M	P	org	3	1		3	1								1													
211	4.0 N	S	P	sand	1	1			1																					
200	2.6 N	S	P	Sand	1								1					1												
188	6.3 N	M	P	org	1									1	1															
187	7.0 N	S	P	sand	1										1															
191	2.8 Y	S	P	Sand	1	1	1		1	1																				
184	8.0 N	M	P	org	~~0~~																									

4

Waterbody/Project: Trego Date: 6/9/2022
Crew: Laura Sass Heather Lutzow

Sampling Point	Depth (ft)	CWD (Y/N)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	C. demersum / P. crispus	M. spicatum / M. sibiricum	P. zosteriformis / E. canadensis	N. odorata / N. variegata	V. americana / nitella												
185	8.5	N	S	P	sand	Ø																	
196	8.9	N	S	P	sand	Ø																	
197	7.0	N	S	P	sand	Ø																	
198	6.5	N	S	P	sand	1	1																
210	1.5	N	M	P	org	Ø				V													
209	5.5	N	M	P	org	1	1																
208	6.8	N	S	P	Sand	Ø																	
207	9.7	N	M	P	muck	Ø																	
217	9.7	N	S	P	sand	Ø																	
216	3.5	N	S	P	sand	1					1 1												
220	7.1	N	S	P	Sand	Ø																	
219	1.3	N	S	P	sand	Ø																	
221	5.5	N	S	P	sand	Ø																	
222	1.8	N	S	P	Sand	1	1																
223	9.0	N	R	P	cobble	Ø																	
228	9.5	N	S	P	sand	Ø																	
227	5.0	N	S	P	sand	Ø																	
237	8.5	N	S	P	sand	Ø																	
236	10.5	N	S	P	Sand	Ø																	
226	5.0	N	S	P	Sand	Ø																	
225	5.0	N	S	P	Sand	Ø																	
228	10.8	Y	S	P	wood	Ø																	
224	5.0	N	S	P	sand	Ø																	
233	10.0	Y	S	P	sand	Ø																	
232	10.0	N	S	P	sand	Ø																	
231	10.3	N	S	P	sand	Ø																	
230	9.0	N	S	P	sand	Ø																	
229	3.8	N	S	P	Sand	1					1												

(5)

Waterbody/Project: Trego Date: 6/9/2022

Crew: Laura Sass Heather Lutzow

Sampling Point	Depth (ft)	CWD (Y/N)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	C. demersum	P. crispus	M. spicatum	M. Sibiricum	P. zosteriformis	E. canadensis	N. odorata	N. variegata	Stuckenia pectinata	Lemna trisulca	Spirodela polyrhiza	.	.	.	.	.	.	.	.	.	.	.
238	7.2 N	M	P	org	Ø																						
239	10.0 N	S	P	sand	Ø																						
240	7.2 N	S	P	sand	Ø																						
241	4.1 N	M	P	org	1	1			1																		
242	2.4 N	M	P	org	1	1			1																		
245	2.2 N	M	P	silt	1							1	1	1													
244	4.3 N	M	P	org	1	1			1																		
243	9.0 N	S	P	sand	Ø																						
253	8.0 N	S	P	sand	Ø																						
264	7.2 N	S	P	sand	Ø																						
302	>11 Y	=	P	—	—																						
301	2.5 Y	R	P	gravel	Ø																						
316	10.0 N	M	P	org	Ø																						
327	2.5 Y	S	P	sand	Ø																						
326	4.4 Y	M	P	org	1	1			1																		
300	5.2 N	M	P	org	1	1			1																		
299	10.5 N	S	P	sand	Ø																						
296	6.0 N	M	P	org	Ø																						
275	4.0 N	S	P	sand	Ø																						
274	8.6 Y	S	P	wood	Ø																						
252	2.4 N	R	P	cobble	Ø																						
262	5.0 N	M	P	org	1				1																		
249	2.0 Y	S	P	sand	1	1																					
273	8.5 Y	S	P	sand	Ø																						
298	9.0 Y	S	P	sand	Ø																						
225	5.0 Y	S	P	wood	Ø																						
340	7.0 Y	R	P	gravel	Ø																						
344	9.0 Y	S	P	sand	Ø																						

(6)

Waterbody/Project: Treo Date: 6/9/2022

Crew: Laura Sass Heather Lutrow

Sampling Point	Depth (ft) CWD(Y/N)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	C. demersum	P. crispus	M. spicatum	M. sibiricum	P. zosteriformis	E. canadensis	N. odorata	N. variegata	V. americana	P. Robbinsii	S. Sparganium	R. natans	P. praelongus	P. eurycarpum	Bidens beckii										
354	2.9 N	S	P	sand	Ø																									
362	2.9 Y	S	P	sand	Ø								V																	
367	1.5 N	S	P	sand	Ø				V																					
396	4.0 Y	S	P	sand	Ø																									
412	2.5 N	M	P	org	2	2			1	1		V																		
428	2.0 Y	S	P	sand	1				V	1			1																	
438	10.0 N	S	P	sand	Ø																									
471	6.5 Y	S	P	sand	1	1																								
473	9.0 Y	S	P	sand	Ø																									
484	7.5 Y	M	P	org	3	3			1																					
483	4.9 N	S	P	sand	2	2						1																		
488	3.9 N	S	P	sand	2	2			1	1		2																		
492	5.1 Y	S	P	sand	1	1				1		1																		
459	7.9 Y	M	P	org	1		V			1																				
460	3.9 Y	S	P	sand	1		1					1			V															
455	2.3 N	S	P	sand	1					1																				
452	2.0 N	S	P	sand	1	1	1	V					1	1	V															
450	3.0 N	S	P	sand	Ø																									
445	11.0 Y	S	P	sand	Ø																									
443	6.0 Y	S	P	sand	Ø																									
439	2.9 N	M	P	org	1	1			1	1																				
435	2.9 N	R	P	gravel	1		1		1	1					V															
429	6.0 N	S	P	sand					1						V															
408	3.9 N	S	P	sand	1	1										1														
393	3.5 N	R	P	cobble	Ø																									
363	2.0 Y	R	P	cobble	Ø																									
361	4.0 Y	R	P	cobble	Ø																									
340	9.5 N	R	P	cobble	Ø																									

(7)

Waterbody/Project: Trego Date: 6/9/2022

Crew: Laura Sass Heather Lutzow

Sampling Point	Depth (ft)	CWSD (Y/N)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	C. demersum	P. crispus	M. spicatum	M. sibiricum	P. zosteriformis	E. canadensis	N. odorata	N. variegata	V. americana	P. richardsonii	H. dubia	S. eurycarpum	L. Trisulca											
357	9.0	Y	S	P	sand	0																								
351	8.6	N	S	P	sand	0																								
349	7.8	Y	S	P	sand	0																								
341	6.8	Y	R	P	cobble	1									1															
336	9.6	Y	M	P	org	0																								
332	10.5	Y	M	P	org	0																								
328	2.6	Y	S	P	sand	0				V																				
319	10	Y	M	P	org	0																								
289	7.0	N	M	P	org	0																								
288	9.6	N	M	P	org	1									1															
277	10.0	N	M	P	org	1									1															
278	10.2	N	M	P	org	0																								
266	10.0	N	M	P	org	0																								
265	9.5	N	M	P	org	0																								
254	3.4	Y	S	P	Sand	1				1						1														
255	10.3	N	M	P	org	1									1															
246	2.8	Y	S	P	sand	1	1			1	1			1		1														
247	8.0	Y	S	P	Sand	1	1										1													
256	5.5	N	M	P	org	1	1			1	1																			
257	8.5	N	M	P	org	2	2											1												
258	4.0	N	S	P	sand	2	2			1	1																			
259	9.6	N	M	P	org	1	1																							
248	1.8	Y	S	P	Sand	1	1																							
270	10.8	N	S	P	sand	0																								
282	2.4	N	S	P	sand	0	V			V																				
293	5.0	N	S	P	Sand	1									1															
308	3.0	N	S	P	Sand	0																								
309	10.8	N	M	P	org	0																								

357 thru 314 → "M" → Bottom: thin organic debris

(8)

Waterbody/Project: Trego Date:
Crew: Laura Sass Heather Lutzow

Sampling Point	Depth (ft)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	C. demersum	R. cribbsii	M. spicatum	M. sibiricum	P. zosteriformis	E. canadensis	N. odorata	N. variegata	Het. Dubia	S. eurycarpum	L. Trisulca	P. Friesii	.	.	.	.	.	.	.	.	.	.	.	.
514	2 N	S	P	sand	1						1																		
515	1.5 N	S	P	Sand	0																								
518	3 N	S	P	Sand	0																								
519	2 N	S	P	Sand	0																								
520	4 N	S	P	Sand	0																								
521	2.5 N	M	P	Org.	1				1																				
517	2 Y	M	P	Org.	1				1			1																	
513	1.5 N	M	P	Org.	1	1	V					1																	
511	3 N	S	P	Sand	0																								
512	1 N	S	P	Sand	0																								
505	3 N	M	P	Org.	0																								
510	1.5 N	S	P	Sand	0																								
506	1.5 N	S	P	Sand	0																								
507	1.5 N	S	P	Sand	0																								
508	3 N	S	P	Org.	0																								
509	2 N	M	P	Org.	1	1			1	1	1		1																
504	1.5 N	S	P	Sand	0																								
501	1a Y	R	P	Rock	0																								
498	1.5 Y	M	P	Org.	0																								
497	2 N	R	P	cobble	0																								
496	2.5 N	S	P	sand	0																								
495	3 N	M	P	Org.	0																								
494	3.5 N	M	P	Org.	2	2	V		1				1																
65	5 N	R	P	Rock	0																								
64	3 N	S	P	sand	0																								
63	2.5	S	P	Sand	0																								
62	2.5	S	P	Sand	0																								
61	3	S	P	cobble	1						1																		

(9)

Waterbody/Project: Trego Date:

Crew: Laura Sass Heather Lutzow

Sampling Point	Depth (ft)	CWD (Y/N)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	C. demersum	P. crispus	M. spicatum	M. sibiricum	P. zosteriformis	E. canadensis	N. odorata	P. vaseyi	P. Robbinsii	Chara sp.	N. flexilis sp.	V. americana	S. fluctuans											
55	2	N	S	P	Sand	0																								
54	3	N	S	P	Sand	0																								
53	2	N	S	P	Sand	0																								
38	4	N	M	P	Org.	3	1			3																				
34	4	N	M	P	Org	3	1		1	2		2	1																	
30	4	N	M	P	Org	2				1	1		1	1																
26	4.5	N	M	P	Org.	3				3			1		1															
21	4	N	M	P	Org.	1			V				1																	
25	4.5	N	M	P	Org.	3	1		1	1	3		1																	
24	3	N	M	P	Org.	3	1			1	1		2																	
29	3.5	N	M	P	Org.	3	2				1		1																	
33	0.5	N	M	P	Org.	1		1		1	1																			
52	8	N	R	P	Rock	0																								
50	1	N	S	P	Sand	1				1						1														
72	3	N	S	P	Sand	0																								
85	0.5	N	S	P	Sand	0																								
95	1	N	S	P	sand	0																								
112	2	N	S	P	sand	0																								
130	2	N	M	P	Org.	1				1	1					1														
140	1	N	S	P	Sand	1										1														
129	1.5	N	M	P	Org.	1				1	1					1														
119	1.5	N	M	P	Org.	1					1					1														
109	1	N	M	P	Org.	1										1														
99	1	N	M	P	Org.	1										1														
89	1	N	M	P	Org.	1					1					1														
78	3.5	N	M	P	Org.	1										1														
68	2	N	M	P	Org.	1										1														
58	3.5	N	M	P	Org.	1				1						1														

Incidentals: Typha sp.

(10)

Non-nav points are noted on the PI map.

Waterbody/Project: Trego Date:

Crew: Laura Sass Heather Lutzow

Sampling Point	Depth (ft) CWD (Y/N)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	C. demersum R. crispus	M. spicatum M. sibiricum	P. zosteriformis E. canadensis	N. odorata N. variegata	U. trisulca S. fluctuans	L. minor
32	3.5 N	M	P	Org.	0						
19	2.5 N	M	P	Org.	0						
18	3.5 N	M	P	Org.	1	1		1		1	
17	1.5 N	M	P	Org.	1					1	
13	1 N	M	P	Org	1						1
16	1.5 N	M	P	Org.	0						
23	3.5 N	M	P	Org	1			1			
28	3 N	M	P	Org.	1	1					1
59	1.5 N	M	P	Org.	1					1	
69	0.5 N	M	P	Org	0						
71	2.5 N	S	P	Sand	0						
84	3 N	S	P	Sand	0						
94	2.5 N	S	P	Sand	0						
111	1.5 N	S	P	Sand	0						
110	1.5 N	S	P	Sand	0						

NN = Non-nav.

Waterbody/Project: Trego Flowage Date: 6/9/2022

Crew: Laura Sass, Heather Lutzow, Kellen Black

Sampling Point	Depth (ft)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Woody Debris? YES(Y)/NO(N)	Ceratophyllum demersum	Potamogeton zosteriformis	Elodea Canadensis	Myriophyllum sibiricum	Utricularia vulgaris	Potamogeton amplifolius	Lemna Trisulca	Nuphar Variegata								
493	4.0	M	P	org	2	Y	1	1	1	1	V.	V	V	V								
489	7.5	R	P	gravel	0	N																
13	NN	—	—	—	—	—																
294	9.4	S	P	wood	0	Y																
283	3.4	S	P	sand	0	Y																
271	10.5	S	P	sand	0	N																

ATTACHMENT D

Trego Point-Intercept/AIS Survey Field Data Sheets – July/August

Waterbody/Project: Trego Lake Date: 7-20-22
Crew: Sass / Lutzow

Sampling Point	Depth (ft)	CWD? Y or N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Myriophyllum spicatum, EWM	Potamogeton crispus, CLP	Bidens beckii	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Nitella sp.
19	2	N	M	P	Org.	1						1		1	1		
23	3	N	m	P	Org	1								1	1		
29	2.8	N	M	P	Silt	1				1		1		1	1		1
32	2.5	N	m	P	org.	1								1			1
37	3	N	m	P	org	1				1							1
41	2	Yes	m	P	Org.	1				1		1					
40	2.5	N	m	P	Org.	1				1		1					1
39	3	N	m	P	Org.	1				1		1					1
35	2.5	N	m	P	Org	3				3		1		1			1
21	2.5	N	M	P	Org.	2				1		2		1			
42	1.8	N	M	P	Org.	2				1	1	1		1	1		1
43	3.5	N	M	P	Org.	2		1		2					1		
24	3.8	N	m	P	Org	3				1	1						3
45	1	N	S	P	Sand	∅											
51	3.5	N	m	P	Org.	1						1					1
52	3.5	N	m	P	Org	1						1					1
49	3.5	N	M	P	Org	3	1					3		1			
48	4	N	M	P	Org	1						1	1				1
56	4	N	m	P	Org.	1				1							1
57	4.7	N	m	P	Org	1				1		1					
58	2	N	m	P	Org.	∅											
59	1.3	N	M	P	Org	∅											
175	3.5	N	m	P	Org.	1											
137	3.5	N	m	P	Org	1	1			1		1					
170	3.5	N	m	P	Org	∅											
159	3.5	N	m	P	Org	3				3		1					
149	4.5	N	M	P	Org	1						1					
139	2.5	N	m	P	Org	∅											
140	1.5	Y	S	P	Sand	1											
121	0.2	N	S	P	Sand	1							1				
111	1	N	S	P	Sand	∅											
112	2	N	S	P	Sand	∅											
506	1	N	S	P	Sand	∅											
505	2.5	N	S	P	Sand	1						1					

Sampling Point	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton friesii	Potamogeton natans	Potamogeton praelongus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Ranunculus aquatilis	Sparganium eurycarpum	Sparganium fluctuans	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana	Wolffia	C. echinatum (3 fires)	F. Alga	N. flexilis	Tolypella intricata
19				1					1				1			1	1				
23				1																	
29													1			1		1			
32													1								
37																					
41		1							1				1								
40													1								
39													1						1		
35													2								
21									1												
42													1			2	1			1	
43								1					1								
24								1	1												1
45																					
51				1									1								
52																			1		
49									1	1											
48																					1
56																1					
57									1				1						1		1
58																					
59																					
175																1					
137									1												
170																					
159									2												
149									1												
139																					
140				1					1												
121																					
111																					
112																					
506																					
505																1					

↳ Visual on Zizania

Waterbody/Project: _____ Trego Lake _____ Date: 7-20-22

Crew: SASS / Lutzow

Sampling Point	Depth (ft)	CWD? Y or N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Myriophyllum spicatum, EWM	Potamogeton crispus, CLP	Bidens beckii	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton friesii	Potamogeton natans	Potamogeton praelongus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Ranunculus aquatilis	Sparganium eurycarpum	Sparganium fluctuans	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana	Zizania sp.
507	1.5	N	m	P	Org.	0																												
508	2.5	N	m	P	Org.	0																												
504	2.5	N	S	P	Sand	0																												
501	5.5	N	R	P	Boulder	0																												
498	2	N	m	P	Org.	3																	3								2			
497	5.5	N	R	P	cobble	1																									1			
496	3.5	N	S	P	Sand	0																												
495	4.5	N	m	P	Org.	0																												
165	5.5	N	R	P	cobble	0																												
164	3.5	N	S	P	Sand	0																												
163	2.5	N	S	P	Sand	0																												
162	2.5	N	S	P	Sand	0																												
161	3.5	N	R	P	cobble	0																												
55	1.5	N	S	P	Sand	0																												
54	3	N	S	P	Sand	0																												
53	2	N	S	P	Sand	0																												
29	3.5	N	m	P	Org.	2			2		1							1				1									1			
25	3.5	N	M	P	org	2			1		2												1											
24	2.5	N	m	P	Org	3			2		1		V		V		V				V	3				V								
21	2.5	N	m	P	Org.	3		3		1																								
26	3.5	N	M	P	Org	3				1											1	3									1			
30	3.5	N	M	P	Org	2				2												1									1			
34	4	N	m	P	Org	3		1	1	3												2												
38	4	N	M	P	Org.	3		2		3							1				1	1												
52	7	N	S	P	cobble	0																												
160	1.5	N	m	P	Org.	1				1													1								1			
72	2	N	S	P	Sand	0																												
85	1.5	N	S	P	Sand	0																												
95	1	N	S	P	Sand	0																												
84	3	N	S	P	Sand	0																												
44	2	N	S	P	Sand	0																												
71	2	N	S	P	Sand	0																												
19	2	N	M	P	Org.	0																												
18	3	N	m	P	Org	1																									1			

JAK

Waterbody/Project: Trego   Date: 8/1/2022

Crew: Laura Sass, Kollen Black

Sampling Point	Depth (ft)	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Elodea canadensis	Spirodella polyrhiza	Sagittaria latifolia	Sparganium Eurycarpum	Nuphar variegata	Heteranthera dubia	Lemna minor	Potamogeton zosteriformis	Ceratophyllum demersum	Myriophyllum spicatum (EWM)
521	1.4	M	P	org	3	3	1	V	V	V					
520	2.9	S	P	sand	1						1				
519	1.2	S	P	sand	Ø										
518	2.2	S	P	sand	Ø										
517	NN-	Terrestrial		–	–										
516	NN-	Plants		–	–										
515	1.5	S	P	Sand	Ø										
514	1.5	S	P	Sand	Ø										
513	1.4	M	P	org	2		V		1	V		V	1		1
512	1.9	S	P	Sand	Ø										
511	1.5	S	P	sand	Ø										
510	2.4	S	P	sand	Ø										

Incidentals: Sagittaria cristata

✓JAK

Waterbody/Project: Trego Lake Date: 8/4/2022
Crew: Laura Sass Heather Lutzow

Sampling Point	Depth (ft)	CWD? Y or N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Myriophyllum spicatum, EWM	Potamogeton crispus, CLP	Bidens beckii	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton friesii	Potamogeton natans	Potamogeton praelongus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Ranunculus aquatilis	Sparganium eurycarpum	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana
255	10.0	N	M	P	org	3										3																
267	2.5	N	S	P	sand	1	1			1		1											1							1		
279	13.0	N	M	P	org	Ø																										
280	13.5	N	M	P	org	Ø																										
268	13.0	N	M	P	org	3																										
256	5.5	N	M	P	org	3				3		3																				
247	1.5	N	M	P	org	3						1													3							
257	11.0	N	M	P	org	Ø																										
258	6.8	N	M	P	org	2				2																				2		
259	4.0	N	M	P	org	2				2											1		1							2		
270	9.0	N	M	P	org	2				2																						
269	13.5	N	M	P	org	Ø																										
281	11.3	N	M	P	org	Ø																										
282	2.0	N	S	P	sand	1				1		1																		1		
293	1.0	N	S	P	Sand	1																								1		
308	2.8	N	R	P	grav	Ø																										
309	10.5	N	M	P	org	Ø																										
294	8.8	N	M	P	org	Ø																										
295	9.5	N	M	P	org	1										1																
283	5.7	N	M	P	sand	Ø																										
284	11.0	N	M	P	org	Ø																										
271	10.0	N	R	P	grav	Ø																										
260	13.5	N	M	P	org	Ø																										
249	1.5	Y	S	P	sand	1																								1		

JAK

Waterbody/Project: Trego Lake Date: 8/4/2022

Crew: Laura Sass Heather Lutzow

Sampling Point	Depth (ft)	CWD? Y or N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Myriophyllum spicatum, EWM	Potamogeton crispus, CLP	Bidens beckii	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton friesii	Potamogeton natans	Potamogeton praelongus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Ranunculus aquatilis	Sparganium eurycarpum	Sparganium fluctuans	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana
459	4.5	N	M	P	org	2	2				1											1								1			
460	3.5	N	S	P	Sand	0					1																			2			
455	2.0	N	S	P	Sand	1			1		1																			1			
456	11.0	N	S	P	Sand	1			1																								
450	1.5	N	S	P	sand	2																								2			
445	16.0	-	-	-	—	1																											
443	3.5	Y	S	P	sand	0																											
435	2.5	N	M	P	org	2	1		1		2		1									1				1				2			
432	5.0	N	M	P	org	3			2													1								2			
429	6.0	N	S	P	Sand	2			2																					2			
425	13.4	N	S	P	Sand	0																											
408	6.5	N	M	P	org	3			2													1								3			
413	16.0	-	-	-	—	—																											
393	3.0	N	S	P	Sand	0																											
363	3.0	Y	R	P	gravel	2																								2			
364	2.5	N	R	P	Gravel	0																											
360	7.0	N	R	P	Gravel	0																											
357	5.5	N	M	P	org	0																											
351	11.5	Y	S	P	Sand	0																											
349	7.8	N	R	P	grav	0																											
336	10.0	N	M	P	org	0																											
332	10.9	N	M	P	org	0																											
328	11.5	Y	S	P	Sand	0																											
319	8.0	N	M	P	org	1																								1			
304	13.5	N	M	P	org	0																											
289	10.5	N	M	P	org	0																											
290	13.5	N	M	P	org	0																											
285	13.5	N	M	P	org	0																											
280	14.5	N	M	P	org	0																											
277	10.0	N	M	P	org	2										2																	
265	8.5	N	M	P	org	3			3																								
266	10.0	N	M	P	org	2										2																	
254	4.0	N	M	P	org	3			3		1																			1			
246	2.5	N	M	P	org	2	1		1		1																			1			

✓ JAK

Waterbody/Project: Trego Lake Date: 8/4/2022
Crew: Laura Sass, Heather Lutzow

Sampling Point	Depth (ft)	CWD? Y or N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Myriophyllum spicatum, EWM	Potamogeton crispus, CLP	Bidens beckii	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton friesii	Potamogeton natans	Potamogeton praelongus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Ranunculus aquatilis	Sparganium eurycarpum	Sparganium fluctuans	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana
325	5.0	Y	M	P	org	0																											
324	13.0	N	M	P	org	0																											
303	14.5	N	M	P	org	0																											
307	13.0	N	M	P	org	0																											
592	12.6	N	M	P	org	0																											
291	12.7	N	M	P	org	0																											
306	13.0	N	M	P	org	0																											
322	10.3	N	M	P	org	0																											
321	13.6	N	M	P	org	0																											
331	12.5	N	M	P	org	0																											
335	13.7	N	M	P	org	0																											
339	13.7	N	M	P	org	0																											
340	4.0	N	S	P	sand	0																											
341	11.0	N	S	P	sand	0																											
343	13.3	N	M	P	org	0																											
346	5.2	-	-	-	-	-																											
348	12.4	-	-	-	-	-																											
354	2.5	N	S	P	sand	2																											
367	1.3	N	S	P	sand	0																											
378	15.4	-	-	-	-	-																											
389	13.2	N	M	P	org	0																											
396	2.9	Y	S	P	sand	3																											
411	8.5	N	R	P	grav	3																											
428	2.0	N	S	P	sand	0																											
438	10.0	N	M	P	org	0																											
446	12.0	Y	S	P	sand	0																											
471	5.0	Y	S	P	sand	0																											
478	12.5	N	R	P	grav	0																											
489	2.5	N	S	P	sand	2			5																								
484	10.0	N	S	P	sand	3			3		1																						
483	5.5	N	M	P	org	3			2																								
488	3.0	N	S	P	sand	2					2																						
493	7.2	N	M	P	org	2			1		1																						
278	10.0	N	M	P	org	0																											

JAK

Waterbody/Project: Trego Lake Date: 8/4/2022
Crew: Laura Jass + Heather Lutzow

Sampling Point	Depth (ft)	CWD? Y or N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Myriophyllum spicatum, EWM	Potamogeton crispus, CLP	Bidens beckii	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton friesii	Potamogeton natans	Potamogeton praelongus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Ranunculus aquatilis	Sparganium eurycarpum	Sparganium fluctuans	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana
260	13.2	N	M	P	org	0																											
259	11.9	N	M	P	org	0																											
263	11.2	N	M	P	org	0																											
274	11.0	N	M	P	org	1				1																							
275	7.1	N	M	P	org	0																											
280	6.0	N	M	P	org	0																											
299	8.0	N	M	P	org	0																											
300	5.5	N	M	P	org	0																											
314	12.3	N	S	P	sand	0																											
317	13.3	N	R	P	gravel	0																											
315	11.0	N	M	P	org	0																											
316	11.6	N	M	P	org	0																											
317	12.6	N	S	P	sand	0																											
318	12.0	N	R	P	gravel	0																											
301	0.5	N	R	P	gravel	0																											
302	11.0	N	R	P	boulder	0																											
287	13.5	N	R	P	cobble	0																											
276	11.5	N	S	P	Sand	0																											
264	7.5	N	S	P	sand	0																											
253	10.0	N	S	P	sand	0																											
242	8.8	N	S	P	sand	0																											
238	7.3	N	M	P	org	0																											
229	3.5	N	S	P	sand	1																											
230	9.0	N	M	P	org	0																											
231	10.5	N	M	P	org	0																											
232	10.5	N	S	P	sand	0																											
233	11.0	N	S	P	sand	0																											
224	5.5	Y	M	P	org	1				1																							
225	5.0	N	M	P	org	0																											
226	5.5	N	M	P	org	1										1																	
227	5.5	N	M	P	org	1				1						1																	
223	9.0	N	M	P	org	0																									1		
221	3.5	N	S	P	sand	1																									1		
219	0.8	N	S	P	sand	1						1																			1		

✓JAK

Waterbody/Project: Trego Lake Date: 8/4/2022

Crew: Laura Sass Heather Hitzroth

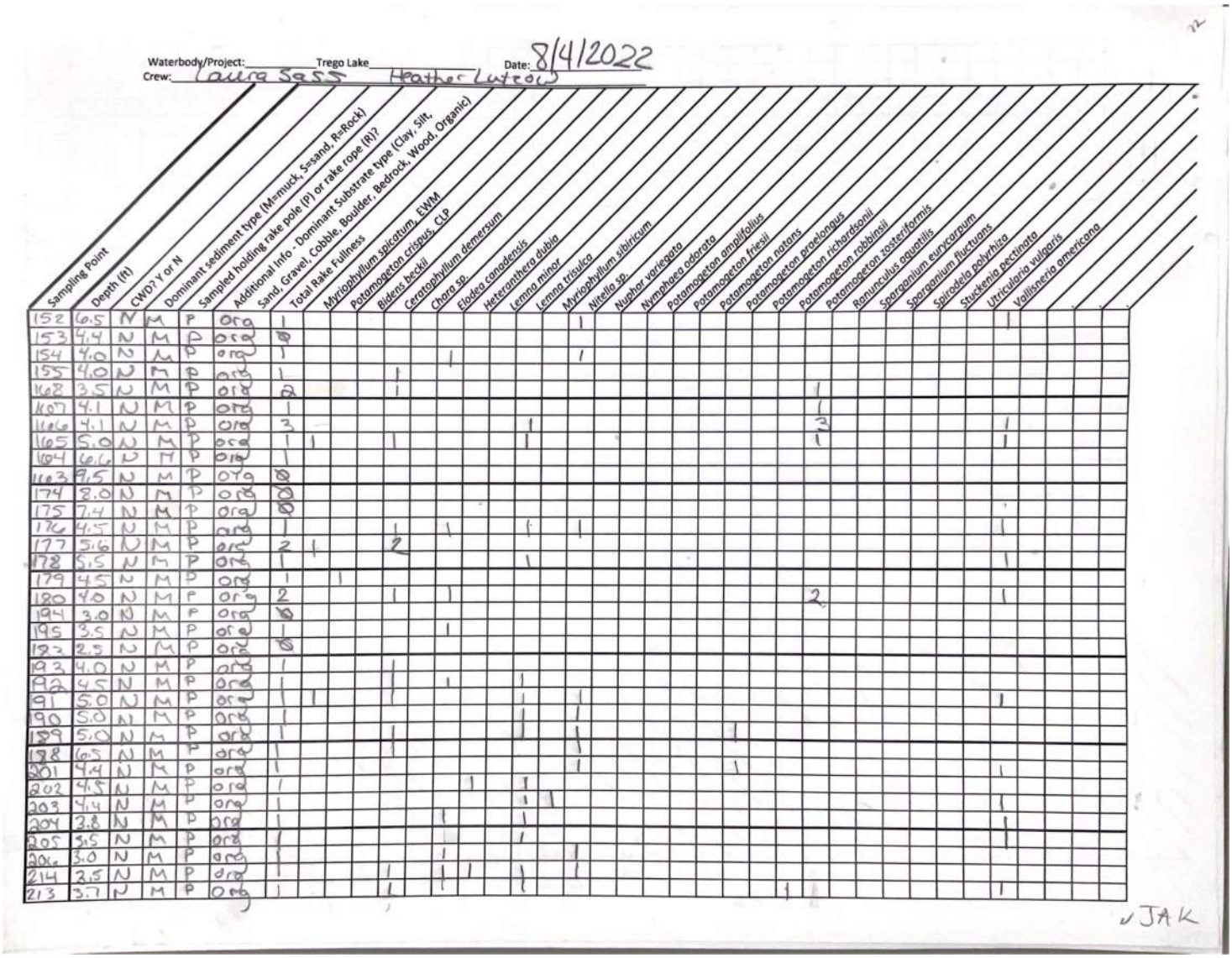
Sampling Point	Depth (ft)	CWD? Y or N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Myriophyllum spicatum, EWM	Potamogeton crispus, CLP	Bidens beckii	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton friesii	Potamogeton natans	Potamogeton praelongus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Ranunculus aquatilis	Sparganium eurycarpum	Sparganium fluctuans	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana
218	3.8	N	M	P	org	1			1		1			1																			
217	4.0	N	R	P	gravel	0																											
212	4.1	N	M	P	org	2					1		1			2																	
211	3.9	N	M	P	org	2			1	1						2							1							1			
200	3.2	N	M	P	org	1			1										1														
187	7.5	Y	M	D	org	1			1					1																1			
199	1.5	N	S	R	sand	1																								1			
186	8.4	N	M	P	org	0																	1							1			
198	6.4	N	M	P	org	1			1																								
209	7.0	Y	M	P	org	0																											
208	7.2	N	M	P	org	1										1																	
210	10.0	N	M	P	org	3										1														3			
220	10.0	N	M	P	org	1										1																	
222	4.3	N	M	P	org	1			1														1										
208	9.5	N	S	P	sand	0																											
237	6.9	N	M	P	org	3			1																					3			
240	11.5	N	S	P	sand	0																											
235	12.0	N	S	P	sand	0																											
234	10.0	N	R	P	gravel	0								1																			
241	10.0	N	M	P	org	1			1																								
240	7.0	N	M	P	org	2										2																	
239	10.5	N	S	P	sand	0																											
307	5.8	Y	M	P	org	1																	1										
262	5.5	N	M	P	org	3			3																					3			
261	5.8	N	M	P	org	3																											
273	8.5	N	M	P	org	0																											
272	8.0	N	M	P	org	1										1																	
285	9.0	N	M	P	org	1										1																	
298	9.6	Y	M	P	org	0																											
297	10.0	N	M	P	org	0																											
296	11.5	N	M	P	org	0																											
312	12.5	N	M	P	org	0																											
311	13.3	N	M	P	org	0																											
310	11.5	N	M	P	org	0																											

JAR

Waterbody/Project: Trego Lake Date: 8/4/2022
Crew: Laura Sass Heather Lutzow

Sampling Point	Depth (ft)	CWD? Y or N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Myriophyllum spicatum, EWM	Potamogeton crispus, CLP	Bidens beckii	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton friesii	Potamogeton natans	Potamogeton praelongus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Ranunculus aquatilis	Sparganium eurycarpum	Sparganium fluctuans	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana	Zizania sp.
215	9.0	N	S	P	sand	0																												
207	9.8	N	M	P	org	0																												
196	9.0	N	S	P	sand	0																												
197	7.0	N	M	P	org	1									1																			
185	8.0	N	M	P	org	0																												
172	5.5	N	M	P	org	1			1				1																					
173	4.0	N	M	P	org	1					1				1																	1		
160	5.0	N	M	P	org	1					1		1		1																	1		
161	3.5	N	M	P	org	2			1		1		2		1																			
162	3.8	N	M	P	org	0																												
150	2.5	N	M	P	org	0																												
151	9.0	N	M	P	org	0																												
141	1.0	N	M	P	sand	0																												
132	3.0	N	M	P	org.	0																												
122	8.0	N	M	P	org	1									1																			
113	5.0	N	M	P	org	2																1				1						2		
104	4.5	N	M	P	org	2									1																	2		
105	5.5	N	M	P	org	0																										1		
96	6.4	N	M	P	org	1																												
87	4.0	N	M	P	org	1																1									1			
116	4.5	N	M	P	org	3																										3		
106	3.5	N	M	P	org	1			1													1										1		
107	3.8	N	M	P	org	1					1																						1		
114	4.4	N	M	P	org	1																										1		
123	5.0	N	M	P	org	0																												
124	3.8	N	M	P	org	2			1				1									1												
135	3.8	N	M	P	org	1	1								1																			
136	3.5	N	M	P	org	1		1			1																							
145	8.9	N	M	P	org	1									1																			
144	3.8	N	M	P	org	1					1		1		1																			
134	4.0	N	M	P	org	0																												
133	5.7	N	M	P	org	0																												
142	7.5	N	M	P	org	0																												
143	4.1	N	M	P	org	1									1																			

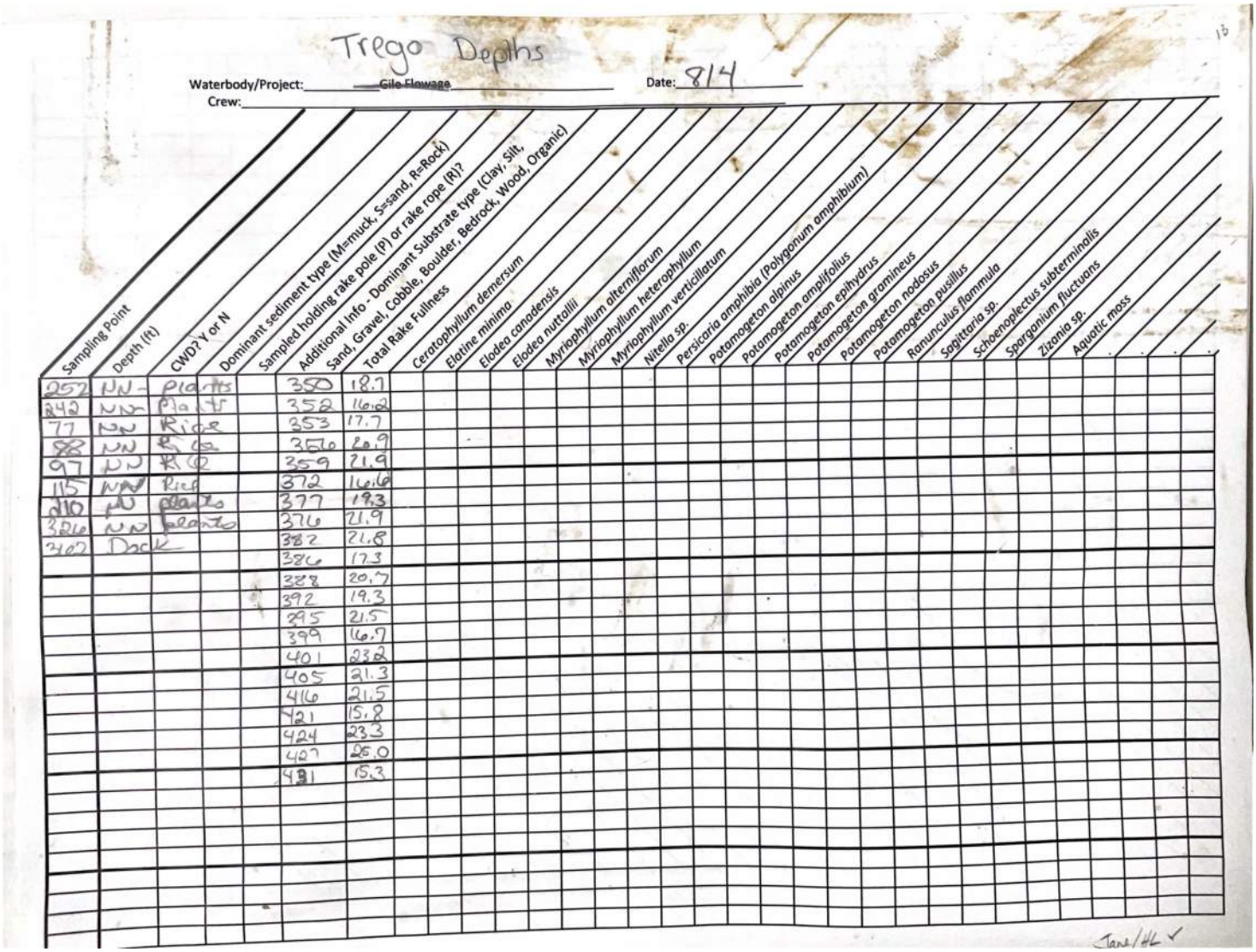
JAK



Waterbody/Project: Trego Lake Date: 8/4/2022
Crew: Laura Sass Heather Lutrow

Sampling Point	Depth (ft)	CWD? Y or N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Myriophyllum spicatum, EWM	Potamogeton crispus, CLP	Bidens beckii	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton friesii	Potamogeton natans	Potamogeton praelongus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Ranunculus aquatilis	Sparganium eurycarpum	Sparganium fluctuans	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana
152	6.5	N	M	P	org	1									1																1		
153	4.4	N	M	P	org	0																											
154	4.0	N	M	P	org	1					1				1																		
155	4.0	N	M	P	org	1			1																								
168	3.5	N	M	P	org	2			1																1								
167	4.1	N	M	P	org	1																			1								
166	4.1	N	M	P	org	3							1												1						1		
165	5.0	N	M	P	org	1	1		1				1												1						1		
164	6.6	N	M	P	org	1																											
163	9.5	N	M	P	org	0																											
174	8.0	N	M	P	org	0																											
175	7.4	N	M	P	org	0																											
176	4.5	N	M	P	org	1			1		1		1		1																1		
177	5.6	N	M	P	org	2	1		2				1																		1		
178	5.5	N	M	P	org	1							1																		1		
179	4.5	N	M	P	org	1	1																										
180	4.0	N	M	P	org	2			1		1														2						1		
194	3.0	N	M	P	org	0																											
195	3.5	N	M	P	org	1					1																						
192	2.5	N	M	P	org	0																											
193	4.0	N	M	P	org	1																											
92	4.5	N	M	P	org	1					1		1		1																		
191	5.0	N	M	P	org	1	1		1				1		1																1		
190	5.0	N	M	P	org	1							1		1																		
189	5.0	N	M	P	org	1			1				1		1					1													
188	6.5	N	M	P	org	1							1		1					1													
201	4.4	N	M	P	org	1																									1		
202	4.5	N	M	P	org	1					1		1																				
203	4.4	N	M	P	org	1							1		1																1		
204	3.8	N	M	P	org	1					1		1																				
205	3.5	N	M	P	org	1					1		1																		1		
206	3.0	N	M	P	org	1					1				1																		
214	3.5	N	M	P	org	1			1		1		1																				
213	3.7	N	M	P	org	1			1				1												1						1		

JAK



Trego Depths

Waterbody/Project: Gile Flowage Date: 8/4

Crew:

Sampling Point	Depth (ft)	CWD? Y or N	Dominant sediment type (M=muck, S=sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Ceratophyllum demersum	Elatine minima	Elodea canadensis	Elodea nuttallii	Myriophyllum alterniflorum	Myriophyllum heterophyllum	Myriophyllum verticillatum	Nitella sp.	Persicaria amphibia (Polygonum amphibium)	Potamogeton alpinus	Potamogeton amplifolius	Potamogeton epihydrus	Potamogeton gramineus	Potamogeton nodosus	Potamogeton pusillus	Ranunculus flammula	Sagittaria sp.	Schoenoplectus subterminalis	Spargonium fluctuans	Zizania sp.	Aquatic moss
252	NN	plants				350	18.1																				
242	NN	Plants				352	16.2																				
77	NN	Rock				353	17.7																				
88	NN	R Co				356	20.9																				
97	NN	R Co				359	21.9																				
115	NN	Rock				372	16.6																				
210	NN	plants				377	19.3																				
326	NN	plants				376	21.9																				
307	Dock					382	21.8																				
						386	17.3																				
						388	20.7																				
						392	19.3																				
						395	21.5																				
						399	16.7																				
						401	23.2																				
						405	21.3																				
						416	21.5																				
						421	15.8																				
						424	23.3																				
						427	25.0																				
						431	15.3																				

Jane/HL ✓

ATTACHMENT E
Photo Log

Hayward and Trego Aquatic and Terrestrial Species Study Report Photo Log

	
Yellow iris growing along the Hayward Lake shoreline, near the WI-77 bridge. 46.0105333, -91.45753611, June 8, 2022	Purple loosestrife near the Hayward Lake public boat launch. 46.00919, -91.479261, August 2, 2022
	
Recording aquatic plant data during the point-intercept survey in a heavily vegetated area. 46.0044666, -91.461097222, June 8, 2022	Japanese mystery snail found in Hayward Lake. 46.0095888, -91.4727555, June 7, 2022

	
Narrow-leaved cattail growing in Trego Lake. 45.91019444, -91.8340527778, July 20, 2022	Purple loosestrife being removed on Trego Lake. 45.910374, -91.833862, July 20, 2022
	
Yellow iris growing along the shoreline of Trego Lake. 45.9175749972, -91.848052775, June 6, 2022	An assortment of snails found near boat launches during the sediment sampling at Trego Lake. 45.909531, -91.824674, June 10, 2022

Dense honeysuckle and buckthorn near the downstream Hayward Dam during a terrestrial meander.
46.006645, -91.485340, August 3, 2022

Dense knapweed on NSPW-owned land near the Hayward Dam.
46.007639, -91.485386, August 3, 2022

Bay at northeast end of Trego Lake with purple loosestrife along much of the shoreline.
45.949049, -91.879788, August 5, 2022

Large, dense beds of wild rice near the south end of Trego Lake.
45.912055, -91.843041, August 4, 2022

Dense bed of aquatic forget-me-not and emergent species in the east portion Hayward Lake.
46.004454, -91.453852, August 5, 2022

ATTACHMENT F
Hayward WDNR Incident Report Forms

State of Wisconsin
Department of Natural Resources
Wisconsin Lakes Partnership

Aquatic Invasive Plant Incident Report

Form 3200-125 (R 2/10)

The purpose of this form is to notify DNR of a new species of AIS in a waterbody. Only use if you found an aquatic invasive plant on a lake where it hasn't been found previously.

To find where aquatic invasives have already been found, visit: http://dnr.wi.gov/lakes/ais.

Notice: Information on this voluntary form is collected under ss. 33.02 and 281.11, Wis. Stats. Personally identifiable information collected on this form will be incorporated into the DNR Surface Water Integrated Monitoring System (SWIMS) Database. It is not intended to be used for any other purposes, but may be made available to requesters under Wisconsin's Open Records laws, ss. 19.32 - 19.39, Wis. Stats.

Primary Data Collector

Name	Phone Number	Email
Laura Sass	920-328-0980	L.Sass@gaiconsultants.com

Monitoring Location

Waterbody Name	Township Name	County
Hayward Lake	Hayward	Sawyer

Boat Landing (if you only monitor at a boat landing)

Date and Time of Monitoring or Discovery

Monitoring Date	Start Time	End Time
6-7-2022		

Information on the Aquatic Invasive Plant Found (Fill out one form for each species found.)

Which aquatic invasive plant did you find?:

- ☐ Curly-leaf Pondweed
- ☐ Eurasian Water-milfoil
- ☐ Purple Loosestrife
- ☐ Brittle Naiad
- ☐ Hydrilla
- ☐ Brazilian Waterweed
- ☐ Yellow Floating Heart

Where did you find the invasive plant?

Pale yellow iris - observed in many shoreline locations throughout the lake (photo available on the next page)

Latitude:	Longitude:

Approximately how large an area do the plants occupy?

- ☐ A Few Plants
- ☐ One or a few beds
- ☒ Many beds
- ☐ A Whole Bay or Portion of Lake
- ☐ Widespread, covering most shallow areas of lake
- ☐ Don't know (e.g. didn't check the whole lake)

Was the plant floating or rooted?

- ☐ Floating
- ☒ Rooted

Estimated percent cover in the area where the invasive was found (optional)

Substrate cobble, %	Substrate muck, %	Substrate boulders, %	Substrate sand, %	Bottom covered with plants, %

Voucher Sample

Did you collect a sample of the plant (a voucher specimen) and bring it to your local DNR office? If so, which office?

- ☐ Rhinelander
- ☐ Spooner
- ☐ Green Bay
- ☐ Oshkosh
- ☒ Did not take plant sample to a DNR office
- ☐ Fitchburg
- ☐ Waukesha
- ☐ Eau Claire
- ☐ Superior
- ☐ Other Office _____

Please collect up to 5-10 intact specimens. Try to get the root system, all leaves as well as seed heads and flowers when present. Place in ziplock bag with no water. Place on ice and transport to refrigerator. Bring samples, a copy of this form, along with a map showing where you found the suspect plants to your regional AIS or Citizen Lake Monitoring Coordinator at the DNR.

For DNR AIS Coordinator to fill out

AIS Coordinator(s) or qualified field staff who verified the occurrence: _____

Statewide taxanomic expert who verified the occurrence: _____
(for list see http://dnr.wi.gov/invasives/aquatic/whattodo/staff/AisVerificationExperts.pdf)

Was the specimen confirmed as the species indicated above? ☐ Yes ☐ No — If no, what was it?

Herbarium where specimen is housed: _____ Herbarium Specimen ID: _____

Have you entered the results of the voucher in SWIMS? ☐ Yes ☐ No

AIS Coordinator: Please enter the incident report in SWIMS under the Incident Report project for the county the AIS was found in. Then, keep the paper copy for your records.

State of Wisconsin
Department of Natural Resources
Wisconsin Lakes Partnership

Aquatic Invasive Plant Incident Report

Form 3200-125 (R 2/10)

The purpose of this form is to notify DNR of a new species of AIS in a waterbody. Only use if you found an aquatic invasive plant on a lake where it hasn't been found previously.

To find where aquatic invasives have already been found, visit: http://dnr.wi.gov/lakes/ais.

Notice: Information on this voluntary form is collected under ss. 33.02 and 281.11, Wis. Stats. Personally identifiable information collected on this form will be incorporated into the DNR Surface Water Integrated Monitoring System (SWIMS) Database. It is not intended to be used for any other purposes, but may be made available to requesters under Wisconsin's Open Records laws, ss. 19.32 - 19.39, Wis. Stats.

Primary Data Collector

Name	Phone Number	Email
Laura Sass	920-328-0980	L.Sass@gaiconsultants.com

Monitoring Location

Waterbody Name	Township Name	County
Hayward Lake	Hayward	Sawyer

Boat Landing (if you only monitor at a boat landing)

Date and Time of Monitoring or Discovery

Monitoring Date	Start Time	End Time
6-8-2022		

Information on the Aquatic Invasive Plant Found (Fill out one form for each species found.)

Which aquatic invasive plant did you find?:

- ☐ Curly-leaf Pondweed
- ☐ Eurasian Water-milfoil
- ☐ Purple Loosestrife
- ☐ Brittle Naiad
- ☐ Hydrilla
- ☐ Brazilian Waterweed
- ☐ Yellow Floating Heart

Where did you find the invasive plant?

This is to report aquatic forget-me-not; found in 2 locations along shore, nearby to GPS coordinates below. Photo documentation not feasible due to access limitations.

Latitude: 46.00855915795532 Longitude: -91.45869357790528

Approximately how large an area do the plants occupy?

- ☒ A Few Plants
- ☐ One or a few beds
- ☐ Many beds
- ☐ A Whole Bay or Portion of Lake
- ☐ Widespread, covering most shallow areas of lake
- ☐ Don't know (e.g. didn't check the whole lake)

Was the plant floating or rooted?

- ☐ Floating
- ☒ Rooted

Estimated percent cover in the area where the invasive was found (optional)

Substrate cobble, %	Substrate muck, %	Substrate boulders, %	Substrate sand, %	Bottom covered with plants, %

Voucher Sample

Did you collect a sample of the plant (a voucher specimen) and bring it to your local DNR office? If so, which office?

- ☐ Rhinelander
- ☐ Spooner
- ☐ Green Bay
- ☐ Oshkosh
- ☒ Did not take plant sample to a DNR office
- ☐ Fitchburg
- ☐ Waukesha
- ☐ Eau Claire
- ☐ Superior
- ☐ Other Office _____

Please collect up to 5-10 intact specimens. Try to get the root system, all leaves as well as seed heads and flowers when present. Place in ziplock bag with no water. Place on ice and transport to refrigerator. Bring samples, a copy of this form, along with a map showing where you found the suspect plants to your regional AIS or Citizen Lake Monitoring Coordinator at the DNR.

For DNR AIS Coordinator to fill out

AIS Coordinator(s) or qualified field staff who verified the occurrence: _____

Statewide taxanomic expert who verified the occurrence: _____
(for list see http://dnr.wi.gov/invasives/aquatic/whattodo/staff/AisVerificationExperts.pdf)

Was the specimen confirmed as the species indicated above? ☐ Yes ☐ No If no, what was it?

Herbarium where specimen is housed: _____ Herbarium Specimen ID: _____

Have you entered the results of the voucher in SWIMS? ☐ Yes ☐ No

AIS Coordinator: Please enter the incident report in SWIMS under the Incident Report project for the county the AIS was found in. Then, keep the paper copy for your records.

ATTACHMENT G
Hayward Terrestrial Survey Field Data

Terrestrial Invasive Species Monitoring Form

Project	Hayward
County	Sawyer
Date	8/2/2022; 8/3/2022
Field Crew	Kellen Black
	Heather Lutzow
	Laura Sass

Site #	Landcover Classification	Starting latitude	Starting longitude	Abundance = Daubenmire Scale; Length = ft.	Common buckthorn	Eurasian honeysuckle	Spotted knapweed	Narrow-leaf cattail	Yellow Iris	Tansy	Glossy buckthorn	Purple loosestrife	Aquatic forget-me-not	
1	Developed - Residential	46.0087073	-91.48209123	Relative Abundance		2	1		1	1	2	1		
				Length of Shoreline		342	60		35	65	332	15		
2	Developed - Residential / Northern Mesic Forest	46.0093846	-91.46804122	Relative Abundance	2	2	1	1	1	1	1	1	1	
				Length of Shoreline	2506	4130	583	79	311	25	1299	1781	2204	
	Hayward Lake Boat Landing and Hayward City Beach	46.0092070	-91.47778859	Relative Abundance	2	2	2			1	2			
				Length of Shoreline	1075	1095	783			138	328			
	East and South of Dam	46.0058979	-91.48425677	Relative Abundance	2	3	3			1	3	1	2	
				Length of Shoreline	508	1279	2218			229	1279	5	290	
	West and South of Dam	46.0051798	-91.48626946	Relative Abundance	3	3				1	3	1		
				Length of Shoreline	2301	3105				5	2291	25		
				Relative Abundance										
				Length of Shoreline										
				Relative Abundance										
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ATTACHMENT H
Trego WDNR Incident Report Forms

State of Wisconsin
Department of Natural Resources
Wisconsin Lakes Partnership

Aquatic Invasive Plant Incident Report

Form 3200-125 (R 2/10)

The purpose of this form is to notify DNR of a new species of AIS in a waterbody. Only use if you found an aquatic invasive plant on a lake where it hasn't been found previously.

To find where aquatic invasives have already been found, visit: http://dnr.wi.gov/lakes/ais.

Notice: Information on this voluntary form is collected under ss. 33.02 and 281.11, Wis. Stats. Personally identifiable information collected on this form will be incorporated into the DNR Surface Water Integrated Monitoring System (SWIMS) Database. It is not intended to be used for any other purposes, but may be made available to requesters under Wisconsin's Open Records laws, ss. 19.32 - 19.39, Wis. Stats.

Primary Data Collector

Name	Phone Number	Email
Laura Sass	920-328-0980	L.Sass@gaiconsultants.com

Monitoring Location

Waterbody Name	Township Name	County
Trego Lake	Trego	Washburn

Boat Landing (if you only monitor at a boat landing)

Date and Time of Monitoring or Discovery

Monitoring Date	Start Time	End Time
6-6-2022		

Information on the Aquatic Invasive Plant Found (Fill out one form for each species found.)

Which aquatic invasive plant did you find?:

- ☐ Curly-leaf Pondweed
- ☐ Eurasian Water-milfoil
- ☐ Purple Loosestrife
- ☐ Brittle Naiad
- ☐ Hydrilla
- ☐ Brazilian Waterweed
- ☐ Yellow Floating Heart

Where did you find the invasive plant?
Pale yellow iris; Observed in many shoreline locations throughout the lake (photo on next page)

Latitude:	Longitude:

Approximately how large an area do the plants occupy?

- ☐ A Few Plants
- ☐ One or a few beds
- ☒ Many beds
- ☐ A Whole Bay or Portion of Lake
- ☐ Widespread, covering most shallow areas of lake
- ☐ Don't know (e.g. didn't check the whole lake)

Was the plant floating or rooted?

- ☐ Floating
- ☒ Rooted

Estimated percent cover in the area where the invasive was found (optional)

Substrate cobble, %	Substrate muck, %	Substrate boulders, %	Substrate sand, %	Bottom covered with plants, %

Voucher Sample

Did you collect a sample of the plant (a voucher specimen) and bring it to your local DNR office? If so, which office?

- ☐ Rhinelander
- ☐ Spooner
- ☐ Green Bay
- ☐ Oshkosh
- ☒ Did not take plant sample to a DNR office
- ☐ Fitchburg
- ☐ Waukesha
- ☐ Eau Claire
- ☐ Superior
- ☐ Other Office _____

Please collect up to 5-10 intact specimens. Try to get the root system, all leaves as well as seed heads and flowers when present. Place in ziplock bag with no water. Place on ice and transport to refrigerator. Bring samples, a copy of this form, along with a map showing where you found the suspect plants to your regional AIS or Citizen Lake Monitoring Coordinator at the DNR.

For DNR AIS Coordinator to fill out

AIS Coordinator(s) or qualified field staff who verified the occurrence: _____

Statewide taxanomic expert who verified the occurrence: _____
(for list see http://dnr.wi.gov/invasives/aquatic/whattodo/staff/AisVerificationExperts.pdf)

Was the specimen confirmed as the species indicated above? ☐ Yes ☐ No — If no, what was it?

Herbarium where specimen is housed: _____ Herbarium Specimen ID: _____

Have you entered the results of the voucher in SWIMS? ☐ Yes ☐ No

AIS Coordinator: Please enter the incident report in SWIMS under the Incident Report project for the county the AIS was found in. Then, keep the paper copy for your records.

State of Wisconsin
Department of Natural Resources
Wisconsin Lakes Partnership

Aquatic Invasive Plant Incident Report

Form 3200-125 (R 2/10)

The purpose of this form is to notify DNR of a new species of AIS in a waterbody. Only use if you found an aquatic invasive plant on a lake where it hasn't been found previously.

To find where aquatic invasives have already been found, visit: http://dnr.wi.gov/lakes/ais.

Notice: Information on this voluntary form is collected under ss. 33.02 and 281.11, Wis. Stats. Personally identifiable information collected on this form will be incorporated into the DNR Surface Water Integrated Monitoring System (SWIMS) Database. It is not intended to be used for any other purposes, but may be made available to requesters under Wisconsin's Open Records laws, ss. 19.32 - 19.39, Wis. Stats.

Primary Data Collector

Name	Phone Number	Email
Heather Lutzow	920-366-2897	H.Lutzow@gaiconsultants.com

Monitoring Location

Waterbody Name	Township Name	County
Trego Lake	Trego	Washburn

Boat Landing (if you only monitor at a boat landing)

Date and Time of Monitoring or Discovery

Monitoring Date	Start Time	End Time
7-20-2022	late afternoon	

Narrow-leaf cattail

Information on the Aquatic Invasive Plant Found (Fill out one form for each species found.)

Which aquatic invasive plant did you find?:

- ☐ Curly-leaf Pondweed
- ☐ Eurasian Water-milfoil
- ☐ Purple Loosestrife
- ☐ Brittle Naiad
- ☐ Hydrilla
- ☐ Brazilian Waterweed
- ☐ Yellow Floating Heart

Where did you find the invasive plant?
Several large beds appear to be present and will be mapped in more detail during next survey visit. GPS coordinates below are for the first one positively ID'ed

Latitude:	Longitude:
45.910182	-91.834023

Approximately how large an area do the plants occupy?

- ☐ A Few Plants
- ☐ One or a few beds
- ☒ Many beds
- ☐ A Whole Bay or Portion of Lake
- ☐ Widespread, covering most shallow areas of lake
- ☐ Don't know (e.g. didn't check the whole lake)

Was the plant floating or rooted?

- ☐ Floating
- ☒ Rooted

Estimated percent cover in the area where the invasive was found (optional)

Substrate cobble, %	Substrate muck, %	Substrate boulders, %	Substrate sand, %	Bottom covered with plants, %

Voucher Sample

Did you collect a sample of the plant (a voucher specimen) and bring it to your local DNR office? If so, which office?

- ☐ Rhinelander
- ☐ Spooner
- ☐ Green Bay
- ☐ Oshkosh
- ☒ Did not take plant sample to a DNR office
- ☐ Fitchburg
- ☐ Waukesha
- ☐ Eau Claire
- ☐ Superior
- ☐ Other Office _____

Please collect up to 5-10 intact specimens. Try to get the root system, all leaves as well as seed heads and flowers when present. Place in ziplock bag with no water. Place on ice and transport to refrigerator. Bring samples, a copy of this form, along with a map showing where you found the suspect plants to your regional AIS or Citizen Lake Monitoring Coordinator at the DNR.

For DNR AIS Coordinator to fill out

AIS Coordinator(s) or qualified field staff who verified the occurrence: _____

Statewide taxanomic expert who verified the occurrence: _____
(for list see http://dnr.wi.gov/invasives/aquatic/whattodo/staff/AisVerificationExperts.pdf)

Was the specimen confirmed as the species indicated above? ☐ Yes ☐ No — If no, what was it?

Herbarium where specimen is housed: _____ Herbarium Specimen ID: _____

Have you entered the results of the voucher in SWIMS? ☐ Yes ☐ No

AIS Coordinator: Please enter the incident report in SWIMS under the Incident Report project for the county the AIS was found in. Then, keep the paper copy for your records.

State of Wisconsin
Department of Natural Resources
Wisconsin Lakes Partnership

Aquatic Invasive Plant Incident Report

Form 3200-125 (R 2/10)

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Primary Data Collector

Name	Phone Number	Email
Heather Lutzow	920-366-2897	H.Lutzow@gaiconsultants.com

Monitoring Location

Waterbody Name	Township Name	County
Trego Lake	Trego	Washburn

Boat Landing (if you only monitor at a boat landing)

Date and Time of Monitoring or Discovery

Monitoring Date	Start Time	End Time
7-20-2022		

Information on the Aquatic Invasive Plant Found (Fill out one form for each species found.)

Which aquatic invasive plant did you find?:

- ☐ Curly-leaf Pondweed
- ☐ Eurasian Water-milfoil
- ☒ Purple Loosestrife
- ☐ Brittle Naiad
- ☐ Hydrilla
- ☐ Brazilian Waterweed
- ☐ Yellow Floating Heart

Where did you find the invasive plant?
One established purple loosestrife plant was located along the shoreline, and as much as possible was pulled, taking care to first bag the flower heads

Latitude:	Longitude:
45.910325	-91.833892

Approximately how large an area do the plants occupy?

- ☐ A Few Plants
- ☒ One or a few beds
- ☐ Many beds
- ☐ A Whole Bay or Portion of Lake
- ☐ Widespread, covering most shallow areas of lake
- ☐ Don't know (e.g. didn't check the whole lake)

Was the plant floating or rooted?

- ☐ Floating
- ☒ Rooted

Estimated percent cover in the area where the invasive was found (optional)

Substrate cobble, %	Substrate muck, %	Substrate boulders, %	Substrate sand, %	Bottom covered with plants, %

Voucher Sample

Did you collect a sample of the plant (a voucher specimen) and bring it to your local DNR office? If so, which office?

- ☐ Rhinelander
- ☐ Spooner
- ☐ Green Bay
- ☐ Oshkosh
- ☒ Did not take plant sample to a DNR office
- ☐ Fitchburg
- ☐ Waukesha
- ☐ Eau Claire
- ☐ Superior
- ☐ Other Office _____

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For DNR AIS Coordinator to fill out

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Was the specimen confirmed as the species indicated above? ☐ Yes ☐ No — If no, what was it?

Herbarium where specimen is housed: _____ Herbarium Specimen ID: _____

Have you entered the results of the voucher in SWIMS? ☐ Yes ☐ No

AIS Coordinator: Please enter the incident report in SWIMS under the Incident Report project for the county the AIS was found in. Then, keep the paper copy for your records.

ATTACHMENT I
Trego Terrestrial Survey Field Data

Terrestrial Invasive Species Monitoring Form														
		Site #	Landcover Classification	Starting latitude	Starting longitude	Abundance = Daubenmire Scale; Length = ft.	Common buckthorn	Eurasian honeysuckle	Spotted knapweed	Narrow-leaf cattail	Yellow Iris	Japanese knotweed	Purple loosestrife	Aquatic forget-me-not
Project	Trego		Northern Mesic Forest / Developed			Relative Abundance			2	3	1		3	
County	Washburn	1	- Residential	45.9095981	-91.82714982	Length of Shoreline			936	4834	198		4531	
Date	8/1/2022; 8/4/2022		Northern Mesic Forest / Developed			Relative Abundance			1	1	1	1		
Field Crew	Kellen Black	2	- Residential	45.9058197	91.83177378	Length of Shoreline			480	197	123	62		
	Heather Lutzow		Northern Mesic Forest / Developed			Relative Abundance					1			
	Laura Sass	3	- Residential	45.9201186	-91.85647773	Length of Shoreline					5			
			Northern Mesic Forest / Developed			Relative Abundance			1	2	1		2	
		4	- Residential	45.9248628	-91.86401172	Length of Shoreline			138	2471	50		4526	
			Northern Mesic Forest / Developed			Relative Abundance			1		1			1
		5	- Residential	45.9318298	-91.87885816	Length of Shoreline			10		10			10
						Relative Abundance			1					
			Trego Landing Road Boat Landing	45.9212136	-91.86836159	Length of Shoreline			10					
						Relative Abundance		1						
			Cash Road Boat Landing	45.9098279	-91.82513304	Length of Shoreline		5						
						Relative Abundance	1	1	2					
			North Side of Dam	45.9484061	-91.88620636	Length of Shoreline	5	20	1207					
						Relative Abundance		1	4					
			South Side of Dam	45.9455827	-91.88822835	Length of Shoreline		33	3858					
						Relative Abundance								
						Length of Shoreline								
						Relative Abundance								
						Length of Shoreline								
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						Length of Shoreline								

ATTACHMENT J
Hayward Water Sample Results

Wisconsin State Laboratory of Hygiene
2601 Agriculture Drive, PO Box 7996
Madison, WI 53707-7996
(800)442-4618 - FAX (608)224-6213
http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 636482003

Report To:

HEATHER LUTZOW
GAI CONSULTANTS
3313 S PACKERLAND DR SUITE E
DE PERE, WI 54115

Invoice To:

HEATHER LUTZOW
GAI CONSULTANTS
3313 S PACKERLAND DR SUITE E
DE PERE, WI 54115

Customer ID: 356553

Field #: HAYWARD-RES,ZM
Project No:
Collection End: 8/3/2022 6:15:00 PM
Collection Start:
Collected By: LAURA SASS
Date Received: 8/11/2022
Date Reported: 10/19/2022
Sample Reason:

ID#: 583131
Sample Location: HAYWARD LAKE - DEEP HOLE
Sample Description: DNR'S DEEP HOLE STATION
Sample Type: SU-SURFACE WATER
Waterbody: 2725500
Point or Outfall:
Sample Depth:
Program Code:
Region Code:
County: 58

Environmental Toxicology

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 10/18/22 00:00	Analysis Date: 10/18/22 00:00				
Mussel Veliger Screen	Mussel Veliger-WDNR	Absent			

Wisconsin State Laboratory of Hygiene
2601 Agriculture Drive, PO Box 7996
Madison, WI 53707-7996
(800)442-4618 - FAX (608)224-6213
http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 636482003

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

LOD = Level of detection
LOQ = Level of quantification (for PFAS the LOQ = MRL)
ND = None detected. Results are less than the LOD
F next to result = Result is between LOD and LOQ
Z next to result = Result is between 0 (zero) and LOD
if LOD=LOQ, Limits were not statistically derived

Test results for NELAP accredited tests are certified to meet the requirements of the NELAC standards. For a list of accredited analytes
see http://www.slh.wisc.edu/about/compliance/nelac-laboratory-accreditation
Results, LOD and LOQ values have been adjusted for analytical dilutions and percent moisture where applicable.
Results relate only to the items tested.
This Laboratory Report shall not be reproduced except in full, without written approval of the laboratory.
The water microbiology unit analyzes samples as received and not all samples are tested for preservation before analysis is performed.

Responsible Party

Inorganic Chemistry: Graham Anderson, Supervisor 608-224-6281
Metals: Graham Anderson, Supervisor 608-224-6281
Organics: Erin Mani, Supervisor 608-224-6269
Environmental Toxicology: Dawn Perkins, Supervisor 608-224-6230
Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

Wisconsin State Laboratory of Hygiene
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Madison, WI 53707-7996
(800)442-4618 - FAX (608)224-6213
http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 636482004

Report To:

HEATHER LUTZOW
GAI CONSULTANTS
3313 S PACKERLAND DR SUITE E
DE PERE, WI 54115

Invoice To:

HEATHER LUTZOW
GAI CONSULTANTS
3313 S PACKERLAND DR SUITE E
DE PERE, WI 54115

Customer ID: 356553

Field #: HAYWARD-TAIL,ZM
Project No:

Collection End: 8/3/2022 7:15:00 PM
Collection Start:
Collected By: LAURA SASS
Date Received: 8/11/2022
Date Reported: 10/19/2022
Sample Reason:

ID#: 10009811
Sample Location: NAMEKAGON 120 (BELOW LAKE HAYWARD DAM)
Sample Description: POOL BELOW DAM
Sample Type: SU-SURFACE WATER
Waterbody:
Point or Outfall:
Sample Depth:
Program Code:
Region Code:
County: 58

Environmental Toxicology

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 10/18/22 00:00	Analysis Date: 10/18/22 00:00				
Mussel Veliger Screen	Mussel Veliger-WDNR	Absent			

Wisconsin State Laboratory of Hygiene
2601 Agriculture Drive, PO Box 7996
Madison, WI 53707-7996
(800)442-4618 - FAX (608)224-6213
http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 636482004

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

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LOQ = Level of quantification (for PFAS the LOQ = MRL)
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Responsible Party

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Water Microbiology: Martin Collins, Supervisor 608-224-6239
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Madison, WI 53707-7996
(800)442-4618 - FAX (608)224-6213
http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 637981003

Report To:

HEATHER LUTZOW
GAI CONSULTANTS
3313 S PACKERLAND DR SUITE E
DE PERE, WI 54115

Invoice To:

HEATHER LUTZOW
GAI CONSULTANTS
3313 S PACKERLAND DR SUITE E
DE PERE, WI 54115

Customer ID: 356553

Field #: Hayward - Res, WF
Project No:
Collection End: 8/3/2022 6:30:00 PM
Collection Start:
Collected By: LAURA SASS
Date Received: 8/11/2022
Date Reported: 10/19/2022
Sample Reason:

ID#: 583131
Sample Location: HAYWARD LAKE - DEEP HOLE
Sample Description: DNR'S DEEP HOLE STATION
Sample Type: SU-SURFACE WATER
Waterbody: 2725500
Point or Outfall:
Sample Depth:
Program Code:
Region Code:
County: 58

Environmental Toxicology

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 10/19/22 00:00	Analysis Date: 10/19/22 00:00				
Spiny Waterflea	Waterflea-WDNR	Absent			

Wisconsin State Laboratory of Hygiene
2601 Agriculture Drive, PO Box 7996
Madison, WI 53707-7996
(800)442-4618 - FAX (608)224-6213
http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 637981003

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

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Metals: Graham Anderson, Supervisor 608-224-6281
Organics: Erin Mani, Supervisor 608-224-6269
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http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 637981004

Report To:

HEATHER LUTZOW
GAI CONSULTANTS
3313 S PACKERLAND DR SUITE E
DE PERE, WI 54115

Invoice To:

HEATHER LUTZOW
GAI CONSULTANTS
3313 S PACKERLAND DR SUITE E
DE PERE, WI 54115

Customer ID: 356553

Field #: Hayward - Tail, WF
Project No:

Collection End: 8/3/2022 7:25:00 PM
Collection Start:
Collected By: LAURA SASS
Date Received: 8/11/2022
Date Reported: 10/19/2022
Sample Reason:

ID#: 10009811
Sample Location: NAMEKAGON 120 (BELOW LAKE HAYWARD DAM)
Sample Description: POOL BELOW DAM
Sample Type: SU-SURFACE WATER
Waterbody:
Point or Outfall:
Sample Depth:
Program Code:
Region Code:
County: 58

Environmental Toxicology

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 10/19/22 00:00	Analysis Date: 10/19/22 00:00				
Spiny Waterflea	Waterflea-WDNR	Absent			

Wisconsin State Laboratory of Hygiene
2601 Agriculture Drive, PO Box 7996
Madison, WI 53707-7996
(800)442-4618 - FAX (608)224-6213
http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 637981004

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

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Organics: Erin Mani, Supervisor 608-224-6269
Environmental Toxicology: Dawn Perkins, Supervisor 608-224-6230
Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

ATTACHMENT K
Trego Water Sample Results

Wisconsin State Laboratory of Hygiene
2601 Agriculture Drive, PO Box 7996
Madison, WI 53707-7996
(800)442-4618 - FAX (608)224-6213
http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 636482001

Report To:

HEATHER LUTZOW
GAI CONSULTANTS
3313 S PACKERLAND DR SUITE E
DE PERE, WI 54115

Invoice To:

HEATHER LUTZOW
GAI CONSULTANTS
3313 S PACKERLAND DR SUITE E
DE PERE, WI 54115

Customer ID: 356553

Field #: TREGO-RES,ZM
Project No:

Collection End: 8/4/2022 3:15:00 PM
Collection Start:
Collected By: LAURA SASS
Date Received: 8/11/2022
Date Reported: 10/19/2022
Sample Reason:

ID#: 663162
Sample Location: TREGO LAKE - DEEP HOLE NEAR DAM
Sample Description: RESEROIR ABOVE DAM
Sample Type: SU-SURFACE WATER
Waterbody: 2712000
Point or Outfall:
Sample Depth:
Program Code: FH
Region Code: 7
County: 66

Environmental Toxicology

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 08/15/22 00:00	Analysis Date: 08/15/22 00:00				
Mussel Veliger Screen	Mussel Veliger-WDNR	Absent			

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Laboratory Report

Environmental Health Division

WSLH Sample: 636482001

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

LOD = Level of detection
LOQ = Level of quantification (for PFAS the LOQ = MRL)
ND = None detected. Results are less than the LOD
F next to result = Result is between LOD and LOQ
Z next to result = Result is between 0 (zero) and LOD
if LOD=LOQ, Limits were not statistically derived

Test results for NELAP accredited tests are certified to meet the requirements of the NELAC standards. For a list of accredited analytes
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Results, LOD and LOQ values have been adjusted for analytical dilutions and percent moisture where applicable.
Results relate only to the items tested.

The water microbiology unit analyzes samples as received and not all samples are tested for preservation before analysis is performed.

Responsible Party

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Laboratory Report

Environmental Health Division

WSLH Sample: 636482002

Report To:

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GAI CONSULTANTS
3313 S PACKERLAND DR SUITE E
DE PERE, WI 54115

Invoice To:

HEATHER LUTZOW
GAI CONSULTANTS
3313 S PACKERLAND DR SUITE E
DE PERE, WI 54115

Customer ID: 356553

Field #: TREGO-TAIL,ZM
Project No:

Collection End: 8/4/2022 3:45:00 PM
Collection Start:
Collected By: LAURA SASS
Date Received: 8/11/2022
Date Reported: 10/19/2022
Sample Reason:

ID#: 663170
Sample Location: NAMEKAGON RIVER DOWNSTREAM CTH K NEAR TREGO WI
Sample Description: TAILWATER, NEARDAM
Sample Type: SU-SURFACE WATER
Waterbody:
Point or Outfall:
Sample Depth:
Program Code:
Region Code:
County: 66

Environmental Toxicology

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 08/15/22 00:00	Analysis Date: 08/15/22 00:00				
Mussel Veliger Screen	Mussel Veliger-WDNR	Absent			

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Laboratory Report

Environmental Health Division

WSLH Sample: 636482002

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

LOD = Level of detection
LOQ = Level of quantification (for PFAS the LOQ = MRL)
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Laboratory Report

Environmental Health Division

WSLH Sample: 637981001

Report To:

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3313 S PACKERLAND DR SUITE E
DE PERE, WI 54115

Invoice To:

HEATHER LUTZOW
GAI CONSULTANTS
3313 S PACKERLAND DR SUITE E
DE PERE, WI 54115

Customer ID: 356553

Field #: Trego-Res, WF
Project No:

Collection End: 8/4/2022 3:00:00 PM
Collection Start:
Collected By: LAURA SASS
Date Received: 8/11/2022
Date Reported: 10/19/2022
Sample Reason:

ID#: 663162
Sample Location: TREGO LAKE - DEEP HOLE NEAR DAM
Sample Description: RESEROIR ABOVE DAM
Sample Type: SU-SURFACE WATER
Waterbody: 2712000
Point or Outfall:
Sample Depth:
Program Code: FH
Region Code: 7
County: 66

Environmental Toxicology

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 10/19/22 00:00	Analysis Date: 10/19/22 00:00				
Spiny Waterflea	Waterflea-WDNR	Absent			

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Laboratory Report

Environmental Health Division

WSLH Sample: 637981001

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

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Laboratory Report

Environmental Health Division

WSLH Sample: 637981002

Report To:

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DE PERE, WI 54115

Invoice To:

HEATHER LUTZOW
GAI CONSULTANTS
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DE PERE, WI 54115

Customer ID: 356553

Field #: Trego- Tail, WF
Project No:

Collection End: 8/4/2022 3:30:00 PM
Collection Start:
Collected By: LAURA SASS
Date Received: 8/11/2022
Date Reported: 10/19/2022
Sample Reason:

ID#: 663170
Sample Location: NAMEKAGON RIVER DOWNSTREAM CTH K NEAR TREGO WI
Sample Description: TAILWATER, NEARDAM
Sample Type: SU-SURFACE WATER
Waterbody:
Point or Outfall:
Sample Depth:
Program Code:
Region Code:
County: 66

Environmental Toxicology

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 10/19/22 00:00	Analysis Date: 10/19/22 00:00				
Spiny Waterflea	Waterflea-WDNR	Absent			

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MUSSEL STUDY REPORTS

FRESHWATER MUSSEL STUDY FOR THE HAYWARD HYDROELECTRIC PROJECT

FERC No. 2417

Prepared for:

Mead & Hunt

1702 Lawrence Drive
De Pere, WI 54115

Project No.: 16082
Date: 1/25/2023

Prepared by:

EnviroScience
Excellence In Any Environment

5070 Stow Rd.
Stow, OH 44224
800-940-4025
www.EnviroScienceInc.com

Freshwater Mussel Study for the Hayward Hydroelectric Project

Initial Study Report

Document Date: 1/25/2023
Project No.: 16082

Prepared for: Mr. Shawn Puzen
Mead & Hunt

Authorization for Release

The analyses, opinions, and conclusions in this document are based entirely on EnviroScience's unbiased, professional judgment. EnviroScience's compensation is not in any way contingent on any action or event resulting from this study.

To the best of their knowledge, the undersigned attest that this document and the information contained herein are accurate and conform to EnviroScience's internal Quality Assurance standards.

Emily Grossman
Senior Scientist | Field Manager

Becca Winterringer
Senior Scientist | Project Manager

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ACKNOWLEDGEMENTS

Xcel Energy provided funding for the project through Mead & Hunt. Mr. Shawn Puzen was the point of contact for Mead & Hunt, and Mr. Matthew Miller was the point of contact for Xcel Energy. The project manager for EnviroScience, Inc. was Ms. Becca Winterringer. Wisconsin permitted malacologist Ms. Emily Grossman led the survey effort. Also assisting with the survey effort were Mr. Robert Williams, Mr. Ben Ebert, Mr. Paul Moreno, and Mr. Matt Gilkay. Ms. Grossman authored the report, which was reviewed by Ms. Winterringer and Ms. Melissa Vaccarino.

1.0 INTRODUCTION

EnviroScience, Inc. was contracted by Mead & Hunt to perform freshwater mussel studies at the Hayward Hydroelectric Project (Project) in Sawyer County, Wisconsin. The Project is located on the Namekagon River in Hayward, Wisconsin (Figure 1). Northern States Power Company – Wisconsin, a Wisconsin corporation (NSPW or Licensee/Applicant), operates and maintains the Project under a Federal Energy Regulatory Commission (FERC) license, which expires in November 2025. NSPW must submit a final license application no later than November 30, 2023, to obtain a subsequent license for continued operation of the Project (FERC Project No. 2417).

The Namekagon River is a tributary of the St. Croix River and harbors a diverse mussel assemblage. Thirteen (13) species have been reported from the Namekagon River in Sawyer County, including one Wisconsin species of special concern (Elktoe [*Alasmidonta marginata*]); however, all observations are dated on or before 1995. No recent survey information was available at the time of this report (Table 1; WDNR, 2018). No federally listed threatened or endangered species are known to occur in this reach of the Namekagon River (Table 1).

Freshwater mussels residing near the Project may be affected by continued operation of the facility. Flow modifications upstream or downstream of the Project may alter habitat for mussels, and mussels occurring in the reservoir may become stranded during drawdown events. The Wisconsin Department of Natural Resources (WDNR) requested that a mussel survey be completed as part of the FERC relicensing process. The objective of the survey was to characterize mussel habitat and determine mussel abundance and species richness in the Project vicinity. Data collected from this survey provides information on the baseline conditions for mussel density, diversity, and habitat in the Project area.

2.0 METHODS

Mussel survey methods were developed in accordance with the 2015 WDNR Guidelines for Sampling Freshwater Mussels in Wadeable Streams (Guidelines; Piette, 2015). Mussel studies included field surveys of two riverine reaches, one above and one below the Hayward Dam. Surveys were led by a Wisconsin permitted malacologist and were conducted according to the survey plan approved by WDNR (Appendix A).

2.1 RIVERINE SURVEYS

Mussel studies were conducted within riverine habitat near the Project. Reach 1 (upstream reach) began approximately 430 meters (m) upstream of the State Highway 77 bridge and extended 1,000 m upstream. Reach 2 (downstream reach) began at the canoe portage put-in (near the intersection of S. 1st St. and S. Florida Ave.) downstream of the tailrace and extended 1,000 m downstream (Figure 1).

Within each reach, a series of transects extending bank to bank was established every 100 m, creating a series of 10 possible transects per reach. Transects were numbered sequentially from downstream to upstream, and a random number function in Microsoft Excel was used to select five transects for the 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. Each transect was evaluated for mussels using an adaptive sampling approach. First, a rapid visual search was conducted and entailed an initial search of 0.2 minutes

per m^2 (min/m^2) along each 10-m segment to determine if mussels were present (living or shell material). If mussels were present in a segment, a semi-quantitative search was triggered and the search time was extended to 1 min/m^2. If no mussels or evidence of mussels was observed in the rapid visual search, no additional effort was expended in that segment. 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 recorded within the study area. Water depth and river bottom substrate composition using the Wentworth Scale (% observed of silt, sand, gravel, etc.; Wentworth, 1922) were recorded for each 10-m transect segment. In addition, a general description of mussel habitat characteristics in the Project boundary was recorded. The Aquatic Habitat Classification on the St. Croix National Scenic Riverway (Wan et al., 2007) was referenced for habitat and substrate classification.

2.2 DATA AND MUSSEL HANDLING

Live mussels were kept submersed in ambient river water and kept cool and moist during processing. All live mussels were identified to species, counted, measured (length in millimeters), aged (external annuli count), and sexed (sexually dimorphic species only) by the team malacologist. Dead shell specimens were scored as fresh dead (dead less than one year, lustrous nacre), weathered dead (dead one to many years; chalky nacre, fragmented, and worn periostracum), or subfossil (dead many years to many decades; severely worn and fragmented). Detailed digital images of the study area and representative mussel species were recorded and reported. Datasheets were populated and summarized per the Mussel Survey Summary Tables provided in Appendix 2 of the mussel study plan provided by Mead & Hunt. Mussel taxonomy followed the names presented by Williams et al., 2017.

3.0 RESULTS AND DISCUSSION

The mussel survey was conducted on June 19, 2022. Discharge on the Namekagon River at Leonards, WI (USGS 05331833) was 117 cubic feet per second. Maximum visibility was greater than 1 m, and the water temperature was approximately 18.9° Celsius (66° Fahrenheit). Photographs of sampling sites and species encountered are provided in Appendix B.

3.1 REACH 1 (UPSTREAM)

The upstream portion of Reach 1 was riverine and consisted of a shallow run with moderate current velocity. The lower portion of Reach 1 was located at the confluence with Hayward Lake where the river was wider and current velocity was low. The surrounding land was primarily residential areas (29%) and forest (34%; USEPA, 2022a). Submerged vegetation was present in small amounts near the banks in the upstream portion of the reach but was more abundant in the downstream portion.

Transects 1, 2, 6, 7, and 8 were randomly selected for sampling in Reach 1. Transects 6, 7, and 8 were the upstream-most transects sampled and were within the shallow run habitat. Substrate along all three transects consisted of a mix of cobble, gravel, and sand and most closely aligned with substrate composition code 7 (abundant fine substrate, gravel, pebbles, and cobbles) in Wan et al. (2007). Woody debris and submerged aquatic vegetation were also present in some transect segments. Water depth did not exceed 0.9 m (3 feet [ft]) along these transects (Table 2; Figure 2).

Habitat along Transects 1 and 2 differed from the upstream transects. Depth reached a maximum of 1.2 m (4 ft) in the thalweg (deepest course along the length of the reach) along the right descending bank but did not exceed 0.9 m (3 ft) in most segments. Substrate in the thalweg contained mixed sand, clay, and silt. Transect 2 also spanned a shallow muddy area between the thalweg and the left descending bank which consisted almost entirely of silt, clay, and submersed aquatic vegetation (Table 2; Figure 2). Substrate along Transects 1 and 2 most closely corresponded with substrate composition code 1 (abundant fine substrate) in Wan et al. (2007).

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 atop the substrate while walking between transects (Table 3). The invasive Chinese Mystery Snail (*Cipangopaludina chinensis*) was abundant in both the coarse substrate observed from Transects 6 through 8 and the soft clay and silt substrate from Transects 1 and 2.

3.2 REACH 2 (DOWNSTREAM)

Reach 2 primarily consisted of a shallow glide/run with heterogeneous substrate and moderate current velocity. The streambanks were low and gradually sloping. While the riparian zones of both banks were forested throughout most of the reach (9%), surrounding land use was primarily commercial and residential (42%; USGS, 2022b). A series of wood piles spanned the width of the river near the upstream end of the reach.

Transects 2, 3, 4, 8, and 9 were randomly selected for sampling in Reach 2. Although some substrate variation was observed among the sampled transects, conditions were generally similar across all five. Substrate was comprised primarily of mixed cobble, gravel, and sand and 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 proportions of boulder, woody debris, and submerged vegetation. Maximum observed depth was 0.9 m (3 ft; Table 2; Figure 3).

A total of 373 live mussels of 10 species were collected in Reach 2 (Table 3). Mucket (*Actinonaias ligamentina*; 29.5%) and Fluted Shell (*Lasmigona costata*; 16.9%) were the most abundant species collected; Plain Pocketbook (*Lampsilis cardium*), Spike (*Eurynia dilatata*), Creeper (*Strophitus undulatus*), and Wabash Pigtoe (*Fusconaia flava*) were also commonly encountered. One Wisconsin species of special concern, Elktoe, was also present. Although species relative abundance varied somewhat among the transects, 7 of the 10 species were present on all five transects.

Mussel abundance was lowest along Transect 2, with only 37 individuals collected and ranged from 77 to 92 individuals in the remaining four transects. Surface density ranged from 1.23 mussels/m^2 on Transect 2 to 3.40 mussels/m^2 on Transect 3 and averaged 2.66 mussels/m^2 over all sampled transects (Table 3). Live mussels were present in all transect segments sampled except the left descending bank segments of Transects 2 and 4 (Figure 4).

Mussel community metrics for Reach 2 are summarized in Table 3. All but one individual had >5 external annuli; this may be due in part to the inherent bias of semi-quantitative sampling toward larger individuals. Simpson's diversity was 0.84 and Pielou's evenness was 0.34. The cumulative species curve suggests that additional species may be present in the reach. Based on the

trendline equation, 70 additional individuals would need to be collected to yield one additional species (Figure 5).

4.0 CONCLUSIONS

No live mussels were collected in Reach 1 upstream of Hayward Lake. The fine substrate observed in Transects 1 and 2 does not provide high-quality mussel habitat. The heterogeneous substrate and more moderate current velocity in Transects 6 – 8 may provide more suitable habitat, and relic shells were observed in this portion of the reach, suggesting that mussels may occur in low abundance in the upstream portion of Reach 1.

In contrast, a total of 373 live mussels of 10 species were collected in Reach 2, including one Wisconsin species of special concern. Mussels were present along all five sampled transects, and relic shells and live individuals were observed in the substrate while walking between transects as well. Habitat along the transects was characterized by heterogeneous substrate (cobble, gravel, sand) and moderate current velocity, and most of this reach appears to provide suitable habitat for mussels.

5.0 REFERENCES

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Table 1. Mussel species reported from the Namekagon River in Sawyer County, Wisconsin.

Species	Common Name	Status [1]	Year of Observation [2]
Pleurobemini			
Eurynia dilatata	Spike		1987
Fusconaia flava	Wabash Pigtoe		1995
Pleurobema sintoxia	Round Pigtoe		1995
Lampsilini			
Actinonaias ligamentina	Mucket		1987
Lampsilis cardium	Plain Pocketbook		1987
Lampsilis siliquoidea	Fatmucket		1995
Ligumia recta	Black Sandshell		1987
Anodontini			
Alasmidonta marginata	Elktoe	SC/P	1987
Anodontoides ferussacianus	Cylindrical Papershell		1987
Lasmigona compressa	Creek Heelsplitter		1995
Lasmigona costata	Fluted Shell		1995
Pyganodon grandis	Giant Floater		1987
Strophitus undulatus	Creeper		1995
Total No. Species	13		

[1] SC/P = Wisconsin species of special concern (protected; WDNR, 2021)

[2] WDNR (2018)

Table 2. Habitat characteristics observed in Hayward riverine surveys, Namekagon River, 2022.

				Substrate Composition (%)										
Reach	Transect	Segment	Depth (m)	Bedrock	Boulder	Cobble	Gravel	Sand	Mud	Silt	LWD	Veg.	Shell	Detritus
Reach 1 (US)	T1	0-10	0.61	0	0	0	30	40	0	10	10	10	0	0
	T1	10-20	0.91	0	10	10	0	40	0	40	0	0	0	0
	T1	20-30	0.91	0	0	0	0	0	70	20	0	10	0	0
	T1	30-40	0.91	0	0	0	0	0	80	15	0	5	0	0
	T1	40-50	0.91	0	0	0	0	0	60	20	0	20	0	0
	T1	50-60	1.22	0	0	0	0	20	0	30	10	40	0	0
	T1	60-70	1.22	0	0	0	10	40	0	20	0	30	0	0
	T1	70-80	0.91	0	0	0	0	20	0	70	0	10	0	0
Reach 1 (US)	T2	0-10	0.91	0	0	0	0	40	50	0	0	10	0	0
	T2	10-20	0.91	0	0	0	0	40	50	0	0	10	0	0
	T2	20-30	0.91	0	0	0	0	40	50	0	0	10	0	0
	T2	30-40	0.91	0	0	0	0	40	50	0	0	10	0	0
	T2	40-50	0.61	0	0	0	0	30	60	0	0	10	0	0
	T2	50-60	0.61	0	0	0	0	20	70	0	0	10	0	0
	T2	60-70	0.61	0	0	0	0	10	80	0	0	10	0	0
	T2	70-80	0.30	0	0	0	0	0	90	0	0	10	0	0
	T2	80-90	0.30	0	0	0	0	0	90	0	0	10	0	0
	T2	90-100	0.30	0	0	0	0	0	90	0	0	10	0	0
	T2	100-110	0.30	0	0	0	0	0	90	0	0	10	0	0
	T2	110-120	0.30	0	0	0	0	0	90	0	0	10	0	0
	T2	120-130	0.30	0	0	0	0	0	90	0	0	10	0	0
	T2	130-140	0.61	0	0	0	0	0	90	0	0	10	0	0
	T2	140-150	0.61	0	0	0	0	0	50	0	0	50	0	0
	T2	150-160	0.61	0	0	0	0	0	80	0	0	20	0	0
Reach 1 (US)	T6	0-10	0.30	0	5	30	20	40	0	0	5	0	0	0
	T6	10-20	0.91	0	0	20	40	20	0	0	20	0	0	0
	T6	20-30	0.91	0	0	0	30	50	0	0	0	20	0	0
	T6	30-40	0.91	0	0	20	20	30	0	0	0	30	0	0

Table 2. Habitat characteristics observed in Hayward riverine surveys, Namekagon River, 2022.

				Substrate Composition (%)										
Reach	Transect	Segment	Depth (m)	Bedrock	Boulder	Cobble	Gravel	Sand	Mud	Silt	LWD	Veg.	Shell	Detritus
Reach 1 (US)	T7	0-10	0.46	0	0	30	40	20	0	0	10	0	0	0
	T7	10-20	0.76	0	0	20	30	50	0	0	0	0	0	0
	T7	20-30	0.91	0	0	10	50	40	0	0	0	0	0	0
	T7	30-35	0.30	0	0	10	50	40	0	0	0	0	0	0
Reach 1 (US)	T8	0-10	0.46	0	0	20	20	40	0	10	10	0	0	0
	T8	10-20	0.46	0	0	20	40	40	0	0	0	0	0	0
	T8	20-30	0.46	0	0	20	40	30	0	0	0	10	0	0
	T8	30-40	0.46	0	0	30	40	20	0	0	0	10	0	0
	T8	40-50	0.46	0	0	20	40	20	0	10	10	0	0	0
Reach 2 (DS)	T2	0-10	0.61	0	0	50	30	10	0	0	10	0	0	0
	T2	10-20	0.61	0	0	50	30	20	0	0	0	0	0	0
	T2	20-30	0.61	0	0	0	10	80	0	0	0	0	10	0
Reach 2 (DS)	T3	0-10	0.61	0	0	50	40	10	0	0	0	0	0	0
	T3	10-20	0.91	0	0	40	40	20	0	0	0	0	0	0
	T3	20-25	0.61	0	0	50	30	20	0	0	0	0	0	0
Reach 2 (DS)	T4	0-10	0.61	0	0	50	30	20	0	0	0	0	0	0
	T4	10-20	0.91	0	10	50	30	10	0	0	0	0	0	0
	T4	20-25	0.30	0	30	0	0	50	0	0	0	20	0	0
Reach 2 (DS)	T8	0-10	0.91	0	0	20	30	40	0	0	10	0	0	0
	T8	10-20	0.91	0	0	10	30	50	0	0	10	0	0	0
	T8	20-30	0.91	0	0	0	10	60	0	0	30	0	0	0
Reach 2 (DS)	T9	0-10	0.61	0	0	40	30	20	0	0	10	0	0	0
	T9	10-20	0.61	0	0	0	80	10	0	0	0	10	0	0
	T9	20-30	0.30	0	0	40	40	20	0	0	0	0	0	0

US = upstream; DS = downstream, LWD = large woody debris

Table 3. Summary of effort and mussels collected in Hayward riverine surveys, Namekagon River, 2022.

		Reach 1 (Upstream)							Reach 2 (Downstream)							Total	
Species	Common Name	T1	T2	T6	T7	T8	Total	%	T2	T3	T4	T8	T9	Total	%	Total	%
Amblemini																	
Amblema plicata	Threeridge	-	-	WD	-	-	WD	-	-	-	-	-	-	-	-	-	
Pleurobemini																	
Eurynia dilatata	Spike	-	-	-	-	-	-	-	2	17	16	2	-	37	9.9	37	9.9
Fusconaia flava	Wabash Pigtoe	-	-	WD	-	-	WD	-	2	6	9	8	10	35	9.4	35	9.4
Lampsilini																	
Actinonaias ligamentina	Mucket	-	-	-	-	-	-	-	18	29	20	23	20	110	29.5	110	29.5
Lampsilis cardium	Plain Pocketbook	-	-	-	-	-	-	-	2	6	10	9	13	40	10.7	40	10.7
Lampsilis siliquoidea	Fatmucket	-	-	SF	-	-	SF	-	5	3	2	4	7	21	5.6	21	5.6
Ligumia recta	Black Sandshell	-	-	-	-	-	-	-	2	3	5	7	1	18	4.8	18	4.8
Anodontini																	
Alasmidonta marginata	Elktoe	-	-	-	-	-	-	-	2	1	5	1	1	10	2.7	10	2.7
Lasmigona costata	Fluted Shell	-	-	-	-	-	-	-	4	15	4	23	17	63	16.9	63	16.9
Pyganodon grandis	Giant Floater	-	-	-	-	-	-	-	-	-	1	1	-	2	0.5	2	0.5
Strophitus undulatus	Creeper	-	-	-	-	-	-	-	-	5	5	14	13	37	9.9	37	9.9
Total Abundance		0	0	0	0	0	0	-	37	85	77	92	82	373	100.0	373	100.0
Live Species		0	0	0	0	0	0		8	9	10	10	8	10			
Effort (m^2)		80	160	40	35	50	365		30	25	25	30	30	140		505	
Surface Density (no./m^2)		0.00	0.00	0.00	0.00	0.00	0.00		1.23	3.40	3.08	3.07	2.73	2.66		0.739	
% ≤5 external annuli							-							0.27			
Simpson's Diversity							-							0.84			
Pielou's Evenness							-							0.34			

WD = weathered dead shell; SF = sub-fossil shell

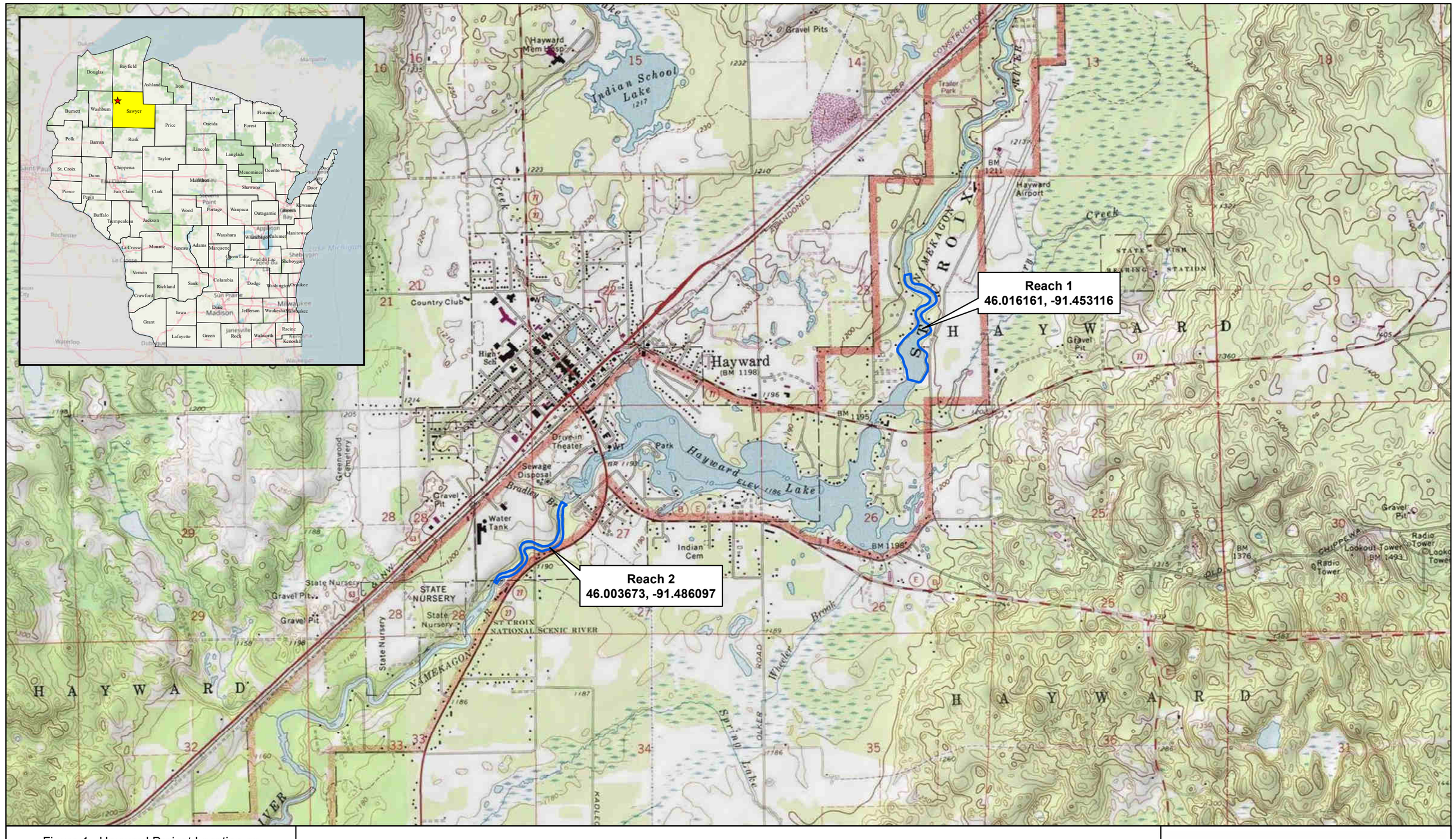

Figure 1. Hayward Project Location on USGS 7.5-minute Topographic Map of Hayward Quadrangle. Sawyer County, Wisconsin.

Riverine Reach Study Area

0 1,500 3,000 6,000 Feet

0 500 1,000 2,000 Meters

EnviroScience
Excellence In Any Environment

Path: C:\Users\Anna Giordano\Desktop\GIS_Projects\MMead-and-Hunt\16082_Wisconsin_Mussels\Map1_Location_Hayward.mxd

Date: 8/17/2022

Basemap courtesy of National Geographic Society (2013).

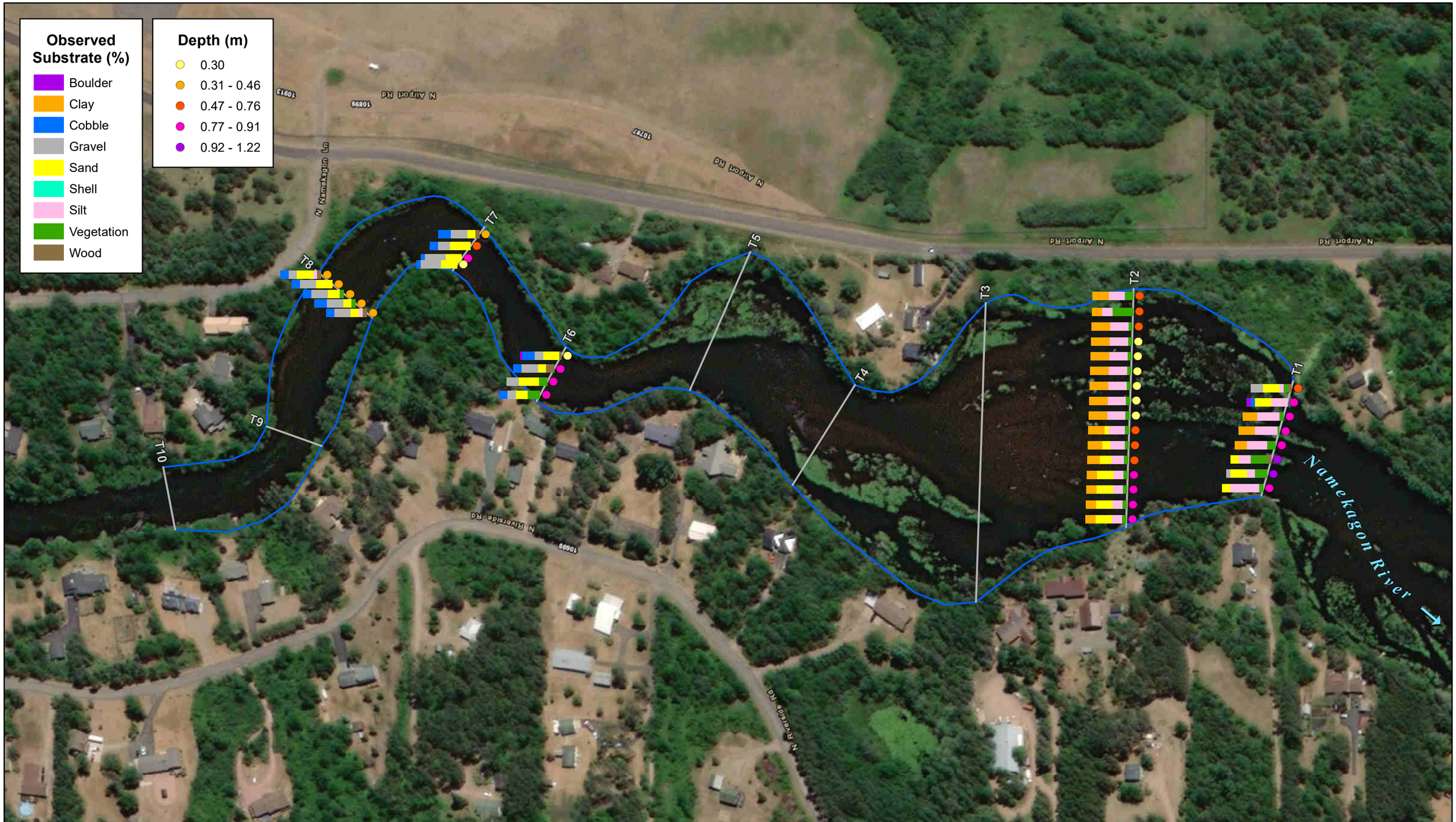

Figure 2. Substrate and Depth for the Hayward Project Reach One on the Namekagon River. Sawyer County, Wisconsin.

Survey Transect

Riverine Reach Study Area

0 150 300 600 Feet

0 50 100 200 Meters

EnviroScience
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Date: 8/24/2022 Path: P:\10_Projects\MMead-and-Hunt\480M\16082_Wisconsin_Mussels\16082_GIS\Map2_Substrate_R1_Hayward.mxd

Basemap courtesy of Esri.

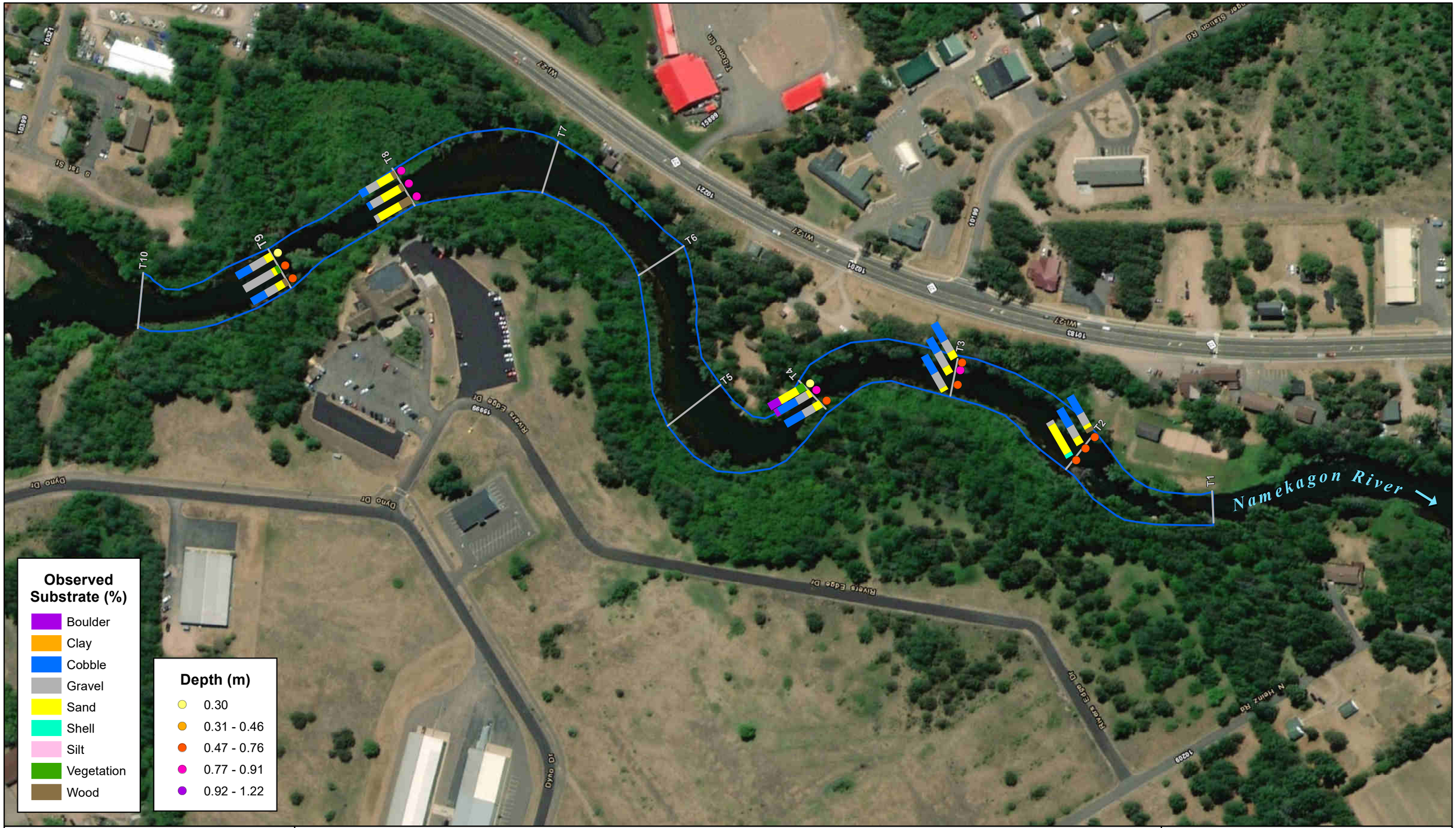


Figure 3. Substrate and Depth for the Hayward Project Reach Two on the Namekagon River. Sawyer County, Wisconsin.

Date: 8/24/2022 Path: P:\10_Projects\MMead-and-Hunt\480M\16082_Wisconsin_Mussels\16082_GIS\Map3_Substrate_R2_Hayward.mxd

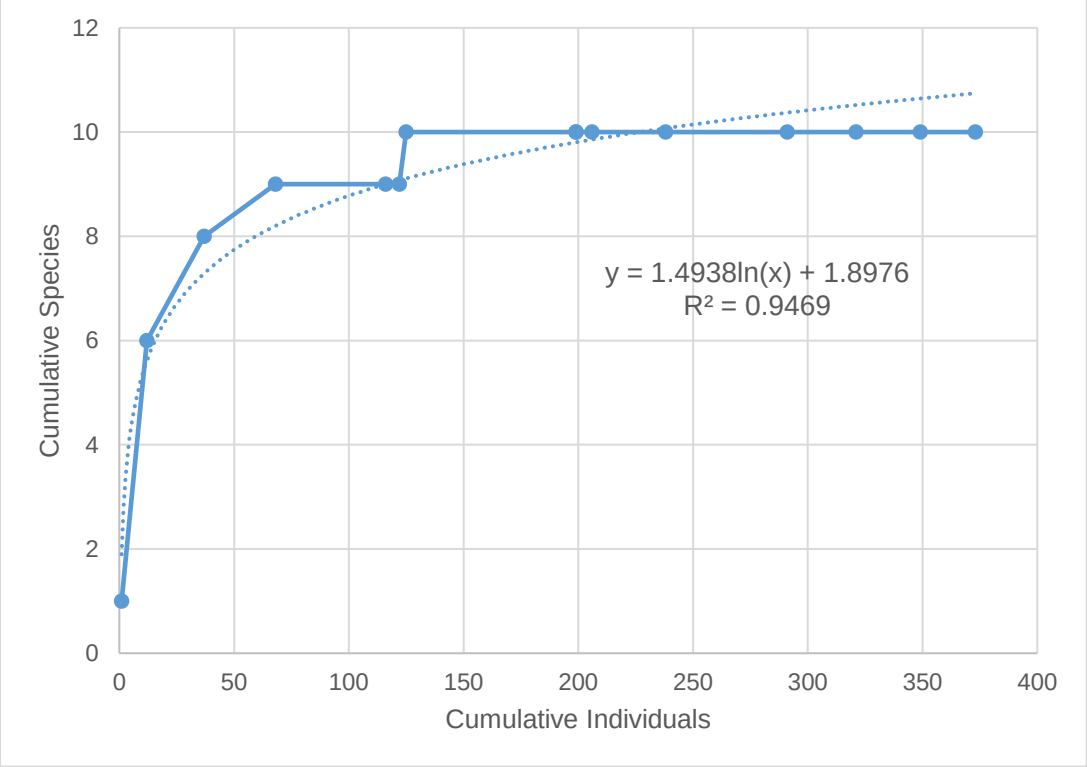
Basemap courtesy of Esri.

Figure 4. Mussel Abundance for the Hayward Project Reach Two on the Namekagon River. Sawyer County, Wisconsin.

Basemap courtesy of Esri.

Date: 8/24/2022 Path: P:\10_Projects\MMead-and-Hunt\480M\16082_Wisconsin_Mussels\16082_GIS\Map4_Mussels_R2_Hayward.mxd

Figure 5. Cumulative species curve for Hayward Project Reach Two on the Namekagon River. Sawyer County, Wisconsin



Appendix A

Scientific Collecting Permits and Survey Plan

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
101 S. Webster Street
Box 7921
Madison WI 53707-7921

Tony Evers, Governor
Preston D. Cole, Secretary
Telephone 608-266-2621
Toll Free 1-888-936-7463

July 30, 2021

Emily Grossman
EnviroScience, Inc
2977 Hwy K #226
O'Fallon, MO 63368

Subject: WI E/T Permit Enclosed

Dear Emily:

With this letter we are updating your **ET Species Permit #1130**, per your request, as follows:

Species added to permit for removal and relocation to nearest suitable habitat outside impacted area:

- All Wisconsin threatened/endangered mussel species, collected as encountered on projects. Live mussels will be returned to the wild. Dead shells may be retained as vouchers and deposited in a reference collection, if permitted.

These updates are now part of your WI E/T Permit and will expire along with your original permit. Updated conditions are attached to this letter.

Please keep this letter and your E/T permit with you when conducting activities involving species listed on your permit.

Thank you for your efforts on behalf of Wisconsin's endangered and threatened resources.

Sincerely,

Drew Feldkirchner
Bureau Director

Wisconsin Endangered and Threatened Species Permit Conditions

The following conditions apply to Wisconsin E/T Species Permit **#1130** issued to **Emily Grossman**:

1. Bureau of Natural Heritage Conservation Mussels should not be surveyed when water temperatures are less than 40 º F and air temperatures are less than 32º F.
2. Permit holder must follow equipment disinfection protocols at outlined in WDNR Manual Code 9183.1, found online at the DNR public site.
3. Permit holder agrees to follow Mussel Relocation Protocol (if applicable) and Wisconsin Wadeable Protocol for Mussel Sampling unless approved by the DNR species expert.
4. If you anticipate encountering a federally listed mussel species while conducting mussel surveys, a federal permit may also be required. For further information, contact U.S. Fish and Wildlife Service, Twin Cities Field Office at (952) 252-0092.
5. If a federally listed species is not anticipated, but is encountered during a survey or relocation, the surveyor must contact the U.S. Fish and Wildlife Service's Twin Cities Field Office (612) 725-3548 ext. 2206) within 24 hours of the encounter, unless the surveyor is already authorized to handle the species under a federal permit.
6. Permit holder must contact Lisie Kitchel (608) 266-5248) prior to conducting field work for each new project.

USACE GUIDELINES

1. Target and non-target species should be returned to point of capture, unless the project involves relocation. If the project involves relocation, please contact Lisie Kitchel (608) 266-5248).
2. Mussels should not be surveyed when water temperatures are less than 40 º F and air temperatures are less than 32º F.
3. It is recommended to follow the equipment disinfection protocols for aquatic invasives as outlined in WDNR Manual Code 9183.1, found online at the DNR public site.
4. It is recommended to follow the Mussel Relocation Protocol (if applicable) and Wisconsin Wadeable Protocol for Mussel Sampling.

State of Wisconsin
Department of Natural Resources
PO Box 7921, Madison WI 53707-7921

Endangered and Threatened Species Permit

Form 1700-002 (R 3/06)

The below named person is authorized by the Wisconsin Department of Natural Resources, pursuant to section 29.604, Wis. Stats., and Chapter NR 27, Wis. Adm. Code, to conduct the described activities for scientific or educational purposes.

DNR Permit Number	DNR Metal Tag Number
1130	
Date DNR Permit Issued	**Date DNR Permit Expires**
07/24/2018	01/31/2024
Federal Permit Number	**Date Federal Permit Expires**

Permittee Information

Last Name	First
Grossman	Emily

Street or Route	City	State	ZIP Code
21 Fort Zumwalt Dr	O'Fallon	MO	63366

Phone Number	Email Address	Date of Birth	Eye Color	Hair Color	Weight	Height
(847) 269-4159	egrossman@enviroscienceinc.com	3/19/1987	Blue	Brown	150	5'6"

Species or Study Information

County(ies) of Activity

Statewide

Name and Number of Specimens or Description of Study

All Wisconsin threatened/endangered mussel species
Mussels will be collected as encountered on projects; specific numbers of each species are not known at this time

Source of Species or Area of Study	Where Species or Item Will Be Kept
Aquatic systems (rivers/streams/lakes) throughout Wisconsin	Live mussels will be returned to the wild. Dead shells may be retained as vouchers and deposited in a reference collection, if permitted.
Method of Taking and/or Transporting	**During the Following Period of Time**
Mussels will be collected by hand via wading/ snorkeling/diving.	Duration of permit validity.

Purpose for Obtaining or Collection

Mussel surveys and possible translocation for construction and/or ecological monitoring projects

Final Disposition of Specimens

Live mussels will be returned to the wild. Dead shells may be retained as vouchers, if permitted.

Scientific Qualification of Permittee

See permit file.

Additional Conditions of This Permit

See attached letter with conditions.

Permittee Certification

I hereby certify that I have read, am familiar, and agree to comply with the regulations described herein. This permit is not transferable and must be exhibited to any authorized agent of the Department of Natural Resources on demand.

Permittee Signature	Date Signed
DocuSigned by: Emily Grossman BCABDB7B5AC8410...	8/3/2021 | 12:23 PM CDT

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES
For the Secretary

By: DocuSigned by: Drew Feldkirchner F8586A547FC44E3... Date: 7/30/2021 | 12:00 PM C

Address updated on 1/14/2022 by NRR.

Emily Grossman

From: Kitchel, Lisie E - DNR <Lisie.Kitchel@wisconsin.gov>
Sent: Monday, June 6, 2022 3:00 PM
To: Emily Grossman; Weinzinger, Jesse J - DNR
Cc: Becca Winterringer
Subject: RE: Mussel survey plans

Emily – all three look good, the only thing I would add would be to please note if there is an obvious 'drawdown zone' in any of the river reaches as a result of either consistent drawdownd or seasonal drawdownd where no mussels are present due to being dewatered, the classic 'bathtub ring', to document habitat that is impacted by operation or seasonal maintenance. This is especially important for the Gile Flowage which has a significant drawdown.
By document I mean not just if its present but the extent to which it occurs, 1 foot, 2 feet, 1 meter, etc. in width, or however best to describe it, not if it is not present.
Hope that is clear, give me a call if you want to discuss.

Have fun in northern Wisconsin!!

Lisie Kitchel
Conservation Biologist
Bureau of Natural Heritage Conservation
Wisconsin Department of Natural Resources
101 S. Webster St.
Madison, WI 53707
Cell Phone: (608-220-5180

dnr.wi.gov

From: Emily Grossman <egrossman@enviroscienceinc.com>
Sent: Monday, June 6, 2022 11:26 AM
To: Kitchel, Lisie E - DNR <Lisie.Kitchel@wisconsin.gov>; Weinzinger, Jesse J - DNR <Jesse.Weinzinger@wisconsin.gov>
Cc: Becca Winterringer <bwinterringer@enviroscienceinc.com>
Subject: Mussel survey plans

Lisie and Jesse,

EnviroScience was recently contracted by Mead and Hunt to conduct mussel surveys for four hydropower licensing/relicensing projects in northern Wisconsin. The locations and survey plans include:

- Hayward Lake and Trego Lake, Namekagon River near Hayward & Trego
- White River Flowage, White River near Ashland
- Gile Flowage, W. Fork Montreal River near Gile

Fieldwork will be led by either me (WI E/T permit #1130) or Becca Winterringer (WI E/T permit #1164). Per our permits, we wanted to notify you that we'll be conducting the surveys and request your review of the survey plans to ensure they're adequate. Based on the RFP we received, it looks like Mead and Hunt may have already discussed the survey methods with WIDNR, but please take a look at the attached plans and let me know if you have any comments or questions. We are hoping to start fieldwork in the next couple weeks, if possible, in order to complete the White River site before a planned drawdown of this reservoir in early July.

Again, please let me know if you have any questions/comments or need any additional info.

Thank you!

Emily Grossman
Senior Scientist/Project Manager

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5070 Stow Road, Stow, OH 44224 | EnviroScienceInc.com
O. 800.940.4025 | C. 847.269.4159 | 24-HR 888.866.8540
OH | TN | VA | WV | NC
Meet our new team in North Carolina!

SCIENTIFIC RESEARCH AND COLLECTING PERMIT

Grants permission in accordance with the attached general and special conditions

United States Department of the Interior
National Park Service
Saint Croix

Study#: SACN-00158
Permit#: SACN-2022-SCI-0013
Start Date: Jun 20, 2022
Expiration Date: Jul 08, 2022
Coop Agreement#:
Optional Park Code:

Name of principal investigator:

Name: Rebecca Winterringer **Phone:**6365444754 **Email:**bwinterringer@enviroscienceinc.com

Name of institution represented:
EnviroScience, Inc.

Additional investigators or key field assistants:

Name: Emily Grossman	**Phone:** 847-269-4159	**Email:** egrossman@enviroscienceinc.com
Name: Robert Williams	**Phone:** 423-802-3237	**Email:** rwilliams@enviroscienceinc.com
Name: Matt Gilkay	**Phone:** 763-222-5107	**Email:** mgilkay@enviroscienceinc.com
Name: Paul Moreno	**Phone:** 54-317-1740	**Email:** m256moreno@gmail.com
Name: Ben Ebert	**Phone:** 517-899-3403	**Email:** bebert@enviroscienceinc.com

Study Title:
Mussel Studies for the Hayward (FERC No. 2417) and Trego (FERC No. 2711) Hydroelectric Projects, Namekagon River, Sawyer and Washburn Counties, Wisconsin.

Purpose of study:
The objective of the mussel studies is to provide data on freshwater mussel species and habitat within each of the Project areas. These studies aim to collect current mussel information to supplement historical data near the Project areas and document the resident mussel community above and below each dam. Coordination of the mussel studies has been undertaken by the Project owner and EnviroScience's client (Mead and Hunt). The mussel studies will follow the approved study plans submitted by Mead and Hunt related to correspondence from the NPS dated March 2, 2022.

Subject/Discipline:
Inventory Natural Resources
Water Resources

Locations authorized:
Hayward Hydroelectric Project - Reach 1 will begin approximately 430 m above the Highway 77 bridge (approx. coordinates: 46.013296, -91.453639) and extend 1,000 m upstream. Reach 2 will begin at the canoe portage put-in (approximate coordinates: 46.002513, -91.489114) and will extend 1,000 m downstream.

Trego Hydroelectric Project - Reach 1 will begin at the Wagon Bridge Road crossing (approx. coordinates: 45.908514, -91.824905) and extend 1,000 m downstream. Reach 2 will begin 45 m below the Trego Dam (approx. coordinates: 45.948372, -91.888830) and extend 1,000 m downstream.

Transportation method to research site(s):
Access to each survey area will be via public boat or canoe launches in public parking designated areas.

Collection of the following specimens or materials, quantities, and any limitations on collecting:

Name of repository for specimens or sample materials if applicable:

Repository type: Temporarily captured or handled (may include marking) and then released undamaged in place
Objects collected:
All freshwater mussels encountered will be inventories and released to their point of collection. Live mussels found will be kept submersed in ambient river water and kept cool and moist during processing. All live mussels will be identified to species, counted, measured (length in millimeters), aged (external annuli count), and sexed (sexually dimorphic species only) by the team malacologist. Dead shell specimens will be scored as fresh dead (dead less than one year, lustrous nacre), weathered dead (dead one to many years; chalky nacre, fragmented, and worn periostracum), or subfossil (dead many years to many decades; severely worn and fragmented). Detailed digital images of the study area and representative mussel species will be recorded and reported.Species likely to be encountered based on Wisconsin Observation by County and Waterbody:

Black Sandshell - Ligumia recta
Creek Heelsplitter - Lasmigona compressa
Creeper - Strophitus undulatus
Cylindrical Papershell - Anodontoides ferussacianus
Deertoe - Truncilla truncata
Elktoe - Alasmidonta marginata
Fatmucket - Lampsilis siliquoidea
Fluted-shell - Lasmigona costata
Fragile Papershell - Leptodea fragilis
Giant Floater - Pyganodon grandis
Hickorynut - Obovaria olivaria
Mapleleaf - Quadrula quadrula
Mucket - Actinonaias ligamentina
Paper Pondshell - Utterbackia imbecillis
Pimpleback - Quadrula pustulosa
Pink Heelsplitter - Potamilus alatus
Plain Pocketbook - Lampsilis cardium
Purple Wartyback - Cyclonaias tuberculata
Round Pigtoe - Pleurobema sintoxia
Salamander Mussel - Simpsonaias ambigua
Spike - Elliptio dilatata
Threeridge - Amblema plicata
Wabash Pigtoe - Fusconaia flava

NPS General Conditions for Scientific Research and Collecting Permit (available at the RPRS HELP page) apply to this permit. The following specific conditions or restrictions, and any attached conditions, also apply to this permit:

Plot Marking
Route marking such as painting, blazing, or flagging is prohibited. Materials used to mark plots must be pre-approved by the Resource Management Specialist and must be as subtle as possible. Biodegradable flagging should be used to temporarily mark plots. All tags must have the researcher s name, project name, and date. Whenever possible, markers must not be readily visible to visitors.

Aquatic Collecting
All equipment must be free of zebra mussels.
Decontamination procedures are visual inspection, removal of plants, shells, etc., and a hot water rinse of 140 degrees F or out of water for at least 5 days.

Other Permits
This permit does not negate or replace other permits that may be required from local, state or other federal agencies.

Summary of permitted field methods and activities:

Mussel studies will include field surveys of two riverine reaches at each of the two Project locations. Mussel study methods were developed based on the Wisconsin Department of Natural Resources' (WDNR) Guidelines for Sampling Freshwater Mussels in Wadable Streams (Piette, 2015).
Mussel studies within riverine habitat will be conducted at each Project location. The survey area for each Project will include two riverine reaches, one upstream of the impoundment and one downstream of the Project powerhouse outside of the mixing zone. The upstream and downstream boundaries of each reach will be defined as follows:
Hayward Hydroelectric Project - Reach 1 will begin approximately 430 m above the Highway 77 bridge and extend 1,000 m upstream. Reach 2 will begin at the canoe portage put-in and will extend 1,000 m downstream.
Trego Hydroelectric Project - Reach 1 will begin at the Wagon Bridge Road crossing and extend 1,000 m downstream. Reach 2 will begin 45 m below the Trego Dam and extend 1,000 m downstream.
Within each reach, a series of transects extending bank to bank will be established every 100 m, creating a series of 10 possible transects per reach. Transects will be numbered sequentially from downstream to upstream, and a random number selector will be used to select five transects for the survey within each reach.
Searches along each transect will be conducted in 10-m segments and will extend 0.5 m on each side of the transect. A rapid visual search for signs of freshwater mussels (living or shell material) will be performed within each segment. The rapid visual search will entail an initial search of 0.2 minutes per m2 (min/m2) along each 10-m segment to determine if mussels are present. If mussels are present in a segment, a semi-quantitative search will be triggered, and the time will be extended to 1 min/m2. During the semi-quantitative search, divers will visually search, probe the substrate, and turn over rocks to detect small, burrowed mussels.
EnviroScience will record general stream conditions and morphology within the study area and reference the Aquatic Habitat Classification on the St. Croix National Scenic Riverway for methodology and classifications. Water depth and river bottom substrate composition using the Wentworth Scale (% observed of silt, sand, gravel, etc.) will be recorded. The survey will be conducted only

when visibility at depth is at least 20 inches. In addition, a general description of mussel habitat in the Project boundary will be provided in reporting.
Live mussels found will be kept submersed in ambient river water and kept cool and moist during processing. All live mussels will be identified to species, counted, measured (length in millimeters), aged (external annuli count), and sexed (sexually dimorphic species only) by the team malacologist. Dead shell specimens will be scored as fresh dead (dead less than one year, lustrous nacre), weathered dead (dead one to many years; chalky nacre, fragmented, and worn periostracum), or subfossil (dead many years to many decades; severely worn and fragmented). Detailed digital images of the study area and representative mussel species will be recorded and reported. Datasheets will be populated and summarized per the Mussel Survey Summary Tables provided in Appendix 2 of each mussel study plan. Mussel taxonomy will follow the names presented by Williams et al., 2017.
If any living or dead federal or state-listed species are encountered, EnviroScience will notify Mead & Hunt immediately; per surveyor collection permits, WDNR, National Park Service (NPS), and the U.S. Fish & Wildlife Service (USFWS) will be notified within 24 hours. No live mussels will be harmed or taken during this Project. Any specimens of federally listed species that are encountered will be individually hand placed in their original locations.

Recommended by park staff(name and title):

Reviewed by Collections Manager:

Yes____ No____

Approved by park official:

Date Approved:

Title:

Superintendent

I Agree To All Conditions And Restrictions Of this Permit As Specified
(Not valid unless signed and dated by the principal investigator)

(Principal investigator's signature) (Date)

THIS PERMIT AND ATTACHED CONDITIONS AND RESTRICTIONS MUST BE CARRIED AT ALL TIMES WHILE CONDUCTING RESEARCH ACTIVITIES IN THE DESIGNATED PARK(S)

GENERAL CONDITIONS
For
SCIENTIFIC RESEARCH AND COLLECTING PERMIT

United States Department of the Interior
National Park Service

1. **Authority** - The permittee is granted privileges covered under this permit subject to the supervision of the superintendent or a designee, and shall comply with all applicable laws and regulations of the National Park System area and other federal and state laws. A National Park Service (NPS) representative may accompany the permittee in the field to ensure compliance with regulations.

2. **Responsibility** - The permittee is responsible for ensuring that all persons working on the project adhere to permit conditions and applicable NPS regulations.

3. **False information** - The permittee is prohibited from giving false information that is used to issue this permit. To do so will be considered a breach of conditions and be grounds for revocation of this permit and other applicable penalties.

4. **Assignment** - This permit may not be transferred or assigned. Additional investigators and field assistants are to be coordinated by the person(s) named in the permit and should carry a copy of the permit while they are working in the park. The principal investigator shall notify the park's Research and Collecting Permit Office when there are desired changes in the approved study protocols or methods, changes in the affiliation or status of the principal investigator, or modification of the name of any project member.

5. **Revocation** - This permit may be terminated for breach of any condition. The permittee may consult with the appropriate NPS Regional Science Advisor to clarify issues resulting in a revoked permit and the potential for reinstatement by the park superintendent or a designee.

6. **Collection of specimens (including materials)** - No specimens (including materials) may be collected unless authorized on the Scientific Research and Collecting permit.

The general conditions for specimen collections are:

- Collection of archeological materials without a valid Federal Archeology Permit is prohibited.

- Collection of federally listed threatened or endangered species without a valid U.S. Fish and Wildlife Service endangered species permit is prohibited.

- Collection methods shall not attract undue attention or cause unapproved damage, depletion, or disturbance to the environment and other park resources, such as historic sites.

- New specimens must be reported to the NPS annually or more frequently if required by the park issuing the permit.Minimum information for annual reporting includes specimen classification, number of specimens collected, location collected, specimen status(e.g., herbarium sheet, preserved in alcohol / formalin, tanned and mounted, dried and boxed, etc.), and current location.

- Collected specimens that are not consumed in analysis or discarded after scientific analysis remain federal property.The NPS reserves the right to designate the repositories of all specimens removed from the park and to approve or restrict reassignment of specimens from one repository to another. Because specimens are Federal property, they shall not be destroyed or discarded without prior NPS authorization.
- Each specimen (or groups of specimens labeled as a group) that is retained permanently must bear NPS labels and must be accessioned and cataloged in the NPS National Catalog.Unless exempted by additional park - specific stipulations, the permittee will complete the labels and catalog records and will provide accession information.It is the permittee's responsibility to contact the park for cataloging instructions and specimen labels as well as instructions on repository designation for the specimens.

- Collected specimens may be used for scientific or educational purposes only, and shall be dedicated to public benefit and be accessible to the public in accordance with NPS policies and procedures.

- Any specimens collected under this permit, any components of any specimens (including but not limited to natural organisms, enzymes or other bioactive molecules, genetic materials, or seeds), and research results derived from collected specimens are to be used for

scientific or educational purposes only, and may not be used for commercial or other revenue - generating purposes unless the permittee has entered into a Cooperative Research And Development Agreement(CRADA) or other approved benefit - sharing agreement with the NPS.The sale of collected research specimens or other unauthorized transfers to third parties is prohibited.Furthermore, if the permittee sells or otherwise transfers collected specimens, any components thereof, or any products or research results developed from such specimens or their components without a CRADA or other approved benefit-sharing agreement with NPS, permittee will pay the NPS a royalty rate of twenty percent(20 %) of gross revenue from such sales or other revenues. In addition to such royalty, the NPS may seek other damages to which the NPS may be entitled including but not limited to injunctive relief against the permittee.

7. **Reports** - - The permittee is required to submit an Investigator's Annual Report and copies of final reports, publications, and other materials resulting from the study. Instructions for how and when to submit an annual report will be provided by NPS staff.Park research coordinators will analyze study proposals to determine whether copies of field notes, databases, maps, photos, and / or other materials may also be requested.The permittee is responsible for the content of reports and data provided to the National Park Service

8. **Confidentiality** - - The permittee agrees to keep the specific location of sensitive park resources confidential. Sensitive resources include threatened species, endangered species, and rare species, archeological sites, caves, fossil sites, minerals, commercially valuable resources, and sacred ceremonial sites.

9. **Methods of travel** - Travel within the park is restricted to only those methods that are available to the general public unless otherwise specified in additional stipulations associated with this permit.

10. **Other permits** - The permittee must obtain all other required permit(s) to conduct the specified project.

11. **Insurance** - If liability insurance is required by the NPS for this project, then documentation must be provided that it has been obtained and is current in all respects before this permit is considered valid.

12. **Mechanized equipment** - No use of mechanized equipment in designated, proposed, or potential wilderness areas is allowed unless authorized by the superintendent or a designee in additional specific conditions associated with this permit.

13. **NPS participation** - The permittee should not anticipate assistance from the NPS unless specific arrangements are made and documented in either an additional stipulation attached to this permit or in other separate written agreements.

14. **Permanent markers and field equipment** - The permittee is required to remove all markers or equipment from the field after the completion of the study or prior to the expiration date of this permit. The superintendent or a designee may modify this requirement through additional park specific conditions that may be attached to this permit. Additional conditions regarding the positioning and identification of markers and field equipment may be issued by staff at individual parks.

15. **Access to park and restricted areas** - Approval for any activity is contingent on the park being open and staffed for required operations. No entry into restricted areas is allowed unless authorized in additional park specific stipulations attached to this permit.

16. **Notification** - The permittee is required to contact the park's Research and Collecting Permit Office (or other offices if indicated in the stipulations associated with this permit) prior to initiating any fieldwork authorized by this permit.Ideally this contact should occur at least one week prior to the initial visit to the park.

17. **Expiration date** - Permits expire on the date listed. Nothing in this permit shall be construed as granting any exclusive research privileges or automatic right to continue, extend, or renew this or any other line of research under new permit(s).

18. **Other stipulations** - This permit includes by reference all stipulations listed in the application materials or in additional attachments to this permit provided by the superintendent or a designee. Breach of any of the terms of this permit will be grounds for revocation of this permit and denial of future permits.

SURVEY PLAN:

FRESHWATER MUSSEL STUDIES FOR THE HAYWARD AND TREGO HYDROELECTRIC PROJECTS

(FERC Nos. 2417 and 2711)

Prepared for:

WISCONSIN DEPT. OF NATURAL RESOURCES

On Behalf of :

Mead & Hunt

Prepared by:

EnviroScience
Excellence In Any Environment
5070 Stow Rd.
Stow, OH 44224
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ES Project No. 16082

Date: June 6, 2022

TABLE OF CONTENTS

1.0 PROJECT OVERVIEW

EnviroScience, Inc. is pleased to submit this survey plan to the Wisconsin Department of Natural Resources (WDNR) on behalf of Mead & Hunt to perform freshwater mussel studies associated with the Federal Energy Regulatory Commission (FERC) relicensing process for the Hayward Hydroelectric Project (FERC Project No. 2417) and Trego Hydroelectric Project (FERC Project No. 2711). Northern States Power Company – Wisconsin, d/b/a Xcel Energy (Licensee/Applicant), is required to evaluate existing freshwater mussel resources and potential impacts to freshwater mussel resources associated with continued project operations. The Hayward project is located on the Namekagon River near Hayward, Sawyer County, Wisconsin. The Trego project is located on the Namekagon River near Trego, Washburn County, Wisconsin.

2.0 MUSSEL SURVEY SCOPE OF WORK

TASK ONE: MUSSEL STUDIES

Mussel survey methods were developed following the 2015 WDNR Guidelines for Sampling Freshwater Mussels in Wadeable Streams (Guidelines; Piette, 2015). Mussel studies will include field surveys of two riverine reaches at each project location. One reach will be located upstream of the impoundment, and one will be downstream of the project powerhouse. The upstream and downstream boundaries of each reach will be defined as follows:

- Hayward Hydroelectric Project (22 MHT Work Scope): Reach 1 will begin approximately 430 m above the Highway 77 bridge and extend 1,000 m upstream. Reach 2 will begin at the canoe portage put-in and will extend 1,000 m downstream.
- Trego Hydroelectric Project (22 MHT Work Scope): Reach 1 will begin at the Wagon Bridge Road crossing and extend 1,000 m downstream. Reach 2 will begin 45 m below the Trego Dam and extend 1,000 m downstream.

Within each reach, a series of transects extending bank to bank will be established every 100 m, creating a series of 10 possible transects per reach. Transects will be numbered sequentially from downstream to upstream, and a random number selector will be used to select five transects for the survey within each reach.

Searches along each transect will be conducted in 10-m segments and will extend 0.5 m on each side of the transect. A rapid visual search for signs of freshwater mussels (living or shell material) will be performed within each segment. The rapid visual search will entail an initial search of 0.2 minutes per m^2 (min/m^2) along each 10-m segment to determine if mussels are present. If mussels are present in a segment, a semi-quantitative search will be triggered, and the time will be extended to 1 min/m^2. During the semi-quantitative search, divers will visually search, probe the substrate, and turn over rocks to detect small, burrowed mussels.

EnviroScience will record general stream conditions and morphology within the study area and will reference the Aquatic Habitat Classification on the St. Croix National Scenic Riverway (Wan et al., 2007) for methodology and classifications. Water depth and river bottom substrate composition using the Wentworth Scale (% observed of silt, sand, gravel, etc.) will be recorded. The survey will be conducted only when visibility at depth is at least 20 inches. In addition, a general description of mussel habitat in the project boundary will be provided.

Data and Mussel Handling

Live mussels found will be kept submersed in ambient river water and kept cool and moist during processing. All live mussels will be identified to species, counted, measured (length in millimeters), aged (external annuli count), and sexed (sexually dimorphic species only) by the team malacologist. Dead shell specimens will be scored as fresh dead (dead less than one year, lustrous nacre), weathered dead (dead one to many years; chalky nacre, fragmented, and worn periostracum), or subfossil (dead many years to many decades; severely worn and fragmented). Detailed digital images of the study area and representative mussel species will be recorded and reported. Datasheets will be populated and summarized per the Mussel Survey Summary Tables provided in Appendix 2 of each mussel study plan provided by Mead & Hunt. Mussel taxonomy will follow the names presented by Williams et al., 2017.

If any living or dead federal or state-listed species are encountered, EnviroScience will notify Mead & Hunt immediately; per surveyor collection permits, WDNR, the National Park Service (NPS), and the U.S. Fish & Wildlife Service (USFWS) will be notified within 24 hours. No live mussels will be harmed or taken during this project. Any specimens of federally listed species that are encountered will be individually hand placed in their original locations.

TASK TWO: REPORTING

EnviroScience will provide Mead & Hunt with draft reports for the Hayward and Trego projects for review within 30 days of completion of fieldwork or by October 31, 2022, whichever occurs first. Final draft reports for each project for distribution to the relicensing participants will be completed within seven days after receiving Mead & Hunt's comments. EnviroScience will review and address participant comments and provide a final study report within 30 days of receiving participant comments from Mead & Hunt.

Each report will include a description of mussel survey activities and the prescribed Mussel Survey Summary Tables of all data collected, including mussel species numbers, sizes, and distribution within the study area. GIS-based mapping will provide further visual presentations of the findings of the survey. Geo-referenced photos and GIS shapefiles will be provided electronically to Mead & Hunt.

MUSSEL SURVEY SCHEDULE

Field work will be initiated following coordination with WDNR, receipt of permits, and when suitable weather and river conditions allow. Normal to low water conditions and good visibility must occur to conduct field work; project activities will be planned accordingly. Fieldwork is tentatively planned for mid-June 2022.

3.0 LITERATURE CITED

Piette, R. R. (2015). Guidelines for sampling freshwater mussels in wadable streams. Wisconsin Department of Natural Resources. 50pp.

Wan, H., Perry, J., Ferrin, R., Moraska-LaFrancois, B., Wan, H., Perry, J., ... & Moraska-LaFrancois, B. (2007). Aquatic habitat classification on the St. Croix National Scenic Riverway. In Research report to the US National Park Service. University of Minnesota.

Williams, J. D., Bogan, A. E., Butler, R. S., Cummings, K. S., Garner, J. T., Harris, J. L., ... & Watters, G. T. (2017). A revised list of the freshwater mussels (Mollusca: Bivalvia: Unionida) of the United States and Canada. *Freshwater Mollusk Biology and Conservation, 20*(2), 33-58.

Appendix B

Photographic Record

Appendix B. Index of photo locations, Hayward Mussel Survey, June 2022.

	Coordinates				
	UTM Zone 15N		NAD 1983		
Photo No.	Northing	Easting	Latitude	Longitude	View direction
Photo 1	5096967	619719	46.01581	-91.45344	South
Photo 2	5097182	619775	46.01774	-91.45266	Northeast
Photo 3	5097237	619857	46.01822	-91.45159	Southwest
Photo 4	5097329	619817	46.01905	-91.45209	Northwest
Photo 5	5095351	616891	46.00176	-91.49036	Southwest
Photo 6	5095745	617246	46.00525	-91.48567	North
Photo 7	5095745	617246	46.00525	-91.48567	South
Photo 8	5095837	617266	46.00607	-91.48540	Northeast
Photo 9	5095837	617266	46.00607	-91.48540	West
Photo 10	5095349	616856	46.00175	-91.49081	N/A
Photo 11	5095349	616856	46.00175	-91.49081	N/A
Photo 12	5095349	616856	46.00175	-91.49081	N/A
Photo 13	5095349	616856	46.00175	-91.49081	N/A
Photo 14	5095349	616856	46.00175	-91.49081	N/A
Photo 15	5095745	617246	46.00525	-91.48567	N/A
Photo 16	5095349	616856	46.00175	-91.49081	N/A
Photo 17	5095349	616856	46.00175	-91.49081	N/A
Photo 18	5095645	617232	46.00435	-91.48588	N/A
Photo 19	5095387	616948	46.00207	-91.48962	N/A
Photo 20	5097187	619767	46.01778	-91.45277	N/A

Photo 1. Reach 1, view looking downstream toward Transect 2.

Photo 2. Reach 1, view looking upstream from Transect 6.

Photo 3. Reach 1, view looking downstream from Transect 7.

Photo 4. Reach 1, view looking upstream from Transect 8.

Photo 5. Reach 2, view looking downstream toward Transect 2.

Photo 6. Reach 2, view looking upstream at old wood piles above Transect 9.

Photo 7. Reach 2, view looking downstream from Transect 9.

Photo 8. Reach 2, view looking upstream from Transect 10.

Photo 9. Reach 2, view looking toward the right descending bank at Transect 10.

Photo 10. Representative photo of Mucket (*Actinonaias ligamentina*) collected in the study area.

Photo 11. Representative photo of Elktoe (*Alasmidonta marginata*) collected in the study area.

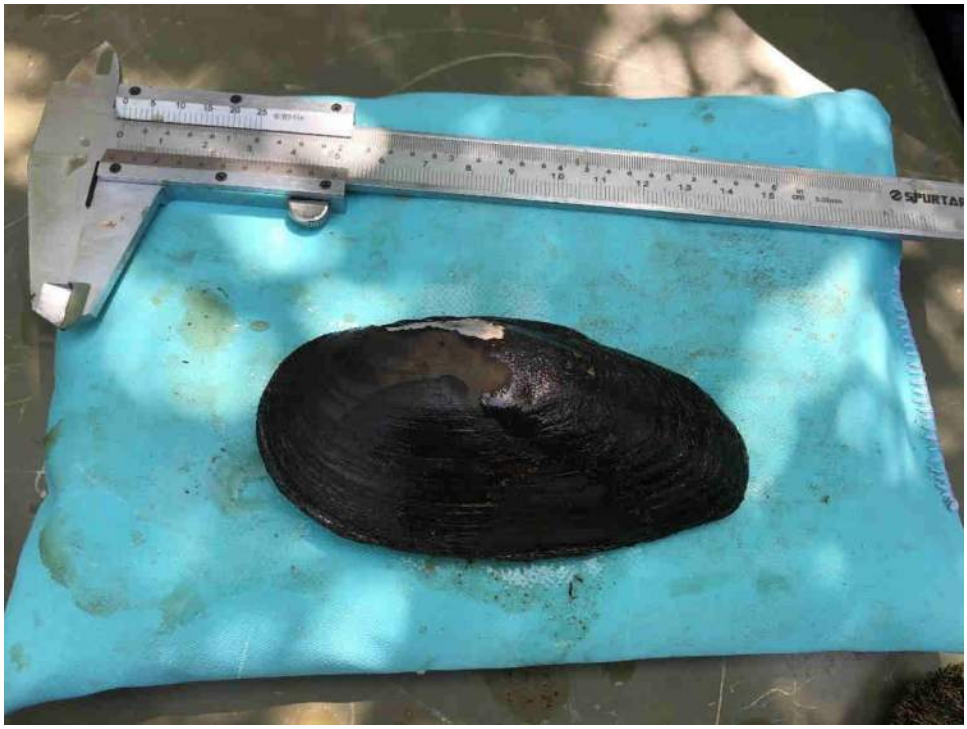

Photo 12. Representative photo of Spike (*Eurynia dilatata*) collected in the study area.

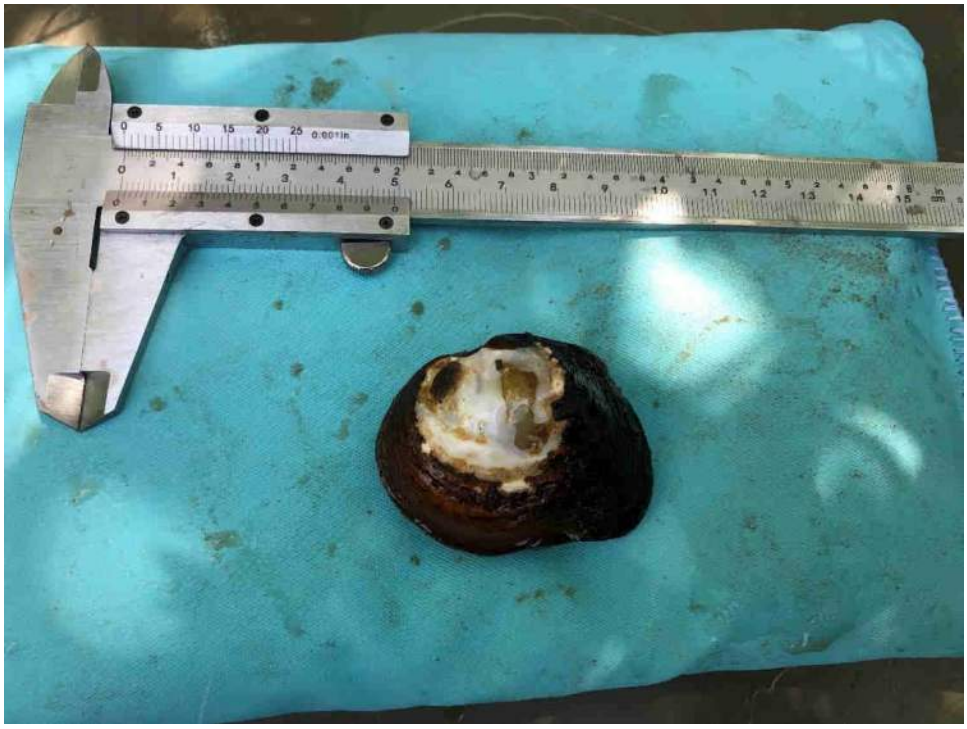

Photo 13. Representative photo of Wabash Pigtoe (*Fusconaia flava*) collected in the study area.

Photo 14. Representative photo of Plain Pocketbook (*Lampsilis cardium*) collected in the study area.

Photo 15. Representative photo of Fatmucket (*Lampsilis siliquoidea*) collected in the study area.

Photo 16. Representative photo of Fluted Shell (*Lasmigona costata*) collected in the study area.

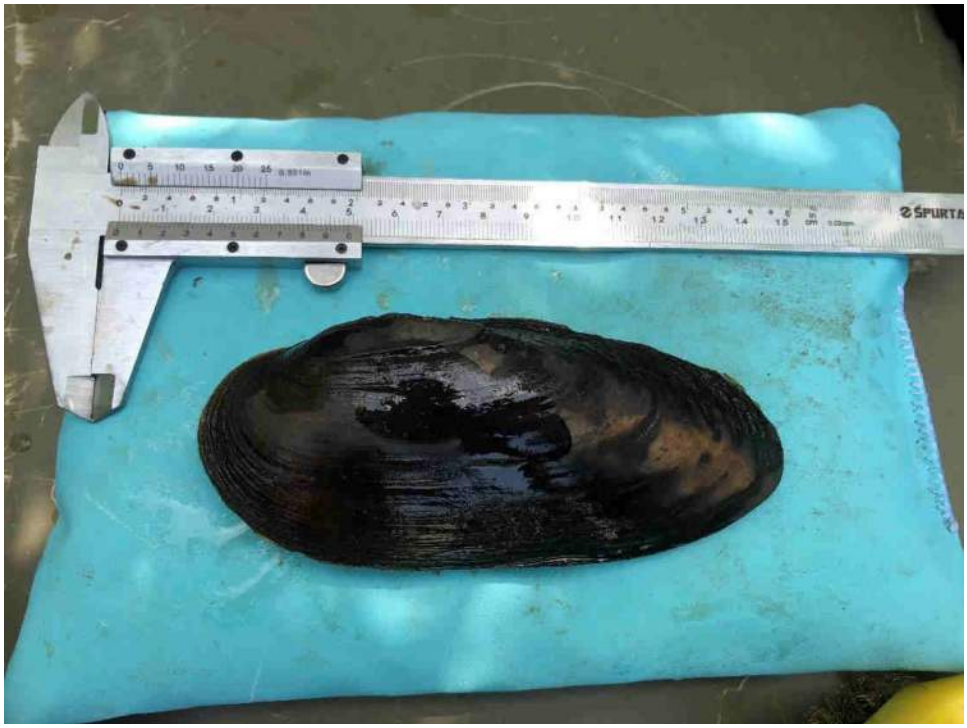

Photo 17. Representative photo of Black Sandshell (*Ligumia recta*) collected in the study area.

Photo 18. Representative photo of Giant Floater (*Pyganodon grandis*) collected in the study area.

Photo 19. Representative photo of Creeper (*Strophitus undulatus*) collected in the study area.

Photo 20. Representative photo of invasive Chinese Mystery Snail (*Cipangopaludina chinensis*) collected in Reach 1.

FRESHWATER MUSSEL STUDY FOR THE TREGO HYDROELECTRIC PROJECT

FERC No. 2711

Prepared for:

Mead & Hunt

1702 Lawrence Drive
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Project No.: 16082
Date: 1/25/2023

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Freshwater Mussel Study for the Trego Hydroelectric Project

Initial Study Report

Document Date: 1/25/2023
Project No.: 16082

Prepared for: Mr. Shawn Puzen
Mead & Hunt

Authorization for Release

The analyses, opinions, and conclusions in this document are based entirely on EnviroScience's unbiased, professional judgment. EnviroScience's compensation is not in any way contingent on any action or event resulting from this study.

To the best of their knowledge, the undersigned attest that this document and the information contained herein are accurate and conform to EnviroScience's internal Quality Assurance standards.

Emily Grossman
Senior Scientist | Field Manager

Becca Winterringer
Senior Scientist | Project Manager

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ACKNOWLEDGEMENTS

Xcel Energy provided funding for the project through Mead & Hunt. Mr. Shawn Puzen was the point of contact for Mead & Hunt, and Mr. Matthew Miller was the point of contact for Xcel Energy. The project manager for EnviroScience, Inc. was Ms. Becca Winterringer. Wisconsin permitted malacologist Ms. Emily Grossman led the survey effort. Also assisting with the survey effort were Mr. Robert Williams, Mr. Ben Ebert, Mr. Paul Moreno, and Mr. Matt Gilkay. Ms. Grossman authored the report, which was reviewed by Ms. Winterringer and Ms. Melissa Vaccarino.

1.0 INTRODUCTION

EnviroScience, Inc. was contracted by Mead & Hunt to perform freshwater mussel studies at the Trego Hydroelectric Project (Project) in Washburn County, Wisconsin. The Project is located on the Namekagon River near Trego, Wisconsin (Figure 1). Northern States Power Company – Wisconsin, a Wisconsin corporation (NSPW or Licensee/Applicant), holds a current license issued by the Federal Energy Regulatory Commission (FERC) to operate and maintain the Project. The current license expires in November 2025. NSPW must submit a final license application no later than November 30, 2023, to obtain a subsequent license (FERC Project No. 2711).

The Namekagon River is a tributary of the St. Croix River and harbors a diverse mussel assemblage. Twenty-three (23) species have been reported from the Namekagon River in Washburn County, including several Wisconsin listed species: Purple Wartyback (*Cyclonaias tuberculata*; endangered), Salamander Mussel (*Simpsonaias ambigua*; threatened), Mapleleaf (*Quadrula quadrula*; species of special concern), and Elktoe (*Alasmidonta marginata*; species of special concern). No federally listed threatened or endangered species are known to occur in this reach of the Namekagon River (Table 1).

Freshwater mussels residing near the Project may be affected by operation of the facility. Flow modifications upstream or downstream of the Project may alter habitat for mussels, and mussels occurring in the reservoir may become stranded during drawdown events. Therefore, the Wisconsin Department of Natural Resources (WDNR) requested that a mussel survey be completed as part of the FERC relicensing process. The objective of the survey was to characterize mussel habitat and determine mussel abundance and species richness in the Project vicinity. Data collected in this survey provides information on the baseline conditions for mussel density, diversity, and habitat in the Project area.

2.0 METHODS

Mussel survey methods were developed following the 2015 WDNR Guidelines for Sampling Freshwater Mussels in Wadeable Streams (Guidelines; Piette, 2015). Mussel studies included field surveys of two riverine reaches, one above and one below the Trego Dam. Surveys were led by a Wisconsin permitted malacologist and were conducted according to the survey plan approved by WDNR (Appendix A).

2.1 RIVERINE SURVEYS

Mussel studies were conducted within riverine habitat near the Project location. Reach 1 (upstream reach) began at the Wagon Bridge Road crossing and extended 1,000 meters (m) downstream. Reach 2 (downstream reach) began 45 m downstream of Trego Dam and extended 1,000 m downstream (Figure 1).

Within each reach, a series of transects extending bank to bank was established every 100 m, creating a series of 10 possible transects per reach. Transects were numbered sequentially from downstream to upstream, and a random number function in Microsoft Excel was used to select five transects for the 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. Each transect was evaluated for mussels using an adaptive sampling approach. First, a rapid visual search was conducted and entailed an initial search of 0.2 minutes

per m^2 (min/m^2) along each 10-m segment to determine if mussels were present (living or shell material). If mussels were present in a segment, a semi-quantitative search was triggered and the search time was extended to 1 min/m^2. If no mussels or evidence of mussels was observed in the rapid visual search, no additional effort was expended in that segment. 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 recorded within the study area. Water depth and river bottom substrate composition using the Wentworth Scale (% observed of silt, sand, gravel, etc.; Wentworth, 2022) were recorded for each 10-m transect segment. In addition, a general description of mussel habitat characteristics in the Project boundary was recorded. The Aquatic Habitat Classification on the St. Croix National Scenic Riverway (Wan et al., 2007) was referenced for habitat and substrate classification.

2.2 DATA AND MUSSEL HANDLING

Live mussels were kept submersed in ambient river water and kept cool and moist during processing. All live mussels were identified to species and counted. The original survey plan also called for all individuals to be measured (length in millimeters), aged (external annuli count), and sexed (sexually dimorphic species only) by the team malacologist. Due to high mussel abundance, WDNR approved modifying the scope of work to measure and age only a representative subset of individuals from each species. Individuals not measured and aged were identified and categorized as adult (>5 external annuli) or juvenile (≤5 external annuli). Dead shell specimens were scored as fresh dead (dead less than one year, lustrous nacre), weathered dead (dead one to many years; chalky nacre, fragmented, and worn periostracum), or subfossil (dead many years to many decades; severely worn and fragmented). Detailed digital images of the study area and representative mussel species were recorded and reported. Datasheets were populated and summarized per the Mussel Survey Summary Tables provided in Appendix 2 of the mussel study plan provided by Mead & Hunt. Mussel taxonomy followed the names presented by Williams et al., 2017.

3.0 RESULTS AND DISCUSSION

The mussel survey was conducted on June 20, 2022. Discharge on the Namekagon River at Leonards, WI (USGS 05331833) was 112 cubic feet per second. Maximum visibility was greater than 1 m, and the water temperature was approximately 20.6° Celsius (69° Fahrenheit). Photographs of sampling sites and species encountered are provided in Appendix B.

3.1 REACH 1 (UPSTREAM)

Reach 1 was a slow-flowing, impounded riverine reach with fine substrate. Current velocity was slow, although there was discernible flow (i.e., the water was not stagnant). The surrounding land cover consisted primarily of forest (65%) and residential area (14%; USEPA, 2022a). U.S. Highway 53 crossed the river near the midpoint of Reach 1. The streambanks were gently to moderately sloped, and no substantial bank erosion was observed. Large patches of cattails (*Typha* spp.) were present along one or both banks throughout much of the reach.

Transects 3, 4, 5, 7, and 9 were randomly selected for sampling in Reach 1. Substrate in most transect segments was primarily sand, with some silt near the banks, and most closely aligned with substrate composition code 1 (abundant fine substrate) in Wan et al. (2007). Boulder, cobble,

gravel, and submerged vegetation were occasionally present in small quantities along the bank, but these constituents were typically absent mid-channel (Figure 2). Water depth ranged from 0.3 m (1 foot [ft]) to 1.4 m (4.5 ft; Table 2; Figure 2).

The Reach 1 survey yielded 120 live mussels of 10 species. Fatmucket (*Lampsilis siliquoidea*; 45.0%) and Plain Pocketbook (*Lampsilis cardium*; 27.5%) together comprised over half of the mussels collected. The remaining eight species each represented <7% of the total (Table 3). No Wisconsin listed species were collected in Reach 1, and no additional species were collected as dead shells.

Mussel abundance was highest in Transect 4 (70 individuals) and considerably lower in the remaining four transects (7 – 23 individuals per transect). Surface density ranged from 0.23 mussels/m^2 in Transects 5 and 7 to 1.75 mussels/m^2 in Transect 4 and averaged 0.60 mussels/m^2 over the entire reach. Mussel distribution generally corresponded with habitat type. Numerous Fatmucket individuals were collected in the vertical silty banks formed by the edges of cattail stands, and most other mussel species were collected near the banks in patches of more heterogeneous substrate. Mussels were scarce in the pure sand substrate mid-channel (Figure 3).

Mussel community metrics are presented in Table 3. Most mussels were classified as adults (>5 external annuli), which may be due in part to the inherent bias of semi-quantitative sampling toward larger individuals. Simpson's diversity was 0.71 and Pielou's evenness was 0.33. Low evenness is attributed to the high relative abundance of Fatmucket and Plain Pocketbook and low relative abundance of the remaining species. The cumulative species curve suggests that additional species could occur in this reach. Based on the trendline equation, only 18 additional individuals would be required to collect one new species (Figure 4).

3.2 REACH 2 (DOWNSTREAM)

Reach 2 primarily consisted of glide/run habitat. Current velocity was moderate, and the maximum observed depth was 1.2 m (4 ft; Table 2; Figure 5). The surrounding land was primarily forested (63%; USEPA, 2022b) with a bridge crossing and canoe launch located in the downstream portion of the reach. Streambanks were gently to moderately sloped throughout most of the reach but were steeper near the Project tailrace.

Transects 3, 4, 5, 7, and 10 were randomly selected for sampling in Reach 2. Although some fine-scale habitat variation was observed among the sampled transects, conditions were generally similar at all five transects. Substrate consisted primarily of mixed boulder, cobble, gravel, and sand and 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 percentage of the substrate constituents in the upstream portion of the reach (Transects 7 and 10), while substrate in the remaining transects was a more even mix of cobble, gravel, and sand with some boulder.

A total of 1143 live mussels of 16 species were collected in Reach 2 (Table 3). Mucket (77.6%) was by far the most abundant species collected along all five transects. Fluted Shell (7.4%) was the only other species that comprised more than 5% of the total. One Wisconsin protected species, Purple Wartyback (endangered; 0.3%), and one Wisconsin special concern species,

Elktoe (2.4%), were collected. Some live mussels were extensively eroded on the umbo and both valves. Abundant dead shell material was present in the substrate throughout the reach.

Mussel abundance and species richness were lowest in Transect 10, along which only 28 individuals of four species were collected. Abundance was considerably higher in the remaining transects, with the live number of mussels ranging from 112 to 382 individuals per transect. Surface density ranged from 0.70 mussels/m^2 in Transect 10 to 9.55 mussels/m^2 in Transect 4 and averaged 5.86 mussels/m^2 over all sampled transects (Table 3). Live mussels were present in all transect segments sampled, though abundance per segment varied widely from 1 to 156 individuals (Figure 6).

Mussel community metrics for Reach 2 are summarized in Table 3. As in Reach 1, the proportion of individuals with ≤5 external annuli was low, likely due to the inherent bias toward large individuals with this sampling method. Simpson's diversity was 0.61 and Pielou's evenness was 0.14. Although species richness was higher than in Reach 1, both diversity and evenness were lower due to the very high abundance of Mucket relative to all other species. The cumulative species curve suggests that additional species may be present in the reach. Based on the trendline equation, 259 additional individuals would need to be collected to yield one additional species (Figure 7).

4.0 CONCLUSIONS

Mussels were present in low abundance in Reach 1 upstream of the impoundment. A total of 120 live individuals of 10 species were collected in this reach, and average surface density was 0.60 mussels/m^2. Most species were only collected in pockets of more heterogeneous substrate near the banks, while Fatmucket was more widely distributed and was found in vegetated banks adjacent to *Typha* stands, as well as in patches with other species. The sand substrate present across most of the channel width does not provide high-quality mussel habitat; patches of more suitable habitat are present along the stream margins.

In contrast, a total of 1143 live mussels of 16 species were collected in Reach 2, including one Wisconsin endangered species and one species of special concern. Surface density was relatively high, averaging 5.86 mussels/m^2 for the entire reach and reaching a maximum of 9.55 mussels/m^2 in Transect 4. Mussels were present along all five sampled transects, and numerous relic shells and live individuals were observed in the substrate while walking between transects. Habitat along the transects was characterized by heterogeneous substrate (boulder, cobble, gravel, sand) and moderate flow, and most of this reach appears to provide high quality mussel habitat.

5.0 REFERENCES

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Table 1. Mussel species reported from the Namekagon River in Washburn County, Wisconsin.

Species	Common Name	Status [1]	Year of Observation [2]
Amblemini			
Amblema plicata	Threeridge		2016
Pleurobemini			
Eurynia dilatata	Spike		2016
Fusconaia flava	Wabash Pigtoe		2016
Pleurobema sintoxia	Round Pigtoe		2016
Quadrulini			
Cyclonaias pustulosa	Pimpleback		2016
Cyclonaias tuberculata	Purple Wartyback	E	1995
Quadrula quadrula	Mapleleaf	SC/P	2016
Lampsilini			
Actinonaias ligamentina	Mucket		2016
Lampsilis cardium	Plain Pocketbook		2016
Lampsilis siliquoidea	Fatmucket		2016
Leptodea fragilis	Fragile Papershell		1995
Ligumia recta	Black Sandshell		2016
Obovaria olivaria	Hickorynut		1988
Potamilus alatus	Pink Heelsplitter		2016
Truncilla truncata	Deertoe		2016
Anodontini			
Alasmidonta marginata	Elktoe	SC/P	2016
Anodontoides ferussacianus	Cylindrical Papershell		2016
Lasmigona compressa	Creek Heelsplitter		2016
Lasmigona costata	Fluted Shell		2016
Pyganodon grandis	Giant Floater		1995
Simpsonaias ambigua	Salamander Mussel	T	1988
Strophitus undulatus	Creeper		2016
Utterbackia imbecillis	Paper Pondshell		2006
Total No. Species	23		

[1] E = Wisconsin endangered, T = Wisconsin threatened, SC/P = Wisconsin species of special concern (protected; WDNR, 2021)

[2] WDNR (2018)

Table 2. Habitat characteristics observed in Trego riverine surveys, Namekagon River, 2022.

Reach	Transect/Segment		Depth (m)	Substrate Composition (%)									
				Bedrock	Boulder	Cobble	Gravel	Sand	Silt	Clay	LWD	Veg.	Shell
Reach 1 (US)	T3	0-10	0.61	0	0	0	0	85	5	0	5	5	0
	T3	10-20	0.91	0	0	0	0	100	0	0	0	0	0
	T3	20-30	0.91	0	0	0	0	90	10	0	0	0	0
	T3	30-40	0.91	0	0	0	0	100	0	0	0	0	0
	T3	40-50	0.91	0	0	0	0	90	0	0	10	0	0
	T3	50-55	0.61	0	0	0	0	40	30	0	30	0	0
Reach 1 (US)	T4	0-10	0.91	0	0	0	0	85	5	0	5	5	0
	T4	10-20	0.91	0	0	0	0	100	0	0	0	0	0
	T4	20-30	0.91	0	0	0	0	100	0	0	0	0	0
	T4	30-40	1.22	0	0	20	0	40	25	5	0	10	0
Reach 1 (US)	T5	0-10	0.30	0	0	0	0	75	20	0	0	5	0
	T5	10-20	0.76	0	0	0	0	90	10	0	0	0	0
	T5	20-30	1.07	0	0	0	0	100	0	0	0	0	0
	T5	30-40	0.91	0	20	20	0	50	0	0	0	10	0
Reach 1 (US)	T7	0-10	1.37	0	0	10	10	40	20	0	0	20	0
	T7	10-20	1.37	0	0	0	0	100	0	0	0	0	0
	T7	20-30	0.76	0	0	0	0	80	10	0	10	0	0
Reach 1 (US)	T9	0-10	0.61	0	0	0	0	70	20	0	10	0	0
	T9	10-20	0.91	0	0	0	0	80	10	0	10	0	0
	T9	20-30	0.91	0	0	0	0	80	10	0	10	0	0
	T9	30-35	0.61	0	0	0	0	80	10	0	10	0	0
Reach 2 (DS)	T3	0-10	0.46	0	20	30	30	20	0	0	0	0	0
	T3	10-20	1.22	0	20	40	30	10	0	0	0	0	0
	T3	20-30	0.61	0	10	30	40	20	0	0	0	0	0
Reach 2 (DS)	T4	0-10	0.30	0	0	10	20	60	0	0	0	10	0
	T4	10-20	1.07	0	0	40	20	40	0	0	0	0	0
	T4	20-30	1.07	0	20	30	40	10	0	0	0	0	0
	T4	30-40	0.46	0	0	40	20	40	0	0	0	0	0

Table 2. Habitat characteristics observed in Trego riverine surveys, Namekagon River, 2022.

Reach	Transect/Segment		Depth (m)	Substrate Composition (%)									
				Bedrock	Boulder	Cobble	Gravel	Sand	Silt	Clay	LWD	Veg.	Shell
Reach 2 (DS)	T5	0-10	0.61	0	0	20	40	20	0	0	10	0	10
	T5	10-20	0.61	0	0	20	50	20	0	0	0	0	10
	T5	20-30	0.61	0	0	30	20	50	0	0	0	0	0
	T5	30-40	0.61	0	0	40	30	20	0	0	0	0	10
	T5	40-50	0.61	0	0	30	50	10	0	0	0	0	10
Reach 2 (DS)	T7	0-10	1.07	0	10	60	10	20	0	0	0	0	0
	T7	10-20	0.91	0	20	50	10	20	0	0	0	0	0
	T7	20-30	0.61	0	0	40	20	10	0	0	10	0	20
	T7	30-35	0.30	0	10	40	20	20	10	0	0	0	0
Reach 2 (DS)	T10	0-10	0.61	0	30	50	10	10	0	0	0	0	0
	T10	10-20	0.61	0	30	50	10	10	0	0	0	0	0
	T10	20-30	0.61	0	20	40	30	10	0	0	0	0	0
	T10	30-40	0.61	0	20	40	30	10	0	0	0	0	0

US = upstream; DS = downstream; LWD = large woody debris

Table 3. Summary of effort and mussels collected in Trego riverine surveys, Namekagon River, 2022.

		Reach 1 (Upstream)							Reach 2 (Downstream)							Total	
Species	Common Name	T3	T4	T5	T7	T9	Total	%	T3	T4	T5	T7	T10	Total	%	Total	%
Amblemini																	
Amblema plicata	Threeridge	-	-	-	-	-	-	-	2	6	1	-	-	9	0.8	9	0.7
Pleurobemini																	
Eurynia dilatata	Spike	-	4	1	-	1	6	5.0	-	4	3	-	-	7	0.6	13	1.0
Fusconaia flava	Wabash Pigtoe	2	3	1	-	2	8	6.7	-	8	3	-	-	11	1.0	19	1.5
Pleurobema sintoxia	Round Pigtoe	-	1	1	-	-	2	1.7	1	-	-	-	-	1	0.1	3	0.2
Quadrulini																	
Cyclonaias pustulosa	Pimpleback	-	-	-	-	-	-	-	-	2	1	-	-	3	0.3	3	0.2
Cyclonaias tuberculata	Purple Wartyback	-	-	-	-	-	-	-	-	-	3	1	-	4	0.3	4	0.3
Lampsilini																	
Actinonaias ligamentina	Mucket	-	3	1	3	1	8	6.7	78	300	252	240	17	887	77.6	895	70.9
Lampsilis cardium	Plain Pocketbook	7	18	4	2	2	33	27.5	6	10	15	9	7	47	4.1	80	6.3
Lampsilis siliquoidea	Fatmucket	9	37	1	2	5	54	45.0	2	1	7	7	2	19	1.7	73	5.8
Ligumia recta	Black Sandshell	4	-	-	-	-	4	3.3	2	2	6	5	-	15	1.3	19	1.5
Obovaria olivaria	Hickorynut	-	-	-	-	-	-	-	-	1	1	-	-	2	0.2	2	0.2
Potamilus alatus	Pink Heelsplitter	-	-	-	-	-	-	-	-	1	-	-	-	1	0.1	1	0.1
Anodontini																	
Alasmidonta marginata	Elktoe	-	-	-	-	-	-	-	8	3	13	4	-	28	2.4	28	2.2
Lasmigona costata	Fluted Shell	-	1	-	-	-	1	0.8	11	41	18	13	2	85	7.4	86	6.8
Pyganodon grandis	Giant Floater	1	-	-	-	-	1	0.8	1	-	-	-	-	1	0.1	2	0.2
Strophitus undulatus	Creeper	-	3	-	-	-	3	2.5	1	3	15	4	-	23	2.0	26	2.1
Total Abundance		23	70	9	7	11	120	100.0	112	382	338	283	28	1143	100.0	1263	100.0
Live Species		5	8	6	3	5	10		10	13	13	8	4	16		16	
Effort (m^2)		55	40	40	30	35	200		30	40	50	35	40	195		395	
Surface Density (no./m^2)		0.42	1.75	0.23	0.23	0.31	0.60		3.73	9.55	6.76	8.09	0.70	5.86		3.20	
% ≤5 external annuli							1.67							0.96			
Simpson's Diversity							0.71							0.61			
Pielou's Evenness							0.33							0.14			

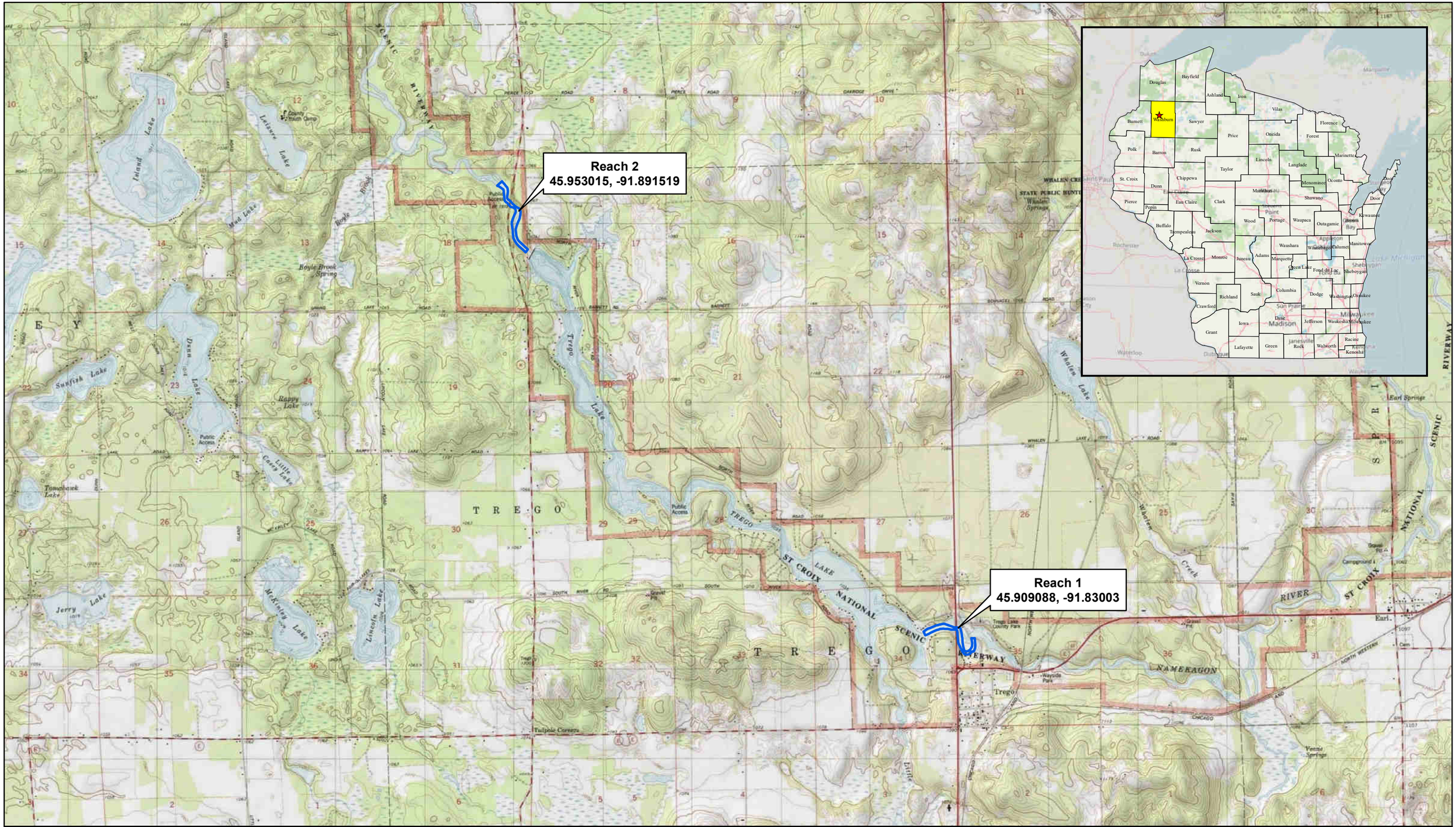

Figure 1. Trego Project Location on USGS 7.5-minute Topographic Map of Dunn Lake and Trego Quadrangles. Washburn County, Wisconsin.

Riverine Reach Study Area

0 2,500 5,000 10,000 Feet

0 750 1,500 3,000 Meters

EnviroScience
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Basemap courtesy of Esri.

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Date: 8/17/2022

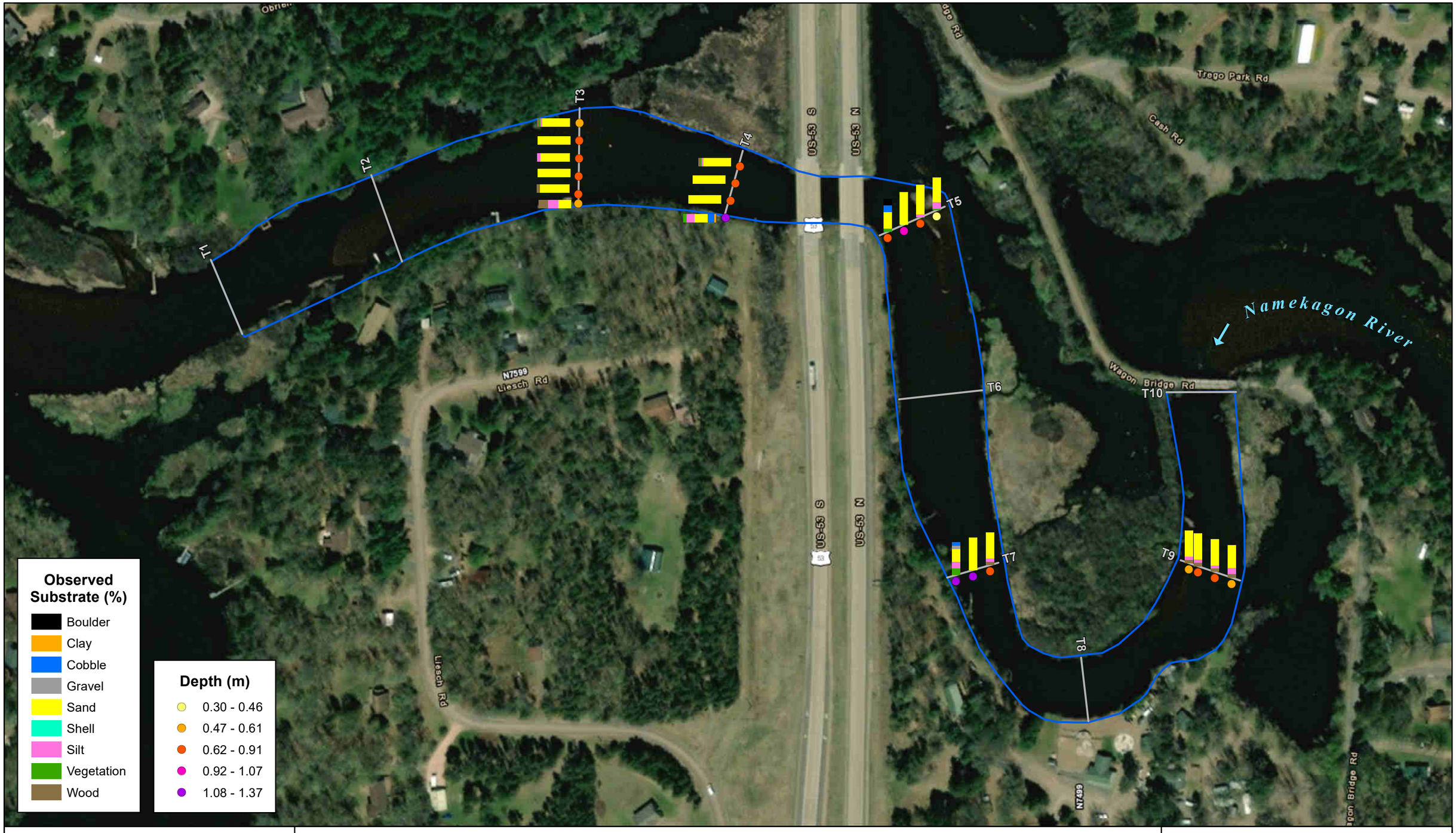

Figure 2. Substrate and Depth for the Trego Project Reach One on the Namekagon River. Washburn County, Wisconsin.

Basemap courtesy of Esri.

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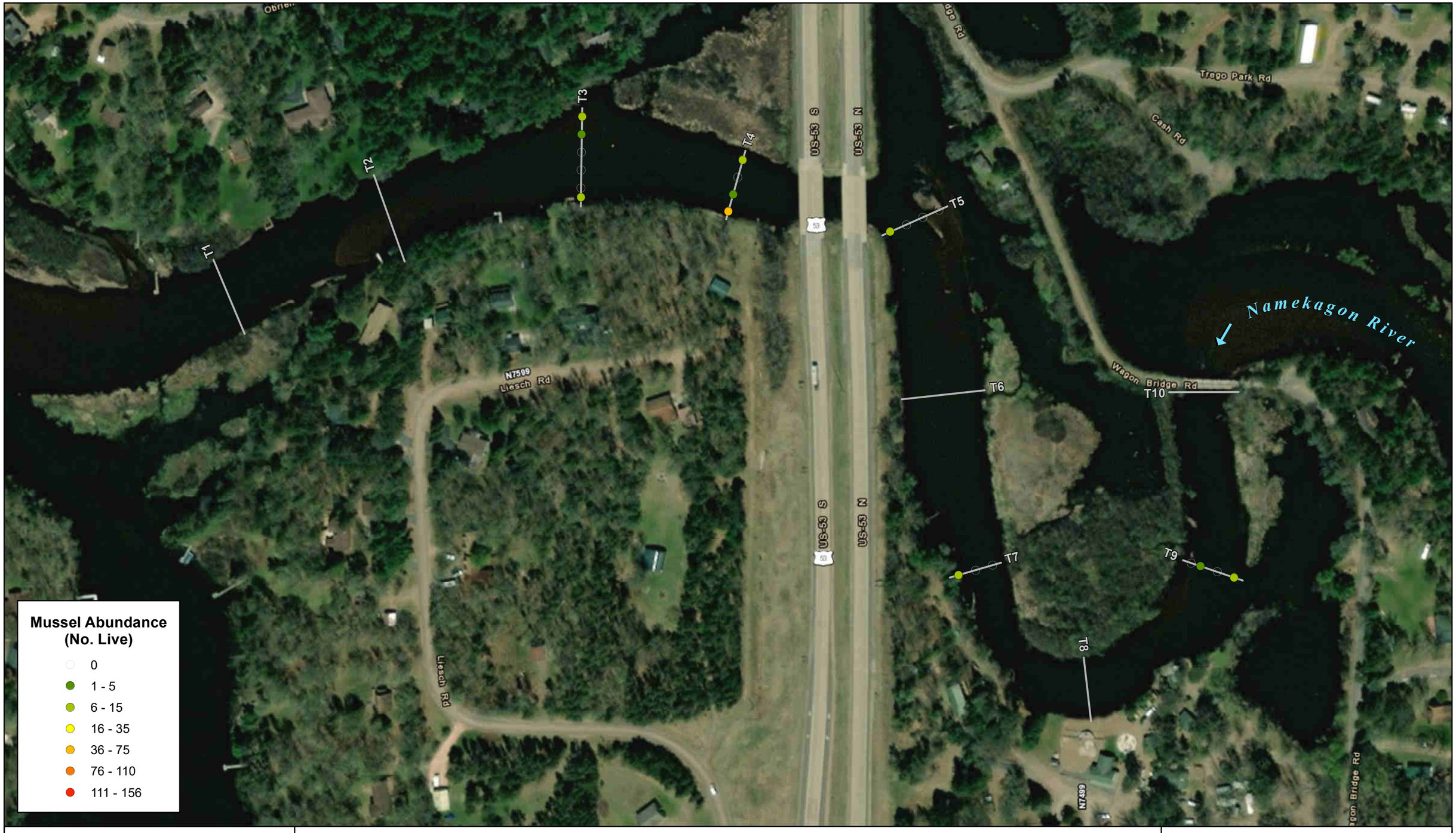

Figure 3. Mussel Abundance for the Trego Project Reach One on the Namekagon River. Washburn County, Wisconsin.

Survey Transect

0 125 250 500 Feet

0 37.5 75 150 Meters

EnviroScience
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Date: 8/7/2022 Path: C:\Users\Anna Giordano\Desktop\GIS_Projects\MiMead-and-Hunt\16082_Wisconsin_Mussels\Map4_Mussels_R1_Trego.mxd

Basemap courtesy of Esri.

Figure 4. Cumulative species curve for Trego Project Reach One on the Namekagon River. Washburn County, Wisconsin.

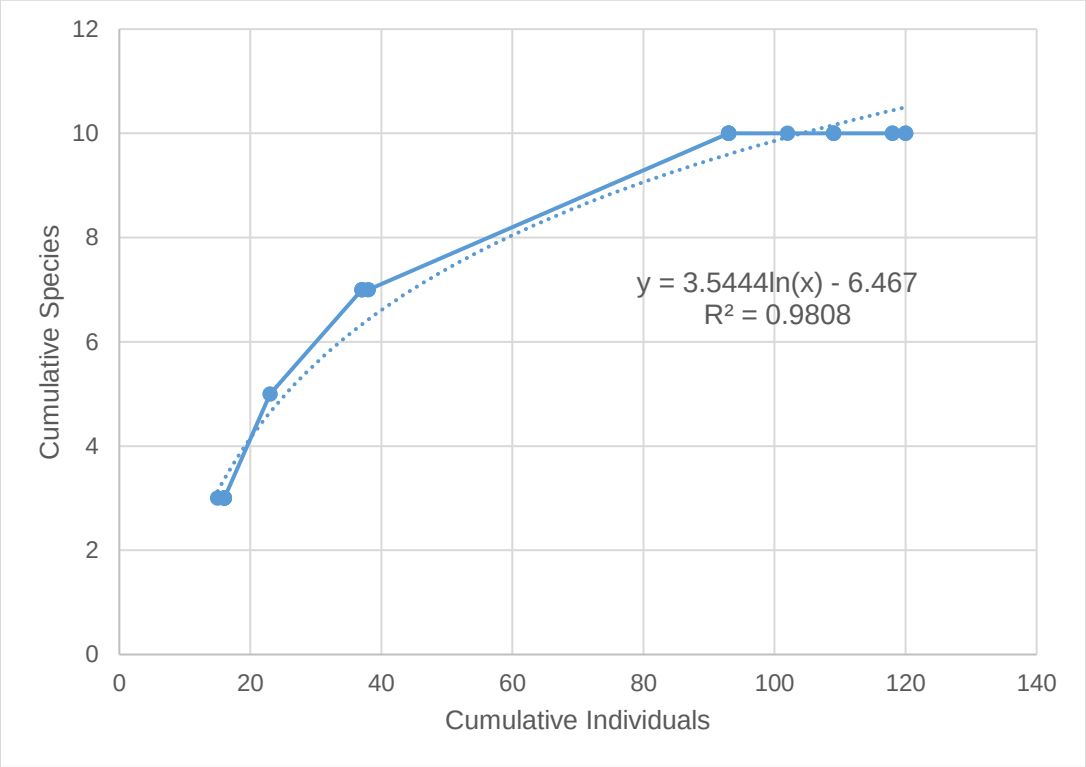

Figure 5. Substrate and Depth for the Trego Project Reach Two on the Namekagon River. Washburn County, Wisconsin.

Survey Transect

Riverine Reach Study Area

0 150 300 600 Feet

0 50 100 200 Meters

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Basemap courtesy of Esri.

Date: 8/18/2022 Path: P:\10_Projects\M\Mead-and-Hunt\480M\16082_Wisconsin_Mussels\16082_GIS\Map3_Substrate_R2_Trego.mxd

Figure 6. Mussel Abundance for the Trego Project Reach Two on the Namekagon River. Washburn County, Wisconsin.

Survey Transect

0 150 300 600 Feet

0 50 100 200 Meters

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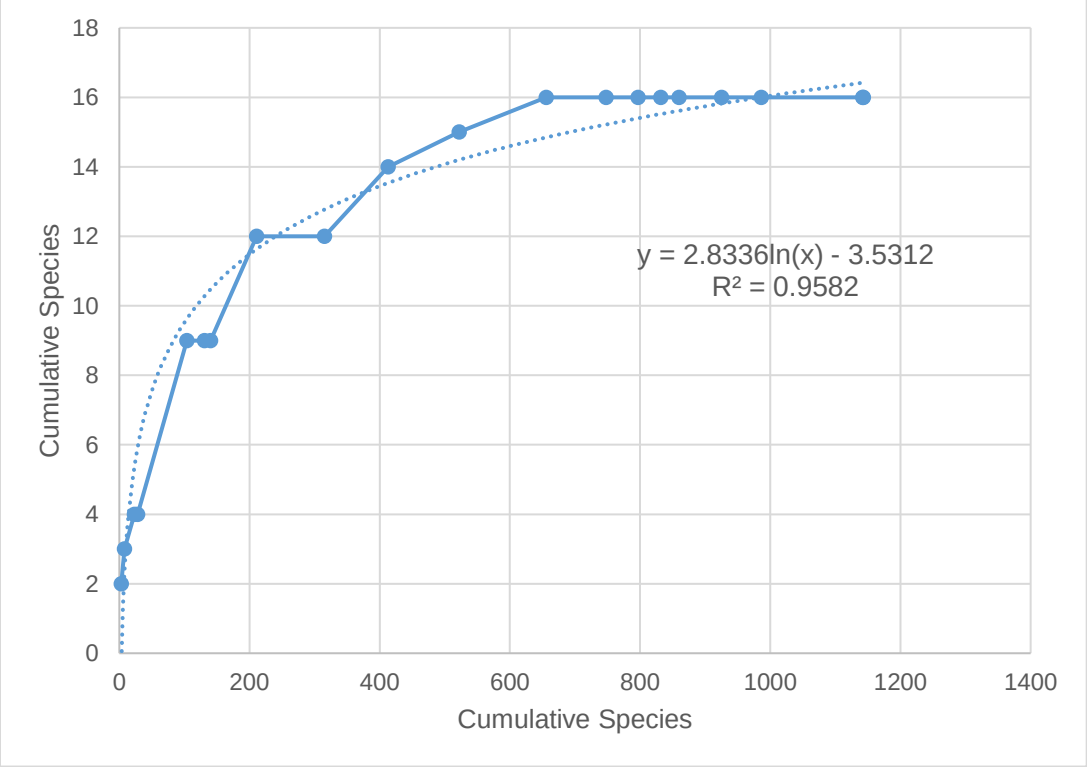
Date: 8/7/2022 Path: C:\Users\Anna Giordano\Desktop\GIS_Projects\MMead-and-Hunt\16082_Wisconsin_Mussels\Map5_Mussels_R2_Trego.mxd

Basemap courtesy of Esri.

Figure 7. Cumulative species curve for Trego Project Reach Two on the Namekagon River. Washburn County, Wisconsin.



Appendix A

Scientific Collecting Permits and Survey Plan

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
101 S. Webster Street
Box 7921
Madison WI 53707-7921

Tony Evers, Governor
Preston D. Cole, Secretary
Telephone 608-266-2621
Toll Free 1-888-936-7463

July 30, 2021

Emily Grossman
EnviroScience, Inc
2977 Hwy K #226
O'Fallon, MO 63368

Subject: WI E/T Permit Enclosed

Dear Emily:

With this letter we are updating your **ET Species Permit #1130**, per your request, as follows:

Species added to permit for removal and relocation to nearest suitable habitat outside impacted area:

- All Wisconsin threatened/endangered mussel species, collected as encountered on projects. Live mussels will be returned to the wild. Dead shells may be retained as vouchers and deposited in a reference collection, if permitted.

These updates are now part of your WI E/T Permit and will expire along with your original permit. Updated conditions are attached to this letter.

Please keep this letter and your E/T permit with you when conducting activities involving species listed on your permit.

Thank you for your efforts on behalf of Wisconsin's endangered and threatened resources.

Sincerely,

Drew Feldkirchner
Bureau Director

Wisconsin Endangered and Threatened Species Permit Conditions

The following conditions apply to Wisconsin E/T Species Permit **#1130** issued to **Emily Grossman**:

1. Bureau of Natural Heritage Conservation Mussels should not be surveyed when water temperatures are less than 40 º F and air temperatures are less than 32º F.
2. Permit holder must follow equipment disinfection protocols at outlined in WDNR Manual Code 9183.1, found online at the DNR public site.
3. Permit holder agrees to follow Mussel Relocation Protocol (if applicable) and Wisconsin Wadeable Protocol for Mussel Sampling unless approved by the DNR species expert.
4. If you anticipate encountering a federally listed mussel species while conducting mussel surveys, a federal permit may also be required. For further information, contact U.S. Fish and Wildlife Service, Twin Cities Field Office at (952) 252-0092.
5. If a federally listed species is not anticipated, but is encountered during a survey or relocation, the surveyor must contact the U.S. Fish and Wildlife Service's Twin Cities Field Office (612) 725-3548 ext. 2206) within 24 hours of the encounter, unless the surveyor is already authorized to handle the species under a federal permit.
6. Permit holder must contact Lisie Kitchel (608) 266-5248) prior to conducting field work for each new project.

USACE GUIDELINES

1. Target and non-target species should be returned to point of capture, unless the project involves relocation. If the project involves relocation, please contact Lisie Kitchel (608) 266-5248).
2. Mussels should not be surveyed when water temperatures are less than 40 º F and air temperatures are less than 32º F.
3. It is recommended to follow the equipment disinfection protocols for aquatic invasives as outlined in WDNR Manual Code 9183.1, found online at the DNR public site.
4. It is recommended to follow the Mussel Relocation Protocol (if applicable) and Wisconsin Wadeable Protocol for Mussel Sampling.

State of Wisconsin
Department of Natural Resources
PO Box 7921, Madison WI 53707-7921

Endangered and Threatened Species Permit

Form 1700-002 (R 3/06)

The below named person is authorized by the Wisconsin Department of Natural Resources, pursuant to section 29.604, Wis. Stats., and Chapter NR 27, Wis. Adm. Code, to conduct the described activities for scientific or educational purposes.

DNR Permit Number	DNR Metal Tag Number
1130	
Date DNR Permit Issued	**Date DNR Permit Expires**
07/24/2018	01/31/2024
Federal Permit Number	**Date Federal Permit Expires**

Permittee Information

Last Name	First
Grossman	Emily

Street or Route	City	State	ZIP Code
21 Fort Zumwalt Dr	O'Fallon	MO	63366

Phone Number	Email Address	Date of Birth	Eye Color	Hair Color	Weight	Height
(847) 269-4159	egrossman@enviroscienceinc.com	3/19/1987	Blue	Brown	150	5'6"

Species or Study Information

County(ies) of Activity
Statewide

Name and Number of Specimens or Description of Study
All Wisconsin threatened/endangered mussel species
Mussels will be collected as encountered on projects; specific numbers of each species are not known at this time

Source of Species or Area of Study	Where Species or Item Will Be Kept
Aquatic systems (rivers/streams/lakes) throughout Wisconsin	Live mussels will be returned to the wild. Dead shells may be retained as vouchers and deposited in a reference collection, if permitted.
Method of Taking and/or Transporting	**During the Following Period of Time**
Mussels will be collected by hand via wading/ snorkeling/diving.	Duration of permit validity.

Purpose for Obtaining or Collection
Mussel surveys and possible translocation for construction and/or ecological monitoring projects

Final Disposition of Specimens
Live mussels will be returned to the wild. Dead shells may be retained as vouchers, if permitted.

Scientific Qualification of Permittee
See permit file.

Additional Conditions of This Permit
See attached letter with conditions.

Permittee Certification

I hereby certify that I have read, am familiar, and agree to comply with the regulations described herein. This permit is not transferable and must be exhibited to any authorized agent of the Department of Natural Resources on demand.

Permittee Signature	Date Signed
DocuSigned by: Emily Grossman BCABDB7B5AC8410...	8/3/2021 | 12:23 PM CDT

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES
For the Secretary

By: DocuSigned by: Drew Feldkirchner F8586A547FC44E3... Date: 7/30/2021 | 12:00 PM C

Address updated on 1/14/2022 by NRR.

Emily Grossman

From: Kitchel, Lisie E - DNR <Lisie.Kitchel@wisconsin.gov>
Sent: Monday, June 6, 2022 3:00 PM
To: Emily Grossman; Weinzinger, Jesse J - DNR
Cc: Becca Winterringer
Subject: RE: Mussel survey plans

Emily – all three look good, the only thing I would add would be to please note if there is an obvious 'drawdown zone' in any of the river reaches as a result of either consistent drawdownd or seasonal drawdownd where no mussels are present due to being dewatered, the classic 'bathtub ring', to document habitat that is impacted by operation or seasonal maintenance. This is especially important for the Gile Flowage which has a significant drawdown.
By document I mean not just if its present but the extent to which it occurs, 1 foot, 2 feet, 1 meter, etc. in width, or however best to describe it, not if it is not present.
Hope that is clear, give me a call if you want to discuss.

Have fun in northern Wisconsin!!

Lisie Kitchel
Conservation Biologist
Bureau of Natural Heritage Conservation
Wisconsin Department of Natural Resources
101 S. Webster St.
Madison, WI 53707
Cell Phone: (608-220-5180

dnr.wi.gov

From: Emily Grossman <egrossman@enviroscienceinc.com>
Sent: Monday, June 6, 2022 11:26 AM
To: Kitchel, Lisie E - DNR <Lisie.Kitchel@wisconsin.gov>; Weinzinger, Jesse J - DNR <Jesse.Weinzinger@wisconsin.gov>
Cc: Becca Winterringer <bwinterringer@enviroscienceinc.com>
Subject: Mussel survey plans

Lisie and Jesse,

EnviroScience was recently contracted by Mead and Hunt to conduct mussel surveys for four hydropower licensing/relicensing projects in northern Wisconsin. The locations and survey plans include:

- Hayward Lake and Trego Lake, Namekagon River near Hayward & Trego
- White River Flowage, White River near Ashland
- Gile Flowage, W. Fork Montreal River near Gile

Fieldwork will be led by either me (WI E/T permit #1130) or Becca Winterringer (WI E/T permit #1164). Per our permits, we wanted to notify you that we'll be conducting the surveys and request your review of the survey plans to ensure they're adequate. Based on the RFP we received, it looks like Mead and Hunt may have already discussed the survey methods with WIDNR, but please take a look at the attached plans and let me know if you have any comments or questions. We are hoping to start fieldwork in the next couple weeks, if possible, in order to complete the White River site before a planned drawdown of this reservoir in early July.

Again, please let me know if you have any questions/comments or need any additional info.

Thank you!

Emily Grossman
Senior Scientist/Project Manager

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5070 Stow Road, Stow, OH 44224 | EnviroScienceInc.com
O. 800.940.4025 | C. 847.269.4159 | 24-HR 888.866.8540
OH | TN | VA | WV | NC
Meet our new team in North Carolina!

SCIENTIFIC RESEARCH AND COLLECTING PERMIT

Grants permission in accordance with the attached general and special conditions

United States Department of the Interior
National Park Service
Saint Croix

Study#: SACN-00158
Permit#: SACN-2022-SCI-0013
Start Date: Jun 20, 2022
Expiration Date: Jul 08, 2022
Coop Agreement#:
Optional Park Code:

Name of principal investigator:

Name: Rebecca Winterringer **Phone:**6365444754 **Email:**bwinterringer@enviroscienceinc.com

Name of institution represented:
EnviroScience, Inc.

Additional investigators or key field assistants:

Name: Emily Grossman	**Phone:** 847-269-4159	**Email:** egrossman@enviroscienceinc.com
Name: Robert Williams	**Phone:** 423-802-3237	**Email:** rwilliams@enviroscienceinc.com
Name: Matt Gilkay	**Phone:** 763-222-5107	**Email:** mgilkay@enviroscienceinc.com
Name: Paul Moreno	**Phone:** 54-317-1740	**Email:** m256moreno@gmail.com
Name: Ben Ebert	**Phone:** 517-899-3403	**Email:** bebert@enviroscienceinc.com

Study Title:
Mussel Studies for the Hayward (FERC No. 2417) and Trego (FERC No. 2711) Hydroelectric Projects, Namekagon River, Sawyer and Washburn Counties, Wisconsin.

Purpose of study:
The objective of the mussel studies is to provide data on freshwater mussel species and habitat within each of the Project areas. These studies aim to collect current mussel information to supplement historical data near the Project areas and document the resident mussel community above and below each dam. Coordination of the mussel studies has been undertaken by the Project owner and EnviroScience's client (Mead and Hunt). The mussel studies will follow the approved study plans submitted by Mead and Hunt related to correspondence from the NPS dated March 2, 2022.

Subject/Discipline:
Inventory Natural Resources
Water Resources

Locations authorized:
Hayward Hydroelectric Project - Reach 1 will begin approximately 430 m above the Highway 77 bridge (approx. coordinates: 46.013296, -91.453639) and extend 1,000 m upstream. Reach 2 will begin at the canoe portage put-in (approximate coordinates: 46.002513, -91.489114) and will extend 1,000 m downstream.

Trego Hydroelectric Project - Reach 1 will begin at the Wagon Bridge Road crossing (approx. coordinates: 45.908514, -91.824905) and extend 1,000 m downstream. Reach 2 will begin 45 m below the Trego Dam (approx. coordinates: 45.948372, -91.888830) and extend 1,000 m downstream.

Transportation method to research site(s):
Access to each survey area will be via public boat or canoe launches in public parking designated areas.

Collection of the following specimens or materials, quantities, and any limitations on collecting:

Name of repository for specimens or sample materials if applicable:

Repository type: Temporarily captured or handled (may include marking) and then released undamaged in place
Objects collected:
All freshwater mussels encountered will be inventories and released to their point of collection. Live mussels found will be kept submersed in ambient river water and kept cool and moist during processing. All live mussels will be identified to species, counted, measured (length in millimeters), aged (external annuli count), and sexed (sexually dimorphic species only) by the team malacologist. Dead shell specimens will be scored as fresh dead (dead less than one year, lustrous nacre), weathered dead (dead one to many years; chalky nacre, fragmented, and worn periostracum), or subfossil (dead many years to many decades; severely worn and fragmented). Detailed digital images of the study area and representative mussel species will be recorded and reported.Species likely to be encountered based on Wisconsin Observation by County and Waterbody:

Black Sandshell - Ligumia recta
Creek Heelsplitter - Lasmigona compressa
Creeper - Strophitus undulatus
Cylindrical Papershell - Anodontoides ferussacianus
Deertoe - Truncilla truncata
Elktoe - Alasmidonta marginata
Fatmucket - Lampsilis siliquoidea
Fluted-shell - Lasmigona costata
Fragile Papershell - Leptodea fragilis
Giant Floater - Pyganodon grandis
Hickorynut - Obovaria olivaria
Mapleleaf - Quadrula quadrula
Mucket - Actinonaias ligamentina
Paper Pondshell - Utterbackia imbecillis
Pimpleback - Quadrula pustulosa
Pink Heelsplitter - Potamilus alatus
Plain Pocketbook - Lampsilis cardium
Purple Wartyback - Cyclonaias tuberculata
Round Pigtoe - Pleurobema sintoxia
Salamander Mussel - Simpsonaias ambigua
Spike - Elliptio dilatata
Threeridge - Amblema plicata
Wabash Pigtoe - Fusconaia flava

NPS General Conditions for Scientific Research and Collecting Permit (available at the RPRS HELP page) apply to this permit. The following specific conditions or restrictions, and any attached conditions, also apply to this permit:

Plot Marking
Route marking such as painting, blazing, or flagging is prohibited. Materials used to mark plots must be pre-approved by the Resource Management Specialist and must be as subtle as possible. Biodegradable flagging should be used to temporarily mark plots. All tags must have the researcher s name, project name, and date. Whenever possible, markers must not be readily visible to visitors.

Aquatic Collecting
All equipment must be free of zebra mussels.
Decontamination procedures are visual inspection, removal of plants, shells, etc., and a hot water rinse of 140 degrees F or out of water for at least 5 days.

Other Permits
This permit does not negate or replace other permits that may be required from local, state or other federal agencies.

Summary of permitted field methods and activities:

Mussel studies will include field surveys of two riverine reaches at each of the two Project locations. Mussel study methods were developed based on the Wisconsin Department of Natural Resources' (WDNR) Guidelines for Sampling Freshwater Mussels in Wadable Streams (Piette, 2015).
Mussel studies within riverine habitat will be conducted at each Project location. The survey area for each Project will include two riverine reaches, one upstream of the impoundment and one downstream of the Project powerhouse outside of the mixing zone. The upstream and downstream boundaries of each reach will be defined as follows:
Hayward Hydroelectric Project - Reach 1 will begin approximately 430 m above the Highway 77 bridge and extend 1,000 m upstream. Reach 2 will begin at the canoe portage put-in and will extend 1,000 m downstream.
Trego Hydroelectric Project - Reach 1 will begin at the Wagon Bridge Road crossing and extend 1,000 m downstream. Reach 2 will begin 45 m below the Trego Dam and extend 1,000 m downstream.
Within each reach, a series of transects extending bank to bank will be established every 100 m, creating a series of 10 possible transects per reach. Transects will be numbered sequentially from downstream to upstream, and a random number selector will be used to select five transects for the survey within each reach.
Searches along each transect will be conducted in 10-m segments and will extend 0.5 m on each side of the transect. A rapid visual search for signs of freshwater mussels (living or shell material) will be performed within each segment. The rapid visual search will entail an initial search of 0.2 minutes per m2 (min/m2) along each 10-m segment to determine if mussels are present. If mussels are present in a segment, a semi-quantitative search will be triggered, and the time will be extended to 1 min/m2. During the semi-quantitative search, divers will visually search, probe the substrate, and turn over rocks to detect small, burrowed mussels.
EnviroScience will record general stream conditions and morphology within the study area and reference the Aquatic Habitat Classification on the St. Croix National Scenic Riverway for methodology and classifications. Water depth and river bottom substrate composition using the Wentworth Scale (% observed of silt, sand, gravel, etc.) will be recorded. The survey will be conducted only

when visibility at depth is at least 20 inches. In addition, a general description of mussel habitat in the Project boundary will be provided in reporting.
Live mussels found will be kept submersed in ambient river water and kept cool and moist during processing. All live mussels will be identified to species, counted, measured (length in millimeters), aged (external annuli count), and sexed (sexually dimorphic species only) by the team malacologist. Dead shell specimens will be scored as fresh dead (dead less than one year, lustrous nacre), weathered dead (dead one to many years; chalky nacre, fragmented, and worn periostracum), or subfossil (dead many years to many decades; severely worn and fragmented). Detailed digital images of the study area and representative mussel species will be recorded and reported. Datasheets will be populated and summarized per the Mussel Survey Summary Tables provided in Appendix 2 of each mussel study plan. Mussel taxonomy will follow the names presented by Williams et al., 2017.
If any living or dead federal or state-listed species are encountered, EnviroScience will notify Mead & Hunt immediately; per surveyor collection permits, WDNR, National Park Service (NPS), and the U.S. Fish & Wildlife Service (USFWS) will be notified within 24 hours. No live mussels will be harmed or taken during this Project. Any specimens of federally listed species that are encountered will be individually hand placed in their original locations.

Recommended by park staff(name and title):

Reviewed by Collections Manager:

Yes____ No____

Approved by park official:

Date Approved:

Title:

Superintendent

I Agree To All Conditions And Restrictions Of this Permit As Specified
(Not valid unless signed and dated by the principal investigator)

(Principal investigator's signature) (Date)

THIS PERMIT AND ATTACHED CONDITIONS AND RESTRICTIONS MUST BE CARRIED AT ALL TIMES WHILE CONDUCTING RESEARCH ACTIVITIES IN THE DESIGNATED PARK(S)

GENERAL CONDITIONS
For
SCIENTIFIC RESEARCH AND COLLECTING PERMIT

United States Department of the Interior
National Park Service

1. **Authority** - The permittee is granted privileges covered under this permit subject to the supervision of the superintendent or a designee, and shall comply with all applicable laws and regulations of the National Park System area and other federal and state laws. A National Park Service (NPS) representative may accompany the permittee in the field to ensure compliance with regulations.

2. **Responsibility** - The permittee is responsible for ensuring that all persons working on the project adhere to permit conditions and applicable NPS regulations.

3. **False information** - The permittee is prohibited from giving false information that is used to issue this permit. To do so will be considered a breach of conditions and be grounds for revocation of this permit and other applicable penalties.

4. **Assignment** - This permit may not be transferred or assigned. Additional investigators and field assistants are to be coordinated by the person(s) named in the permit and should carry a copy of the permit while they are working in the park. The principal investigator shall notify the park's Research and Collecting Permit Office when there are desired changes in the approved study protocols or methods, changes in the affiliation or status of the principal investigator, or modification of the name of any project member.

5. **Revocation** - This permit may be terminated for breach of any condition. The permittee may consult with the appropriate NPS Regional Science Advisor to clarify issues resulting in a revoked permit and the potential for reinstatement by the park superintendent or a designee.

6. **Collection of specimens (including materials)** - No specimens (including materials) may be collected unless authorized on the Scientific Research and Collecting permit.

The general conditions for specimen collections are:

- Collection of archeological materials without a valid Federal Archeology Permit is prohibited.

- Collection of federally listed threatened or endangered species without a valid U.S. Fish and Wildlife Service endangered species permit is prohibited.

- Collection methods shall not attract undue attention or cause unapproved damage, depletion, or disturbance to the environment and other park resources, such as historic sites.

- New specimens must be reported to the NPS annually or more frequently if required by the park issuing the permit.Minimum information for annual reporting includes specimen classification, number of specimens collected, location collected, specimen status(e.g., herbarium sheet, preserved in alcohol / formalin, tanned and mounted, dried and boxed, etc.), and current location.

- Collected specimens that are not consumed in analysis or discarded after scientific analysis remain federal property.The NPS reserves the right to designate the repositories of all specimens removed from the park and to approve or restrict reassignment of specimens from one repository to another. Because specimens are Federal property, they shall not be destroyed or discarded without prior NPS authorization.
- Each specimen (or groups of specimens labeled as a group) that is retained permanently must bear NPS labels and must be accessioned and cataloged in the NPS National Catalog.Unless exempted by additional park - specific stipulations, the permittee will complete the labels and catalog records and will provide accession information.It is the permittee's responsibility to contact the park for cataloging instructions and specimen labels as well as instructions on repository designation for the specimens.

- Collected specimens may be used for scientific or educational purposes only, and shall be dedicated to public benefit and be accessible to the public in accordance with NPS policies and procedures.

- Any specimens collected under this permit, any components of any specimens (including but not limited to natural organisms, enzymes or other bioactive molecules, genetic materials, or seeds), and research results derived from collected specimens are to be used for

scientific or educational purposes only, and may not be used for commercial or other revenue - generating purposes unless the permittee has entered into a Cooperative Research And Development Agreement(CRADA) or other approved benefit - sharing agreement with the NPS.The sale of collected research specimens or other unauthorized transfers to third parties is prohibited.Furthermore, if the permittee sells or otherwise transfers collected specimens, any components thereof, or any products or research results developed from such specimens or their components without a CRADA or other approved benefit-sharing agreement with NPS, permittee will pay the NPS a royalty rate of twenty percent(20 %) of gross revenue from such sales or other revenues. In addition to such royalty, the NPS may seek other damages to which the NPS may be entitled including but not limited to injunctive relief against the permittee.

7. **Reports** - - The permittee is required to submit an Investigator's Annual Report and copies of final reports, publications, and other materials resulting from the study. Instructions for how and when to submit an annual report will be provided by NPS staff.Park research coordinators will analyze study proposals to determine whether copies of field notes, databases, maps, photos, and / or other materials may also be requested.The permittee is responsible for the content of reports and data provided to the National Park Service

8. **Confidentiality** - - The permittee agrees to keep the specific location of sensitive park resources confidential. Sensitive resources include threatened species, endangered species, and rare species, archeological sites, caves, fossil sites, minerals, commercially valuable resources, and sacred ceremonial sites.

9. **Methods of travel** - Travel within the park is restricted to only those methods that are available to the general public unless otherwise specified in additional stipulations associated with this permit.

10. **Other permits** - The permittee must obtain all other required permit(s) to conduct the specified project.

11. **Insurance** - If liability insurance is required by the NPS for this project, then documentation must be provided that it has been obtained and is current in all respects before this permit is considered valid.

12. **Mechanized equipment** - No use of mechanized equipment in designated, proposed, or potential wilderness areas is allowed unless authorized by the superintendent or a designee in additional specific conditions associated with this permit.

13. **NPS participation** - The permittee should not anticipate assistance from the NPS unless specific arrangements are made and documented in either an additional stipulation attached to this permit or in other separate written agreements.

14. **Permanent markers and field equipment** - The permittee is required to remove all markers or equipment from the field after the completion of the study or prior to the expiration date of this permit. The superintendent or a designee may modify this requirement through additional park specific conditions that may be attached to this permit. Additional conditions regarding the positioning and identification of markers and field equipment may be issued by staff at individual parks.

15. **Access to park and restricted areas** - Approval for any activity is contingent on the park being open and staffed for required operations. No entry into restricted areas is allowed unless authorized in additional park specific stipulations attached to this permit.

16. **Notification** - The permittee is required to contact the park's Research and Collecting Permit Office (or other offices if indicated in the stipulations associated with this permit) prior to initiating any fieldwork authorized by this permit.Ideally this contact should occur at least one week prior to the initial visit to the park.

17. **Expiration date** - Permits expire on the date listed. Nothing in this permit shall be construed as granting any exclusive research privileges or automatic right to continue, extend, or renew this or any other line of research under new permit(s).

18. **Other stipulations** - This permit includes by reference all stipulations listed in the application materials or in additional attachments to this permit provided by the superintendent or a designee. Breach of any of the terms of this permit will be grounds for revocation of this permit and denial of future permits.

SURVEY PLAN:

FRESHWATER MUSSEL STUDIES FOR THE HAYWARD AND TREGO HYDROELECTRIC PROJECTS

(FERC Nos. 2417 and 2711)

Prepared for:

WISCONSIN DEPT. OF NATURAL RESOURCES

On Behalf of :

Mead & Hunt

Prepared by:

EnviroScience
Excellence In Any Environment
5070 Stow Rd.
Stow, OH 44224
800-940-4025
www.EnviroScienceInc.com

ES Project No. 16082

Date: June 6, 2022

TABLE OF CONTENTS

1.0 PROJECT OVERVIEW

EnviroScience, Inc. is pleased to submit this survey plan to the Wisconsin Department of Natural Resources (WDNR) on behalf of Mead & Hunt to perform freshwater mussel studies associated with the Federal Energy Regulatory Commission (FERC) relicensing process for the Hayward Hydroelectric Project (FERC Project No. 2417) and Trego Hydroelectric Project (FERC Project No. 2711). Northern States Power Company – Wisconsin, d/b/a Xcel Energy (Licensee/Applicant), is required to evaluate existing freshwater mussel resources and potential impacts to freshwater mussel resources associated with continued project operations. The Hayward project is located on the Namekagon River near Hayward, Sawyer County, Wisconsin. The Trego project is located on the Namekagon River near Trego, Washburn County, Wisconsin.

2.0 MUSSEL SURVEY SCOPE OF WORK

TASK ONE: MUSSEL STUDIES

Mussel survey methods were developed following the 2015 WDNR Guidelines for Sampling Freshwater Mussels in Wadeable Streams (Guidelines; Piette, 2015). Mussel studies will include field surveys of two riverine reaches at each project location. One reach will be located upstream of the impoundment, and one will be downstream of the project powerhouse. The upstream and downstream boundaries of each reach will be defined as follows:

- Hayward Hydroelectric Project (22 MHT Work Scope): Reach 1 will begin approximately 430 m above the Highway 77 bridge and extend 1,000 m upstream. Reach 2 will begin at the canoe portage put-in and will extend 1,000 m downstream.
- Trego Hydroelectric Project (22 MHT Work Scope): Reach 1 will begin at the Wagon Bridge Road crossing and extend 1,000 m downstream. Reach 2 will begin 45 m below the Trego Dam and extend 1,000 m downstream.

Within each reach, a series of transects extending bank to bank will be established every 100 m, creating a series of 10 possible transects per reach. Transects will be numbered sequentially from downstream to upstream, and a random number selector will be used to select five transects for the survey within each reach.

Searches along each transect will be conducted in 10-m segments and will extend 0.5 m on each side of the transect. A rapid visual search for signs of freshwater mussels (living or shell material) will be performed within each segment. The rapid visual search will entail an initial search of 0.2 minutes per m^2 (min/m^2) along each 10-m segment to determine if mussels are present. If mussels are present in a segment, a semi-quantitative search will be triggered, and the time will be extended to 1 min/m^2. During the semi-quantitative search, divers will visually search, probe the substrate, and turn over rocks to detect small, burrowed mussels.

EnviroScience will record general stream conditions and morphology within the study area and will reference the Aquatic Habitat Classification on the St. Croix National Scenic Riverway (Wan et al., 2007) for methodology and classifications. Water depth and river bottom substrate composition using the Wentworth Scale (% observed of silt, sand, gravel, etc.) will be recorded. The survey will be conducted only when visibility at depth is at least 20 inches. In addition, a general description of mussel habitat in the project boundary will be provided.

Data and Mussel Handling

Live mussels found will be kept submersed in ambient river water and kept cool and moist during processing. All live mussels will be identified to species, counted, measured (length in millimeters), aged (external annuli count), and sexed (sexually dimorphic species only) by the team malacologist. Dead shell specimens will be scored as fresh dead (dead less than one year, lustrous nacre), weathered dead (dead one to many years; chalky nacre, fragmented, and worn periostracum), or subfossil (dead many years to many decades; severely worn and fragmented). Detailed digital images of the study area and representative mussel species will be recorded and reported. Datasheets will be populated and summarized per the Mussel Survey Summary Tables provided in Appendix 2 of each mussel study plan provided by Mead & Hunt. Mussel taxonomy will follow the names presented by Williams et al., 2017.

If any living or dead federal or state-listed species are encountered, EnviroScience will notify Mead & Hunt immediately; per surveyor collection permits, WDNR, the National Park Service (NPS), and the U.S. Fish & Wildlife Service (USFWS) will be notified within 24 hours. No live mussels will be harmed or taken during this project. Any specimens of federally listed species that are encountered will be individually hand placed in their original locations.

TASK TWO: REPORTING

EnviroScience will provide Mead & Hunt with draft reports for the Hayward and Trego projects for review within 30 days of completion of fieldwork or by October 31, 2022, whichever occurs first. Final draft reports for each project for distribution to the relicensing participants will be completed within seven days after receiving Mead & Hunt's comments. EnviroScience will review and address participant comments and provide a final study report within 30 days of receiving participant comments from Mead & Hunt.

Each report will include a description of mussel survey activities and the prescribed Mussel Survey Summary Tables of all data collected, including mussel species numbers, sizes, and distribution within the study area. GIS-based mapping will provide further visual presentations of the findings of the survey. Geo-referenced photos and GIS shapefiles will be provided electronically to Mead & Hunt.

MUSSEL SURVEY SCHEDULE

Field work will be initiated following coordination with WDNR, receipt of permits, and when suitable weather and river conditions allow. Normal to low water conditions and good visibility must occur to conduct field work; project activities will be planned accordingly. Fieldwork is tentatively planned for mid-June 2022.

3.0 LITERATURE CITED

Piette, R. R. (2015). Guidelines for sampling freshwater mussels in wadable streams. Wisconsin Department of Natural Resources. 50pp.

Wan, H., Perry, J., Ferrin, R., Moraska-LaFrancois, B., Wan, H., Perry, J., ... & Moraska-LaFrancois, B. (2007). Aquatic habitat classification on the St. Croix National Scenic Riverway. In Research report to the US National Park Service. University of Minnesota.

Williams, J. D., Bogan, A. E., Butler, R. S., Cummings, K. S., Garner, J. T., Harris, J. L., ... & Watters, G. T. (2017). A revised list of the freshwater mussels (Mollusca: Bivalvia: Unionida) of the United States and Canada. *Freshwater Mollusk Biology and Conservation, 20*(2), 33-58.

Appendix B

Photographic Record

Appendix B. Index of photo locations, Trego Mussel Survey, June 2022.

	Coordinates				
	UTM Zone 15N		NAD 1983		
Photo No.	Northing	Easting	Latitude	Longitude	View direction
Photo 1	5084683	590792	45.90972	-91.82936	East
Photo 2	5084459	591014	45.90767	-91.82655	South
Photo 3	5084461	591140	45.90768	-91.82492	South
Photo 4	5084461	591140	45.90768	-91.82492	Northeast
Photo 5	5089498	585906	45.95367	-91.89148	Southeast
Photo 6	5089429	585972	45.95304	-91.89065	Southeast
Photo 7	5089345	586008	45.95229	-91.89019	East
Photo 8	5089152	585988	45.95056	-91.89049	North
Photo 9	5088917	586139	45.94842	-91.88859	Northwest
Photo 10	5088917	586139	45.94842	-91.88859	Southwest
Photo 11	5089345	586008	45.95229	-91.89019	N/A
Photo 12	5089152	585978	45.95055	-91.89062	N/A
Photo 13	5089345	586008	45.95229	-91.89019	N/A
Photo 14	5089429	585972	45.95304	-91.89065	N/A
Photo 15	5089345	586008	45.95229	-91.89019	N/A
Photo 16	5089345	586008	45.95229	-91.89019	N/A
Photo 17	5089345	586008	45.95229	-91.89019	N/A
Photo 18	5084668	590792	45.90959	-91.82937	N/A
Photo 19	5084668	590792	45.90959	-91.82937	N/A
Photo 20	5089429	585972	45.95304	-91.89065	N/A
Photo 21	5084668	590792	45.90959	-91.82937	N/A
Photo 22	5089345	586008	45.95229	-91.89019	N/A
Photo 23	5084649	590966	45.90939	-91.82713	N/A
Photo 24	5089429	585972	45.95304	-91.89065	N/A
Photo 25	5084668	590792	45.90959	-91.82937	N/A
Photo 26	5089498	585906	45.95367	-91.89148	N/A
Photo 27	5089152	585978	45.95055	-91.89062	N/A
Photo 28	5089429	585972	45.95304	-91.89065	N/A

Photo 1. Reach 1, view looking upstream from Transect 3.

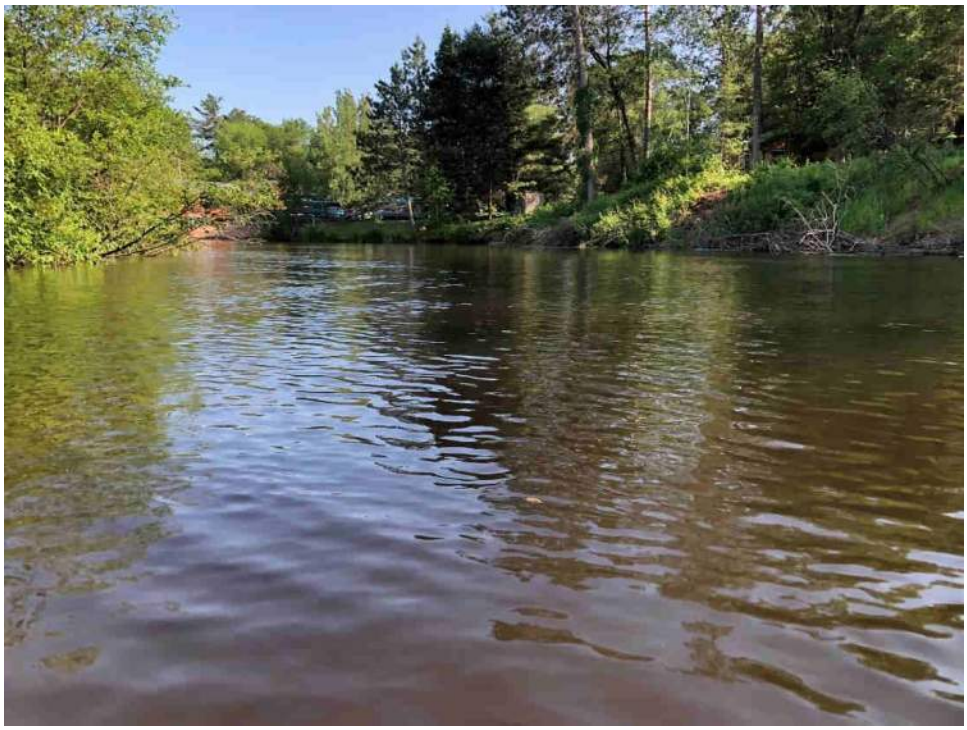

Photo 2. Reach 1, view looking upstream from Transect 7.

Photo 3. Reach 1, view looking downstream from Transect 9.

Photo 4. Reach 1, view looking upstream from Transect 9.

Photo 5. Reach 2, view looking upstream from Transect 3.

Photo 6. Reach 2, view looking upstream from Transect 4.

Photo 7. Reach 2, view looking across the river from the left descending bank near Transect 5.

Photo 8. Reach 2, view looking downstream from Transect 7.

Photo 9. Reach 2, view looking downstream from Transect 10.

Photo 10. Reach 2, view of divers searching for mussels on Transect 10.

Photo 11. Representative photo of Mucket (*Actinonaias ligamentina*) collected in the study area.

Photo 12. Representative photo of Elktoe (*Alasmidonta marginata*) collected in the study area.

Photo 13. Representative photo of Threeridge (*Amblema plicata*) collected in the study area.

Photo 14. Representative photo of Pimpleback (*Cyclonaias pustulosa*) collected in the study area.

Photo 15. Representative photo of Purple Wartyback (*Cyclonaias tuberculata*) collected in the study area.

Photo 16. Representative photo of Spike (*Eurynia dilatata*) collected in the study area.

Photo 17. Representative photo of Wabash Pigtoe (*Fusconaia flava*) collected in the study area.

Photo 18. Representative photo of Plain Pocketbook (*Lampsilis cardium*) collected in the study area.

Photo 19. Representative photo of Fatmucket (*Lampsilis siliquoidea*) collected in the study area.

Photo 20. Representative photo of Fluted Shell (*Lasmigona costata*) collected in the study area.

Photo 21. Representative photo of Black Sandshell (*Ligumia recta*) collected in the study area.

Photo 22. Representative photo of Hickorynut (*Obovaria olivaria*) collected in the study area.

Photo 23. Representative photo of Round Pigtoe (*Pleurobema sintoxia*) collected in the study area.

Photo 24. Representative photo of Pink Heelsplitter (*Potamilus alatus*) collected in the study area.

Photo 25. Representative photo of Giant Floater (*Pyganodon grandis*) collected in the study area.

Photo 26. Representative photo of Creeper (*Strophitus undulatus*) collected in the study area.

Photo 27. Representative photo of shell erosion observed on some live mussels in the project area.

Photo 28. Representative photo of live mussels in the substrate with siphons visible.

RECREATION STUDY REPORT

Recreation Report for the Hayward Hydroelectric Project (FERC No. 2417) and Trego Hydroelectric Project (FERC No. 2711)

Prepared for

Northern States Power Company – Wisconsin
P.O. Box 8
Eau Claire, Wisconsin 54702

Prepared by

EA Engineering, Science, and Technology, Inc., PBC
444 Lake Cook Road, Suite 18
Deerfield, IL 60015

March 2023
Version: FINAL
EA Project No. 16154.02

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS AND ABBREVIATIONS

ATV – All terrain vehicle

AIS – Aquatic Invasive Species

FERC, Commission – Federal Energy Regulatory Commission

NPS – National Park Service

NSPW, Applicant – Northern States Power Company-a Wisconsin corporation

SCORP – Statewide Comprehensive Outdoor Recreation Plan

TLD – Trego Lake District

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1. INTRODUCTION

Northern States Power Company – Wisconsin (NSPW or Licensee), currently holds licenses issued by the Federal Energy Regulatory Commission (FERC or Commission) to operate and maintain the Hayward and Trego Hydroelectric Projects (Projects). The Projects are owned, operated, and maintained by the Licensee. The current licenses, which designate the Projects as FERC Nos. 2417 (Hayward) and 2711 (Trego), expire on November 30, 2025. To obtain subsequent licenses, the Licensee must submit final license applications to FERC no later than November 30, 2023. The final license applications, in part, must include an evaluation of the existing recreational facilities associated with each Project along with proposed recreation enhancements.

The Projects are located on the Namekagon River in Sawyer County (Hayward) and Washburn County (Trego) in Wisconsin. The Namekagon River is a 99.5-mile-long northern tributary to the St. Croix River and is protected by the National Park Service (NPS) under the St. Croix National Scenic Riverway (Figure 1-1). The river is classified as Class I-II rapids. It is generally shallow with a rocky bottom. There are ample opportunities for fishing, wildlife viewing, water sports, and paddling on the Namekagon River.

In March 2019, the State of Wisconsin published its Statewide Comprehensive Outdoor Recreation Plan (SCORP) for 2019-2023. The SCORP identifies recreation needs by region rather than specific sites or Project areas. The SCORP places an emphasis on nature-based recreational opportunities including hiking, fishing, and boating. For both Projects, the Licensee currently provides a carry-in access on the reservoir, a tailrace fishing area downstream of the powerhouse, and a canoe portage that helps fulfill recreation needs. These recreational opportunities are consistent with the SCORP.

Hydro operations, including fluctuations in reservoir elevation, and insufficient public access, can limit recreational opportunities. Adequate information is necessary to determine what impacts may be occurring from hydro operations as well as which recreational opportunities may be enhanced. The existing recreational facilities within the Projects were evaluated for recreational use and improvements.

The goals of the 2022 Hayward and Trego Recreation Study were to:

- obtain a subjective assessment of recreation facility conditions and needed enhancements;
- determine capacity of existing facilities to address current and future user demand; and
- provide sufficient information to evaluate impacts and provide rationale for recreation enhancement recommendations.

The results of the Hayward and Trego Recreation Study are presented herein and include the following items:

- recreation counts based on the data collected in 2022;
- recreation trends by activity and season;
- a discussion of the adequacy of the recreational facilities in the project area to meet recreational demand;
- recommendations to accommodate recreational needs in the project area.

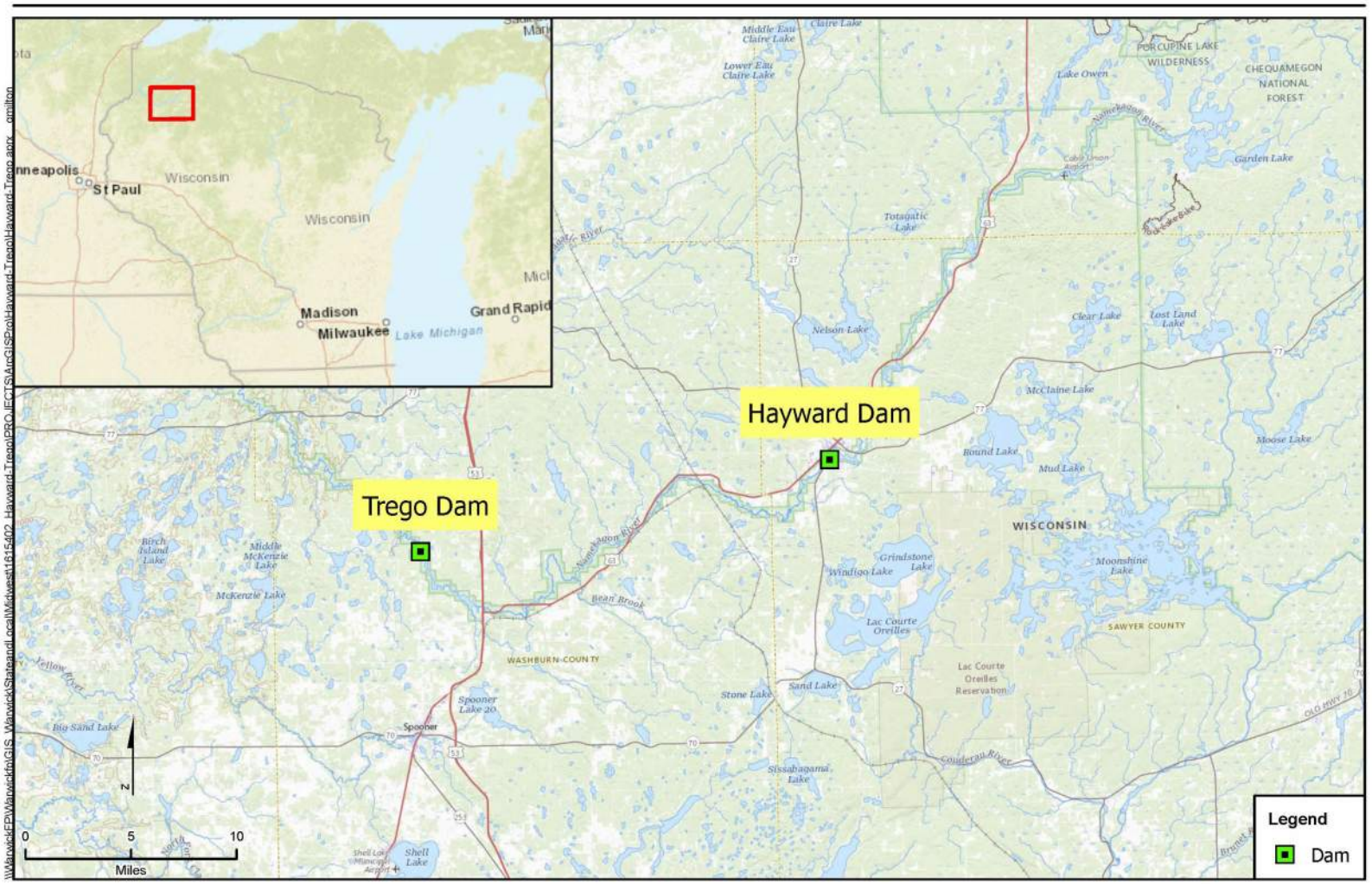

Figure 1-1 Hayward and Trego Project Site Locations

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2. METHODS

This section describes the methods used to collect, summarize, and extrapolate the recreation data collected in 2022. Each subsection focuses on the different types of data and information collected.

2.1 RECREATION INVENTORY

An inventory of public and private recreational facilities near the Projects (Figures 2-1 and 2-2) was created using maps and aerial images of the area, internet resources, and interviews. Section 3 describes each of the following public recreational facilities:

- Hayward Canoe Portage Take-Out and Carry-In Reservoir Access – NSPW facility
- Hayward Canoe Portage Trail and Put-In – NSPW facility
- Hayward Informal Tailwater Bank Fishing Area – NSPW facility
- Hayward City Boat Landing
- Hayward City Beach & Barrier-Free Fishing Pier
- Hayward Bartz's Bay Informal Ice Fishing Access[1]
- Town of Trego Park Boat Landing
- Town of Trego Boat Landing
- Trego North Tailwater Access (Canoe Portage) – NSPW facility
- Trego South Tailwater Access – NSPW facility

The recreation facilities were inventoried during one of the recreational use surveys, using the forms included in Appendix 1, to collect information on recreation amenities and capacity. The following types of information were recorded:

1) The primary type(s) of recreation provided at the site.
2) Existing sanitation facilities (if any).
3) Type of vehicle access and parking capacity (if any).
4) The presence and type (if any) of barrier-free facilities.
5) The geolocation of the facility.
6) Signage
7) Photographs of each recreation site, each amenity and sign, the entryways to primary recreation sites from the main road(s), and any adverse impacts from the site on the surrounding environment, including shoreline erosion.

2.2 FACILITY CONDITION ASSESSMENT

The condition of each amenity or feature at each facility (including recreational wayfinding signs and interpretive signs) and its immediate vicinity were assessed during one of the site visits. Each facility was assigned a rating according to the following scale:

[1] Bartz's Bay Informal Ice Fishing Access was surveyed during the January and February survey periods only.

1) Missing and Needs Replacement
2) Not Usable and Needs Replacement
3) Needs Repair
4) Needs Maintenance or cleaning
5) Good Working Condition (does not need any attention)

If a rating warranted additional attention, that specific item was noted on the form.

2.3 RECREATION USE SURVEY

Recreation use surveys were conducted at each of the recreation sites listed in Section 2.1. The surveys lasted a minimum of one hour per site and were conducted between the hours of 7:00 a.m. and 7:00 p.m. Surveys were completed on a rotating schedule to avoid from being conducted at the same time of the day and to account for time-of-day use patterns. The use survey form included in Appendix 1 was administered to gather opinions about the existing recreation facilities and opportunities. The surveyor recorded the number of people in a party, their primary reason for visiting the site, their perception of level of use, and their opinions regarding the amount and types of recreation opportunities offered within the proposed Project vicinity. The recreation use surveys were conducted according to the following schedule in Table 2-1.

Table 2-1. Recreation Use Survey Schedule.

Survey Month/Season	Recurrence Interval
January	One randomly selected weekend day. One randomly selected weekday.
February	One randomly selected weekend day One randomly selected weekday
April	One randomly selected weekend day.
May	One randomly selected weekend day. One day during Memorial Day weekend.
June	One randomly selected weekday. Two randomly selected weekend day.
July	One randomly selected weekday. One[2] randomly selected weekend day.
August	One randomly selected weekday. Two randomly selected weekend day.
September	One weekend day the weekend following Labor Day weekend.

The recreation surveys provided the information necessary to estimate the use at each site (Section 5.1).

[2] Two randomly selected weekend days were planned; however, only one was completed due to unavoidable staffing shortages.

2.4 RECREATION SPOT COUNTS

Upon arriving at each recreation site where recreation use surveys were collected, a spot count was conducted using the form enclosed in Appendix 1. The information was then analyzed to assess recreational use and is summarized in Section 5.2 by month, season, and type of activity.

2.5 FUTURE AND POTENTIAL RECREATION

To assess future recreation needs within the Project vicinity, a questionnaire was sent to municipalities and other entities responsible for existing recreation within the Project vicinity (Appendix 2). Specifically, the questionnaire was sent to the City of Hayward, Hayward Area Chamber of Commerce, and Sawyer County for the Hayward Project and the Town of Trego, Trego Lake District, and Washburn County for the Trego Project. The questionnaire was also sent to the NPS St. Croix National Scenic Riverway for both Projects. Each entity was given 30 days to respond to the questionnaire and their responses were incorporated into the Future and Projected Use evaluation (Section 5.3).

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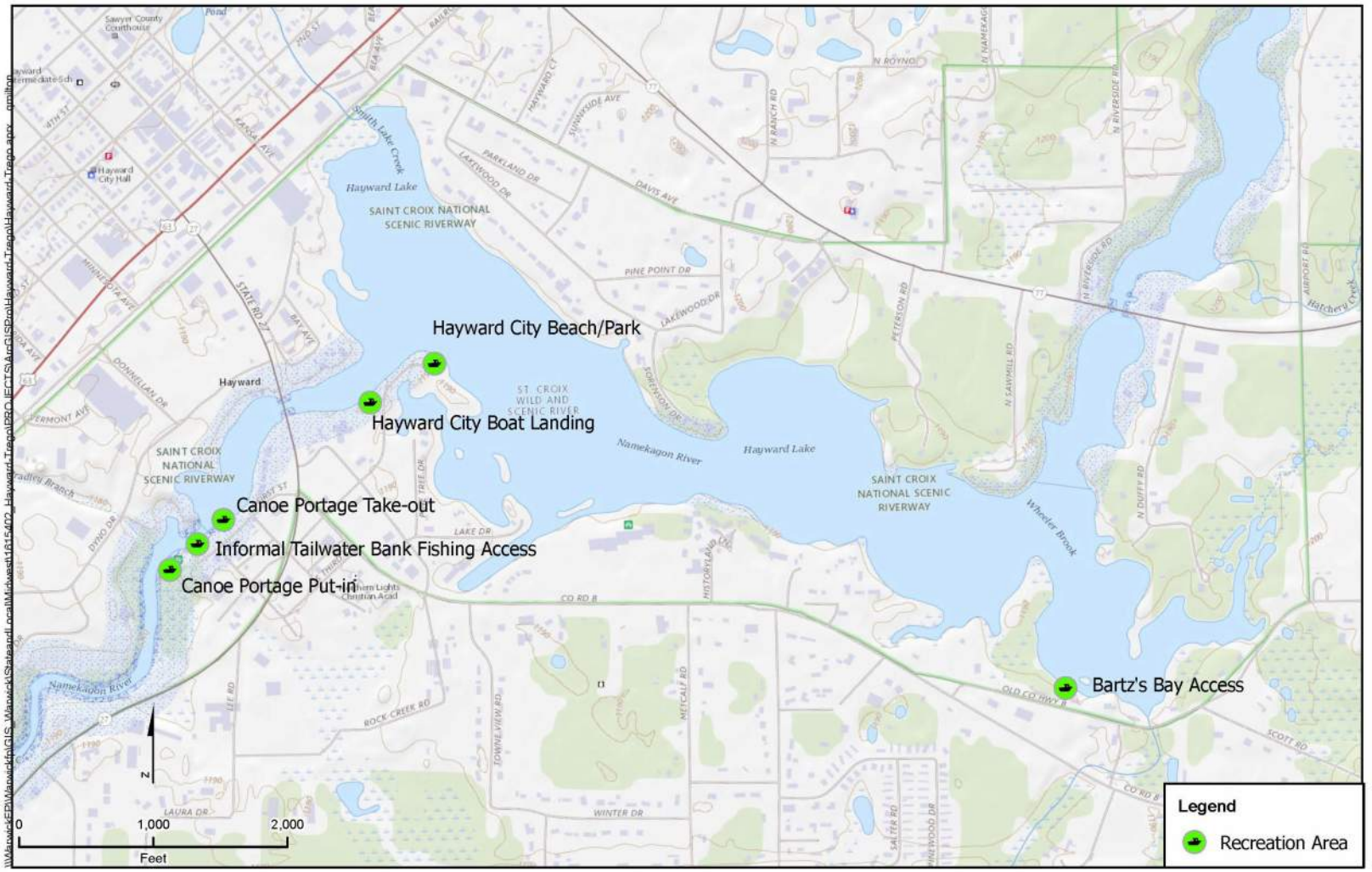

Figure 2-1. Hayward Project Recreation Facilities.

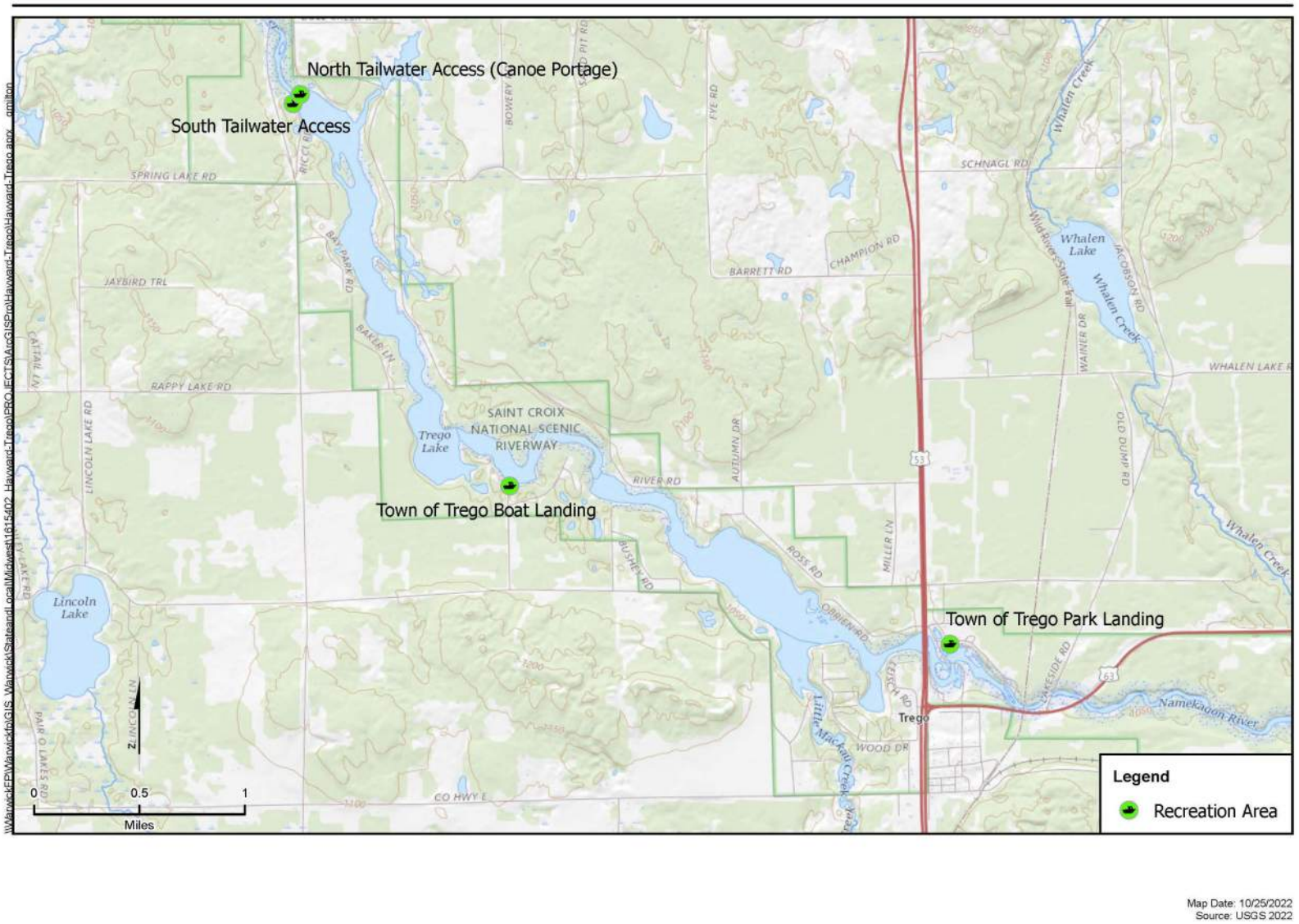

Figure 2-2. Trego Project Recreation Facilities.

3. DESCRIPTIONS OF RECREATIONAL FACILITIES AT THE HAYWARD PROJECT

The public recreational facilities listed in the approved study plan are described below along with a discussion of their use and adequacy. Facility locations are depicted in Figures 2-1, 2-2, and 3-1 through 3-3.

3.1 HAYWARD CANOE PORTAGE TAKE-OUT AND CARRY-IN RESERVOIR ACCESS

NSPW owns and maintains the canoe portage take-out and carry-in access just upstream of the spillway along the east shoreline of Lake Hayward (Figure 3-1). The access enables recreationists to safely launch small craft on, and disembark from, Lake Hayward. The canoe portage take-out and carry-in access was refurbished in 2019 and features a parking area, informational Project signage, and timber step approach to and from the water. The parking area is shared with the informal tailwater bank fishing area and can accommodate approximately 20 vehicles. There is no fee associated with the use of this area.

3.2 HAYWARD CANOE PORTAGE TRAIL AND PUT-IN

NSPW owns and maintains the canoe portage trail and put-in along the east side of the Project (Figure 3-1). The canoe portage trail proceeds from the take-out in a southwesterly direction, along South 1st Street and a gravel road, approximately 600 ft. to the short trail leading from the road to the put-in downstream of the Project tailwater. When combined with the Hayward canoe portage take-out, the trail and put-in enable canoers/kayakers to safely bypass the Hayward Dam. Access between the take-out and put-in is available both to users that are walking and driving. Parking is available for approximately six vehicles along the gravel loop road that terminates at the put-in trail. As with the take-out, there are no fees associated with recreational the use of this area.

3.3 HAYWARD INFORMAL TAILWATER BANK FISHING AREA

NSPW owns and maintains an informal tailwater shoreline fishing area on the east side of the Namekagon River, approximately 270 feet downstream of the canoe portage take-out and carry-in access (Figure 3-1). The informal tailwater access features an area for parking and tiered (i.e., terraced) approach to and from the river. The parking area is shared with the canoe portage take-out and carry-in access and can accommodate approximately 20 vehicles. There is no fee associated with the use of this area.

3.4 HAYWARD CITY BOAT LANDING

The City of Hayward owns and maintains this single launch boat landing on the south side of the lake (Figure 3-2). It is the only public, trailer-accessible boat landing on the lake. The landing consists of a cement launch pad with paved approach and dock with gravel approach. The City maintains a “lifejacket loaner” stand to encourage recreationists to use lifejackets when on Lake

Hayward. A light pole situated in the parking area provides lighting during the evening hours. The adjacent gravel parking lot is large enough to accommodate approximately 20 vehicles or 10 vehicles with trailers. The parking lot also serves as overflow parking for users of the beach and park area. The City does not charge a fee for the use of this launch and no other amenities are present.

3.5 HAYWARD CITY BEACH AND BARRIER-FREE FISHING PIER

The City of Hayward owns the City beach and park on the south side of the lake (Figure 3-2). It consists of a 100-foot sand beach with designated swimming area, changing rooms, restroom facilities, shelter, playground, park bench with solar-powered charging station, six picnic tables near the beach and playground, seven tables in the picnic area with charcoal grills, and shore fishing opportunities. The area also features a walking bridge and an Americans with Disabilities Act (ADA) compliant fishing pier. A paved parking lot is provided that can accommodate 24 vehicles with two parking spots being designated for handicap access. There is no fee associated with the use of the park or beach.

3.6 HAYWARD BARTZ'S BAY INFORMAL ICE FISHING ACCESS

The Bartz's Bay informal ice fishing access was only visited for the recreation survey during January and February since it is a winter recreation access (Figure 2-1). The Bartz's Bay informal ice fishing access is located off a local road, Chippewa Trail, that is popular with ice anglers in the winter who wish to walk out to ice fish. The informal access consists of an unimproved trail on private land, between two residential lots. Ice anglers park their vehicles along Chippewa Trail, predominantly on the southwest side, which is snow-plowed wider at the access point to accommodate approximately six vehicles.

3.7 TOWN OF TREGO PARK BOAT LANDING

The Town of Trego owns and maintains a small boat landing adjacent to the Town Park campground located on the north shore of the Namekagon River, east of U.S. Highway 53, at the end of Cash Road (Figure 2-2). The access consists of a single-lane boat ramp composed of concrete planks with a gravel driveway and no dock. The landing is small and shallow and is primarily used as a put-in and take-out for canoers and kayakers. Shallow water between this landing and the main flowage excludes the use of larger motorized watercraft. Cash Road and the parking area can accommodate 20 vehicles or six vehicles with trailers, primarily along the margin. There is no user fee for the landing.

3.8 TOWN OF TREGO BOAT LANDING

The Town of Trego owns and maintains a single-lane boat launch along the south shore of the middle portion of Trego Flowage (Figure 2-2). It is the only public landing on the flowage and consists of a single cement launch, paved approach, and dock. The landing is sufficient to launch larger motorized boats. Parking is available along the shoulders of Trego Landing Road and can

accommodate eight vehicles or two vehicles with trailers. There is space designated as handicap parking that can accommodate two vehicles. There is no user fee for this launch.

3.9 TREGO NORTH TAILWATER ACCESS (CANOE PORTAGE)

NSPW owns and maintains an area north of the Trego Dam that serves both as a canoe portage and tailwater fishing access (Figure 3-3). The take-out for the canoe portage is located along the northwest shore of Trego Flowage, immediately north of the Trego Dam buoyed exclusion zone. From the take-out, the portage trail follows a west-southwesterly direction for approximately 325 ft. to the downstream put-in, adjacent to the north tailwater access. The portage enables users travelling from upstream-to-downstream to safely bypass the dam. The north tailwater fishing access consists of a concrete retaining wall with safety railing along the river. Parking for the area is available along the shoulder of River Road as well as the gravel approach to the north access gate. There is space for approximately eight vehicles. A portable lavatory is provided and maintained between the portage take-out or parking area and tailwater access. There are no fees associated with the use of these areas.

3.10 TREGO SOUTH TAILWATER ACCESS

NSPW owns and maintains an area southwest of the Trego Dam that provides access to the south tailwater (Figure 3-3). Access to the south tailwater is provided via two metal staircases. The upper staircase is located near the southwest corner of the Project's powerhouse while the lower staircase is closer to river level. The lower staircase provides access to a concrete retaining wall with safety railing along the river. Parking for up to four vehicles is available in an area off the north end of Ricci Road, southwest of the south Project's access gate. There is no fee associated with the use of this area.

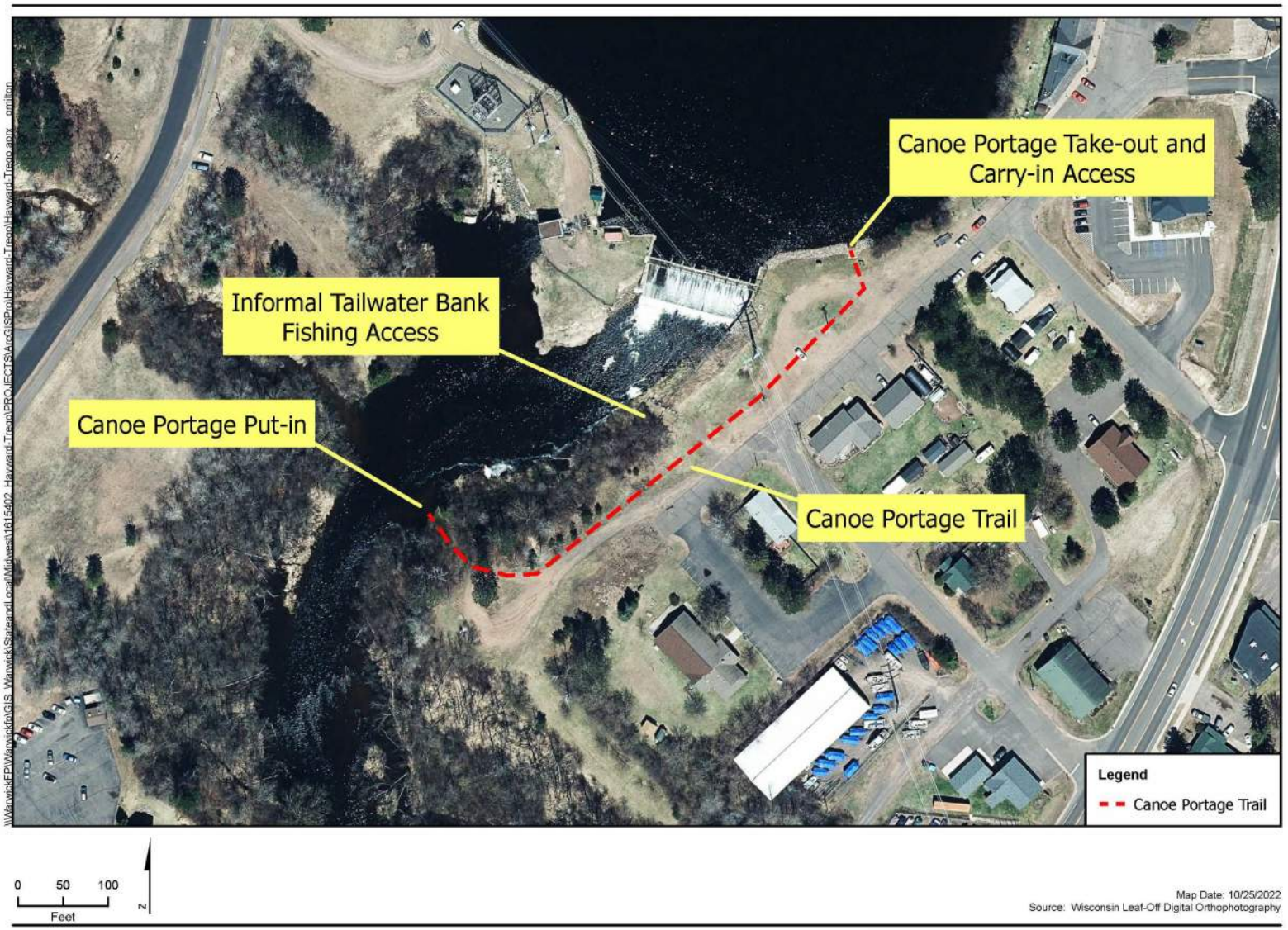

Figure 3-1. Hayward Project Recreation Facilities - Tailwater Areas

Figure 3-2. Hayward Project Recreation Facilities – Upstream Areas.

Figure 3-3. Trego Project Recreation Facilities – Canoe Portage and Tailwater Access

4. RESULTS OF RECREATION INVENTORY AND CONDITION ASSESSMENTS

As part of the recreation inventory and recreation assessments of facilities near the Hayward and Trego Projects, photographs were taken of amenities and observations were recorded on data sheets. A photolog of amenities for each of the facilities inventoried and assessed is presented as Appendix 3. Likewise, data sheets used in the inventory and assessment are provided as Appendix 4.

4.1 HAYWARD CANOE PORTAGE TAKE-OUT AND CARRY-IN RESERVOIR ACCESS

Condition of Amenities

The amenities at the Hayward canoe portage take-out and carry-in reservoir access, as described in Section 3.1, were assessed as being in good condition in 2022. Amenities and signage associated with the Hayward canoe portage take-out and carry-in reservoir access are presented as Photographs 1 through 13 in Appendix 3.

Parking

The Hayward canoe portage take-out and carry-in reservoir access parking is an unpaved area. While there are no designated parking spaces, there is room to park approximately 20 vehicles.

Signage

Signage at the facility includes a directional FERC Project sign that identifies the Hayward Project and displays the nearby recreational resources. Directional signs face the water to inform paddlers of the take-out location and, on the shoreline, display the direction of the portage trail. Additional signage identifies hazards, informs the public of private property, and provides details on normal pond elevation. The signage associated with the portage take-out and carry-in access was considered to be comprehensive and in good condition during 2022.

4.2 HAYWARD CANOE PORTAGE TRAIL AND PUT-IN

Condition of Amenities

The Hayward canoe portage trail and put-in amenities described in Section 3.2 were evaluated as being primarily in good condition. However, due to one sign as described below, the location was rated as needing maintenance. Amenities at the Hayward canoe portage trail and put-in are depicted in Photographs 14 through 25 in Appendix 3.

Parking

There are no designated parking spaces near the Hayward canoe portage put-in. However, the area can accommodate approximately six vehicles along the gravel loop road that terminates at the put-in trail. Additional parking is available a short distance away, near the take-out.

Signage

The canoe portage trail signage consists of a sign near the take-out directing paddlers to the put-in as well as a sign near the trail leading to the river put-in. The signage is in generally good condition and the trail is clearly marked. The only exception is the invasive species sign that was vandalized and observed in the river. The sign is not owned by NSPW nor is it a FERC requirement to have it at this facility. While the existing signage is in good condition, the present condition of the invasive species sign resulted in a "in need of maintenance" rating.

4.3 HAYWARD INFORMAL TAILWATER BANK FISHING AREA

Condition of Amenities

The Hayward informal tailwater shoreline fishing area amenities described in Section 3.3 were assessed as being in good condition during 2022. Amenities at the Hayward informal tailwater bank fishing area are depicted as Photographs 26 through 37 in Appendix 3.

Parking

There are no designated parking spaces for the Hayward informal tailwater bank fishing access. A parking area is shared with the Hayward canoe portage take-out and carry-in reservoir access which can accommodate approximately 20 vehicles.

Signage

Due to the informal nature of the access, signage specific to the Hayward informal tailwater bank fishing access is not provided.

4.4 HAYWARD CITY BOAT LANDING

Condition of Amenities

The amenities at the Hayward City Boat Landing, as described in Section 3.4, were assessed as being in good condition during 2022. The facility's amenities are depicted in Photographs 38 through 47 of Appendix 3.

Parking

There are no designated parking spaces at the Hayward City Boat Landing; however, the available space can accommodate 20 vehicles or 10 vehicles with trailers.

Signage

All signage associated with the Hayward City Boat Landing was rated as being in good condition. Signage includes interpretive and regulation signs. The interpretive signage is related to the Namekagon River being designated a National Scenic River. The regulation signage provides information on fish species bag and size limits as well as invasive species control. Additionally, the City maintains a "lifejacket loaner" stand to encourage recreationists to use lifejackets when on or around Lake Hayward.

4.5 HAYWARD CITY BEACH AND BARRIER-FREE FISHING PIER

Condition of Amenities

All amenities at the Hayward City Beach and Barrier-Free Fishing Pier, described in Section 3.5, were assessed as being in good condition during 2022. Amenities at the Hayward City Beach and Barrier-Free Fishing Pier are included as Photographs 48 through 67 of Appendix 3.

Parking

Central to the beach, park, and picnic area, the City provides a paved parking lot that can accommodate 24 vehicles including two parking spots being designated for handicap access.

Signage

Signage is restricted to areas within the Hayward City Beach and Park. Signs are largely related to regulations and include beach rules, restricted motor vehicle access, and handicap parking. All signage was in good condition.

4.6 HAYWARD BARTZ'S BAY INFORMAL ICE FISHING ACCESS

Condition of Amenities

The limited amenities of the Bartz's Bay Informal Ice Fishing Access, as described in Section 3.6, were assessed as being in good condition during 2022. Photographs 68 through 71 of Appendix 3 depict the amenities at the facility.

Parking

No designated parking spaces are associated with the Bartz's Bay Informal Ice Fishing Access. Parking is available on the shoulder of Chippewa Trail, along the southwest side, which is snow-plowed wider at the access point to accommodate approximately six vehicles

Signage

No signage is associated with the Bartz's Bay Informal Ice Fishing Access.

4.7 TOWN OF TREGO PARK BOAT LANDING

Condition of Amenities

The amenities at the Town of Trego Park Boat Landing, described in Section 3.7, were assessed as being in good condition during 2022. Photographs 72 through 81 of Appendix 3 depict the amenities at the Town of Trego Park Boat Landing.

Parking

The Town of Trego Park Boat Landing does not have delineated spaces in the gravel parking lot; however, the area can accommodate up to 20 vehicles or six vehicles with trailers.

Signage

Signage at the Town of Trego Park Boat Landing consists of both regulation (i.e., no camping) and directional signs. The "no camping" wood sign was in poor condition. However, a newer metal sign nearby was in good condition as were the directional signs to the landing from both the Trego Campground Road and the Namekagon River.

4.8 TOWN OF TREGO BOAT LANDING

Condition of Amenities

The amenities at the Town of Trego Boat Landing, described in Section 3.8, were assessed as being in good condition during 2022. Photographs 82 through 93 of Appendix 3 depict the amenities at the facility.

Parking

The Town of Trego Boat Landing parking area can accommodate eight vehicles or two vehicles with trailers. A handicap parking space is designated and can accommodate two vehicles or one vehicle with a trailer.

Signage

Signage at the Town of Trego Boat Landing is almost entirely related to regulations. Regulation signs consist of fishing regulations, invasive species control, no fireworks, no personal watercraft, no power loading, no parking, and handicap parking. The signs were considered to be in good condition during 2022.

4.9 TREGO NORTH TAILWATER ACCESS (CANOE PORTAGE)

Condition of Amenities

The amenities at the Trego North Tailwater Access (Canoe Portage), described in Section 3.9, were assessed as being in good condition during 2022. Photographs 94 through 119 of Appendix 3 depict the amenities at the facility.

Parking

There are no designated parking spaces for the Trego North Tailwater Access (Canoe Portage) Users may park along the shoulder of River Road as well as the gravel approach to the north Project access gate. Collectively, there is space for approximately eight vehicles.

Signage

Signage at Trego North Tailwater Access (Canoe Portage) includes directional and interpretive signs. Directional signage indicates the canoe portage take out as well as direction of the portage trail. Interpretive signage is provided to inform visitors of the hazards associated with the Project tailwater area. The signs were considered to be in good condition during 2022.

4.10 TREGO SOUTH TAILWATER ACCESS

Condition of Amenities

The amenities at the Trego South Tailwater Access, described in Section 3.10, were assessed as being in good condition during 2022. Photographs 120 through 133 of Appendix 3 depict the amenities at the Trego South Tailwater Access.

Parking

There are no designated parking spaces for the Trego South Tailwater Access; however, parking for up to four vehicles is available in an area off the north end of Ricci Road, southwest of the south access gate for the Project.

Signage

Signage at Trego South Tailwater Access includes a FERC Project sign and interpretive signs. The FERC Project sign is located to the east of the south project access gate. Interpretive signage is provided to inform visitors of the hazards associated with the Project tailwater area. The signs were considered to be in good condition during 2022.

4.11 SUMMARY

The existing amenities of the 10 surveyed recreation resources near the Hayward and Trego Projects were rated as in good condition (Appendix 3). No deficiencies that NSPW is responsible for were identified as part of the recreation inventory and condition assessment.

5. SUMMARY OF RECREATIONAL USE

5.1 RECREATIONAL USE SURVEYS

This section provides a summary of the data gathered from interviews with recreational users regarding the recreational facilities and opportunities near the Hayward and Trego Projects (Appendix 5). Recreational surveys were conducted over 16 days at each of the two project areas between January and September 2022. The surveys were conducted on weekdays, weekends, and holidays with the number of surveys varying by month throughout the period. Surveys near the Hayward Project were conducted at six locations in January and February. Bartz's Bay Informal Ice Fishing Access was not surveyed in April through September. Four locations were surveyed near the Trego Project throughout the study period. Collectively, the 16 surveys at each project yielded 73 total visitor interviews.

Of the 73 recreation users that were interviewed, 44 visitors were interviewed at recreation locations associated with the Hayward Project (Table 5-1).

Table 5-1. Recreational use based on user interviews, Hayward Project (January-February, April-September 2022)

Month	Surveys	Bartz's Bay	Hayward Canoe Portage Take Out	Hayward Canoe Portage Trail Put In	Hayward Informal Tail Access	City of Hayward Boat Landing	City of Hayward Beach/Pier	Total by Month	Average by Month & No. Surveys
January	2	1	0	0	0	2	0	3	1.50
February	2	0	0	0	0	0	0	0	0.00
April	1	--	0	0	0	0	2	2	2.00
May	2	--	0	1	1	0	0	2	1.00
June	3	--	0	0	0	2	8	10	3.33
July	2	--	1	0	0	0	6	7	3.50
August	3	--	2	0	2	1	9	14	4.67
September	1	--	1	0	0	3	2	6	6.00
Total	**16**	**1**	**4**	**1**	**3**	**8**	**27**	**44**	

The City of Hayward Beach and Fishing Pier produced over half of the visitor interviews followed by the City of Hayward Boat Landing. The fewest interviews were conducted at the Bartz's Bay informal ice fishing access and Hayward Canoe Portage Trail and Put-In. The greatest number of visitors were interviewed in August while the single survey in September produced the highest average number of interviews per survey event.

The four recreation sites associated with the Trego Project yielded 29 user interviews over 16 surveys (Table 5-2).

Table 5-2. Recreational use based on user interviews, Trego Project (January-February, April-September 2022)

Month	Surveys	Town of Trego Park Boat Landing	Town of Trego Boat Landing	Trego North Tailwater Access (Canoe Portage)	Trego South Tailwater Access	Total by Month	Average by Month & No. Surveys
January	2	0	0	0	0	0	0.00
February	2	0	0	0	0	0	0.00
April	1	0	0	0	1	1	1.00
May	2	2	0	3	1	6	3.00
June	3	1	2	0	3	6	2.00
July	2	0	1	0	3	4	2.00
August	3	2	0	3	3	8	2.67
September	1	1	0	2	1	4	4.00
Total	**16**	**6**	**3**	**8**	**12**	**29**	

The two tailwater access points were the most popular recreation areas near the Trego Project with 12 and eight visitors being interviewed at the South Tailwater Access and North Tailwater Access, respectively. The fewest interviews were conducted at the Town of Trego Boat Landing. Similar to the Hayward Project, August had the highest number of visitors and the single survey in September again produced the highest average number of interviews per survey event.

Collectively, weekends produced more interviews compared to weekdays for both projects; however, this was more apparent for the Trego Project (Table 5-3). Only slightly more visitors were encountered during weekend surveys compared to weekdays at the Hayward Project. In contrast, more than double the visitors were interviewed on weekend days compared to weekdays at Trego.

Seasonally, the four surveys in January and February yielded three interviews, all at the Hayward Project. By comparison, spring and summer had substantially more visitors with 27 and 43 interviews conducted, respectively. At Hayward, 27 interviews were conducted during the summer period compared to 14 interviews during the spring months. Spring and summer were more evenly split at the Trego Project with spring producing 13 visitor interviews and summer 16.

Table 5-3. Recreational use by type of day, Hayward and Trego Projects (January-February, April-September 2022)

Season	Month	Surveys	Hayward Project		Trego Project		Total	
			Weekday	Weekend	Weekday	Weekend	Monthly	Seasonally
Winter	January	2	0	3	0	0	3	3
	February	2	0	0	0	0	0	
Spring	April	1	0	2	0	1	3	27
	May	2	0	2	0	6	8	
	June	3	6	4	4	2	16	
Summer	July	2	7	0	4	0	11	43
	August	3	5	9	1	7	22	
	September	1	1	5	0	4	10	
Year	**Total**	**16**	**19**	**25**	**9**	**20**	**73**	**73**
	# Days		**6**	**10**	**6**	**10**	**16**	
	Ave. Per		**3.17**	**2.50**	**1.50**	**2.00**	**4.56**	

Visitors were asked which of nine activities they participated in during their visit. At the Hayward Project, each of the nine activities was identified as the primary activity by at least one individual (Table 5-4). The most popular activities at Hayward were shoreline/tailwater fishing (24% of the respondents), swimming (24% of the respondents), and other (22% of the respondents).

Table 5-4. Activities during visit to the Hayward Project Area (January-February, April-September 2022)

Location	Shore fishing	Boat Fishing	Motorized Boating	Paddling	Swim	Picnic	Wildlife Viewing	Ice Fishing	Other
Bartz's Bay	0	0	0	0	0	0	0	1	0
Hayward Portage Take Out	1	0	1	1	0	0	0	0	2
Hayward Portage Trail/Put In	1	0	0	0	0	0	0	0	0
Hayward Informal Tailwater Access	2	0	0	0	0	0	1	0	0
City of Hayward Boat Landing	3	4	1	0	1	0	0	2	0
City of Hayward Beach/Fishing Pier	5	0	1	1	11	1	1	1	9
Total	12	4	3	2	12	1	2	4	11

Shoreline/tailwater fishing was a popular recreation activity for all locations except at Bartz's Bay. In contrast, those who responded that swimming or other was their primary activity were mostly interviewed at the City of Hayward beach and fishing pier. Dog walking was the activity for the majority of visitors that identified their primary activity as other.

Five of the nine activities were identified as the primary activity by visitors to the Trego Project area (Table 5-5). Over 50% percent of visitors at the Trego Project were participating in shoreline/tailwater fishing and most of those respondents were divided between the Trego North Tailwater Access and Trego South Tailwater Access. Motorized boating and non-motorized boating were the second and third most popular activities.

Table 5-5. Activities during visit to the Trego Project Area (January-February, April-September 2022)

Location	Shore fishing	Boat Fishing	Motorized Boating	Paddling	Swim	Picnic	Wildlife Viewing	Ice Fishing	Other
Trego Park Boat Landing	4	0	4	3	0	0	0	0	0
Trego Boat Landing	0	1	2	1	0	0	0	0	0
Trego North Tailwater Access/Canoe Portage	7	0	0	0	0	0	0	0	1
Trego South Tailwater Access	9	0	2	2	0	0	0	0	1
Total	**20**	**1**	**8**	**6**	**0**	**0**	**0**	**0**	**2**

The two visitors that identified other as their primary activity were hiking.

Visitors to both Projects were asked if they were prevented from participating in an activity of their choice and to provide the reasons why they were unable to engage in said activity. Of the 44 respondents at the Hayward Project, two provided comments regarding being unable to engage in an activity. One individual stated that they wanted to ride their All-Terrain Vehicle (ATV) but were unable to locate the trail and another individual stated that they were unable to use the restroom at the Hayward City Beach because a suspicious person was occupying the restroom for an inordinate amount of time. The remainder of the respondents at the Hayward Project, and all individuals interviewed at Trego, stated that they had not been prevented from engaging in the activities of their choice.

Recreationists were asked if they or anyone in their group had a physical condition or personal limitation that made it difficult to access or participate in an activity. All visitors at both Projects responded that they did not have a physical condition or personal limitation that made it difficult to access or participate in activities.

Users were asked multiple questions about resource crowding at recreation sites associated with both Projects. At Hayward, 83 of the 92 responses or 90% stated that the resources were not crowded (Table 5-6). Only three respondents indicated that at least some of the resources were moderately to extremely crowded.

Table 5-6. Crowding during visit to the Hayward Project Area (January-February, April-September 2022)

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 Each Response	**83**	**6**	**1**	**1**	**1**
Total No. Responses	**92**				

Similarly, 64 of 73 responses from individuals visiting the Trego Project area stated that the resources were not crowded (Table 5-7). Once again, only three responses indicated that at least some of the resources were moderately to very crowded.

Table 5-7. Crowding during visit to the Trego Project Area (January-February, April-September 2022)

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 No. Responses	**73**				

Visitors were asked if crowding caused them to change their plans. Overwhelmingly, 93% and 97% of visitors to the Hayward and Trego Project areas, respectively, responded that crowding did not affect their plans. Four individuals responded that crowding did affect them (i.e., three near Hayward and one near Trego). In each case, the individuals stated that they moved to avoid crowding.

When asked if crowding was a factor in their trip planning, 40 of 44 respondents at Hayward and 20 of 29 visitors to the Trego Project area said that crowding was not a factor considered in their trip planning. For those that did consider over-crowding in their trip planning, most said that they avoided certain times of the day while a few others said they avoided specific places.

In addition to crowding, visitors were asked if the behavior of an individual or group had interfered with the enjoyment of their trip. At both the Hayward and Trego Projects, 100% of respondents stated that no group or individual had interfered with the enjoyment of their trip.

Visitors were asked to rate their satisfaction with the amenities during their current visit; 1-very satisfied, 2-somewhat satisfied, 3-neither, 4-dissatisfied, and 5-very dissatisfied. At the Hayward Project, the average ratings given for the facilities among the locations ranged from 1.00 (very satisfied) to 5.00 (very dissatisfied) with an average rating of 1.89 between very satisfied and satisfied (Table 5-8).

While most visitors gave the facilities at the Hayward Project neutral or positive ratings, some negative ratings were received. Of the 44 respondents, 14 expressed dissatisfaction (i.e., dissatisfied or very dissatisfied) among the facilities at the Hayward Project. Dissatisfaction was primarily related to poor signage outside and within the facility at the Hayward Canoe Portage Take-Out (n=2). Lack of trash receptacles, poor signage, and inadequate parking were listed as reasons for visitor dissatisfaction at the Hayward Canoe Portage Trail and Put-In and Hayward Informal Tailwater access (n=2). At Hayward City Beach and Fishing Pier, poor signage, lack of trash receptacles, and restroom conditions were cited as reasons for dissatisfaction (n=10).

Average satisfaction ratings among the recreation amenities associated with the Trego Project ranged from 1.00 (very satisfied) to 4.00 (dissatisfied) with an overall average rating of 2.10 (Table 5-9).

Similar to the recreation facilities at the Hayward Project, most Trego Project amenities were rated neutral or better; however, a few negative ratings were received. Of the 29 visitors interviewed, eight expressed dissatisfaction (i.e., dissatisfied or very dissatisfied) with one or more of the amenities. At the Trego Park Boat Landing, dissatisfaction was voiced regarding the lack of signage (n=2). Four individuals collectively expressed dissatisfaction with the lack of trash receptacles, vehicle parking, roads to the facility, and/or signage at the Trego South Tailwater Access. Lastly, one individual described their dissatisfaction with the condition of the Trego Boat Landing signage, rocks at the end of the ramp and near the dock, as well as the lack of a restroom.

In terms of demographics regarding respondents at the Hayward Project, based on zip codes, 52% (n=22) of them were from Hayward while 31% (n=13) stated that they were from more than 25 miles away. The average distance traveled among the respondents was approximately 76 miles with the longest distance being approximately 600 miles.

The individuals interviewed at the Hayward recreation sites ranged in age from 18 to 75 years with the average age being 38 years old. Among those that provided their age, 62% were under the age of 40.

More than two-thirds (i.e., 70%) of those interviewed at the Hayward Project identified as being male, while women made up one-quarter of the visitors. Likewise, nearly 80% stated their ethnicity as White; however, 16% identified themselves as being Indigenous North American. Those claiming Asian and Hispanic ethnicity each made up approximately two percent of those interviewed.

Approximately 56% of those interviewed among the facilities associated with the Hayward Project stated that they obtained the information to plan their trip via "Other" and "Word of Mouth" while 40% said they planned their trip based on a "Previous Visit". Those responding "Other" identified internet resources most often while local retailers were commonly associated with "Word of Mouth" responses.

Visitors to the Trego Project facilities were less local but also traveled a shorter distance compared to Hayward Project area facilities. Of the 29 visitors interviewed, 24% (n=7) of the Trego respondents were from Trego while 52% (n=15) stated that they were from more than 25 miles away. The average distance travelled among the respondents was approximately 52 miles with the longest distance being approximately 175 miles.

The age of those interviewed at the Trego recreation sites ranged from 17 to 73 years old with the average age being 47 years old. Among those that provided their age, 59% were over the age of 50 years old.

The gender composition of Trego respondents was similar to Hayward with women representing one-quarter and men making up three-quarters. The Trego visitors that were interviewed represented a less diverse segment of the population compared to the Hayward Project. Approximately 97% stated their ethnicity as White with three percent identifying themselves as being Indigenous North American.

Approximately 95% of those interviewed stated that they obtained the information to plan their trip via "Word of Mouth" or based on a "Previous Visit".

Respondents were asked to comment on the amenities, needs, or concerns with the facilities near the Hayward and Trego Projects. Comments from the satisfaction portion of the survey, as well as general comments received at the end of the survey, were combined. While several positive comments about the facilities were given, some comments included recommended improvements. The comments were organized into two main categories: maintenance and new amenities.

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Table 5-8. Satisfaction with the Hayward Project Area Facilities (January-February, April-September 2022)

Location	Parameters	Restroom	Picnic Sites	Trash	Parking	Boat Launch Parking	Boat Launch	Boat Dock	Other Vehicle/ Boat	Roads to Facility	Signage to Facility	Signage within Facility	Other Roads/ Signage
Bartz's Bay	Number Responses	0[1]	0	0	1	0	0	0	1	0	0	0	0
	Average Rating	--	--	--	1.00	--	--	--	1.00	--	--	--	--
Hayward Canoe Portage Take Out	Number Responses	0	0	0	4	0	0	0	0	4	4	4	0
	Average Rating	--	--	--	2.00	--	--	--	--	1.25	3.00	3.00	--
Hayward Canoe Portage Trail Put-In	Number Responses	1	1	1	1	0	0	0	0	1	1	1	0
	Average Rating	1.00	2.00	5.00	1.00	--	--	--	--	1.00	1.00	1.00	--
Hayward Informal Tailwater Access	Number Responses	0	0	0	2	0	0	0	0	3	3	3	0
	Average Rating	--	--	--	3.00	--	--	--	--	2.33	3.00	3.00	--
City of Hayward Boat Landing	Number Responses	0	0	0	5	6	4	4	0	8	8	6	0
	Average Rating	--	--	--	1.20	1.67	1.50	1.25	0.00	1.38	1.38	1.17	--
City of Hayward Beach/Fishing Pier	Number Responses	17	15	10	22	0	0	0	0	26	26	26	1
	Average Rating	2.18	1.53	2.10	1.36	--	--	--	--	1.50	2.15	2.19	1.00

[1] 0 equals no response. Rating scale 1 to 5 (1 = Very Satisfied, 5 = Very Dissatisfied). See Appendix 1.

Table 5-9. Satisfaction with the Trego Project Area Facilities (January-February, April-September 2022)

Location	Parameters	Restroom	Picnic Sites	Trash	Parking	Boat Launch Parking	Boat Launch	Boat Dock	Other Vehicle /Boat	Roads to Facility	Signage to Facility	Signage within Facility	Other Roads/ Signage
Trego Park Boat Landing	Number Responses	0[1]	0	0	2	2	2	2	0	2	3	3	0
	Average Rating	--	--	--	3.00	3.00	3.00	3.00	--	3.00	3.67	2.33	--
Trego Boat Landing	Number Responses	5	0	1	7	0	0	0	1	8	7	5	0
	Average Rating	1.00	--	1.00	1.29	--	--	--	1.00	1.00	1.00	1.00	--
Trego North Tailwater/Canoe Portage	Number Responses	1	0	1	6	4	4	1	0	6	6	6	0
	Average Rating	3.00	--	3.00	1.00	2.25	2.00	3.00	--	1.17	2.00	2.00	--
Trego South Tailwater	Number Responses	0	0	1	11	0	0	0	1	12	11	11	0
	Average Rating	--	--	4.00	2.00	--	--	--	1.00	1.83	2.09	2.36	--

[1] 0 equals no response. Rating scale 1 to 5 (1 = Very Satisfied, 5 = Very Dissatisfied). See Appendix 1.

For the facilities at the Hayward Project, new amenities were more often suggested than maintenance needs (Table 5-10). The City of Hayward Beach/Fishing Pier was the most visited facility at the Hayward Project and it received the most comments (n=21). The most frequent comments received were in regard to new or more signage, need for trash receptacles, and geese management. More or better signage was also mentioned for the Hayward Canoe Portage Take-Out and Carry-In Access while trash receptacles were also suggested for the Hayward Canoe Portage Trail and Put-In.

Table 5-10. Summary of comments received from interviews near the Hayward Project (January-February, April-September 2022), Subject (number of comments)

Location	Maintenance	New Amenities
City of Hayward Beach/Fishing Pier	-Restroom improvements (2) -Geese management (3) -Pavilion maintenance (1)	-Dog waste bag station (1) -Fishing pier (1) -New/more signage (4) -Trash receptacles (3) -Public Wi-Fi (1) -Campground (1) -Additional fishing pier (1) -Buoys for the beach (1) -Widen entry road (2)
City of Hayward Boat Landing		-Additional boat moorings (1)
Hayward Canoe Portage Take-Out and Carry-In Access		-More/better signage (2) -ADA viewing and parking (1)
Hayward Canoe Portage Trail and Put-In		-Trash receptacles (1) -Picnic table (1)

Among the facilities near the Trego Project, constructive comments were received at all four facilities (Table 5-11). The Town of Trego Park Boat Landing and Trego South Tailwater Access received the most comments for facilities near the Trego Project. As with the Hayward facilities, comments regarding new amenities such as signage, portable lavatories, and expanded tailwater fishing access were more common than maintenance related comments.

Table 5-11. Summary of comments received from interviews near the Trego Project (January-February, April-September 2022), Subject (number of comments)

Location	Maintenance	New Amenities
Town of Trego Park Boat Landing	-Replace signage (1) -Remove rocks at end of landing and by dock (1)	-Install portable lavatory (1) -Add marker to sign at CTH K Landing (1)
Town of Trego Boat Landing		-New\better signage (2)
Trego North Tailwater Access/Canoe Portage		-Trash receptacles (1) -Expand fishing area (1) -Rod holders on the railing (1)
Trego South Tailwater Access	-Replace signage (1)	-Trash receptacles (2) -New signage (1) -Expand fishing area (2) -Lighted stairway (1)

5.2 SPOT COUNTS

The 16 recreational surveys conducted at facilities near the Hayward Project resulted in 84 spot count reports across the surveyed locations. These spot counts observed 175 users total (Table 5-12, Appendix 6). The average spot count for the 16 surveys was 10.94 users per location. Use of the City of Hayward Beach /Fishing Pier was substantially greater than the other five facilities surveyed and accounted for 81% of the user counts during 2022.

Among the eight months surveyed, April had the fewest total and average visits by recreational user (Tables 5-12). August had the highest user counts but July exhibited the greatest monthly average. The City of Hayward Boat Landing had the highest Winter counts (i.e., January and February) while the City of Hayward Beach\Fishing Pier saw the highest spring and summer spot counts.

Table 5-12. Recreational use based on spot counts, near the Hayward Project (January-February, April-September 2022)

Month	Surveys	Bartz' s Bay Informal Ice Fishing Access	Hayward Canoe Portage Take-Out and Carry-In Access	Hayward Canoe Portage Trail and Put-In	Hayward Informal Tailwater Bank Fishing Access	City of Hayward Boat Landing	City of Hayward Beach /Fishing Pier	Total by Month	Average by Month & No. Surveys
January	2	2	0	0	0	2	0	4	2.00
February	2	2	0	0	0	3	0	5	2.50
April	1	0	0	1	0	0	0	1	1.00
May	2	0	0	0	0	0	3	3	1.50
June	3	0	0	1	2	1	35	39	13.00
July	2	0	0	0	0	5	45	50	25.00
August	3	0	5	0	0	3	49	57	19.00
September	1	0	1	0	0	5	10	16	16.00
Total	**16**	**4**	**6**	**2**	**2**	**19**	**142**	**175**	**10.94**

In addition to instantaneous site counts of recreation users at each location, the spot count forms identified 11 specific recreational activities and one "other" category (Appendix 1). These activities ranged from ATV/Snowmobiling and various types of boating to hiking, jogging, walking and wildlife viewing. Recreation users at the Hayward Project were observed participating in many of the aforementioned activities, with the exception of bicycling and bird watching. All of the recreationist observed at the Hayward Project during the winter were listed under "other" and were ice fishing. From July through September, the primary activities for most visitors were swimming and shore fishing.

Spot counts conducted at the Trego Project were noticeably lower compared to the Hayward Project. The Trego spot counts tallied 34 users total (Table 5-13). The average spot count for the 16 surveys was 2.13 users per location. Unlike the Trego recreational interviews, which were highest at the tailwater facilities, spot counts were highest at the Town of Trego Boat Landing followed by the Town of Trego Park Boat Landing.

February had the fewest total and average visits by recreational user over the eight survey months (Tables 5-13). Similar to Hayward, the highest user count at Trego was in August, which also exhibited the highest average count. Trego spot counts were similar among the months and seasons with the exception of August, which was substantially higher.

Table 5-13. Recreational use based on spot counts, near the Trego Project (January-February, April-September 2022)

Month	Surveys	Town of Trego Park Boat Landing	Town of Trego Boat Landing	Trego North Tailwater Access/Canoe Portage	Trego South Tailwater Access	Total by Month	Average by Month & No. Surveys
January	2	0	2	0	0	2	1.00
February	2	0	0	0	0	0	0.00
April	1	1	0	0	1	2	2.00
May	2	1	0	2	0	3	1.50
June	3	0	1	1	0	2	0.67
July	2	3	0	0	1	4	2.00
August	3	3	9	3	2	17	5.67
September	1	1	0	2	1	4	4.00
Total	**16**	**9**	**12**	**8**	**5**	**34**	**2.13**

Among the 11 specific recreational activities, visitors to the Trego area were observed participating in seven activities. The four activities that were not observed include swimming, picnicking, bird watching, and ATV/Snowmobiling. Winter activities were minimal and restricted to walking. However, summer activities were largely split between power boating and shore/tailwater fishing.

5.3 FUTURE AND POTENTIAL RECREATION

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, Trego Lake District (TLD), Washburn County, and NPS on July 14, 2022. Delivery on July 18, 2022 was confirmed for each recipient (Appendix 2). Among the seven stakeholder entities that

received the questionnaire, only the TLD and NPS responded. The following is a summary of their responses with complete responses provided by each stakeholder included in Appendix 7.

5.3.1 National Park Service

Stakeholders were asked about their interest in recreation sites in the vicinity of the Hayward and Trego Projects as well as their primary function and responsibilities with regard to the recreation sites. NPS responded that the Namekagon River is protected as part of the Wild and Scenic Rivers system and the National Park system. The Namekagon River is managed by 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 all recreation sites near the Hayward and Trego Projects 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 downstream of the Trego Project. In addition, the NPS Namekagon River Visitor Center in the Town of Trego and the Earl Landing in the Town of Earl are between the Hayward and Trego Project areas but within the responsibilities of NPS. Amenities associated with the County K Landing include a gravel river access, picnic tables, interpretive and informational signage, paved parking lot, and vault toilet. The amenities at Earl Landing include a gravel parking area, concrete boat ramp, vault toilet, primitive camping, potable water, and picnic tables.

NPS reported that Namekagon River access points near the Visitor Center on the north and south banks of the river were removed due to redevelopment of the Highway 63 and Highway 53 Interchange project and the removal of the Lakeside Road Bridge. As such, no facilities remain at these locations. The removal of these two access points has reduced recreational access to the Namekagon River and near the Hayward and Trego Projects. The NPS is considering a river access point to the east of the Namekagon River Visitor Center, near the Highway 63 Bridge. NPS noted that parking capacity is frequently exceeded at Earl Landing. As such, NPS is set to begin the design process to improve conditions at the Earl Landing during Fiscal Year 2024.

5.3.2 Trego Lake District

The TLD described itself as "*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 TLD encompasses the water and shoreline from the Trego Project to the Highway 53 bridge and is managed by those owning property within the boundary. There are approximately 275 landowners that have access to the lake from their property.

TLD works with Wisconsin Department of Natural Resources to analyze water quality, protect the fishery, maintain and mark navigation channels, and coordinate control of aquatic invasive species (AIS) in the lake.

Recreational activities on Trego Lake, including boating, swimming, and fishing, are all impacted by sedimentation buildup and AIS. In conjunction with the Town of Trego, TLD operates and maintains the Trego Landing. In addition, a private resort and campground (i.e., Bay Park Resort and Campground) is situated on Trego Lake. TLD stated that these sites have not exceeded capacity or experienced insufficient parking.

In terms of future management and enhancement of recreational opportunities, TLD will continue to manage AIS and navigation through aquatic macrophyte harvesting and spot dredging. In 2023, via a tax levy on members, TLD intends to expand AIS control through additional macrophyte harvesting as identified in their Aquatic Plant Management Plan. Despite these efforts, TLD foresees the need to further expand AIS and sedimentation management within the district to enhance the resource and improve recreational opportunities near the Trego Project. TLD also expressed concern over the loss of Namekagon River due to the Trego interchange development access (see NPS discussion above) and believes those former access points need to be replaced.

6. CONCLUSIONS

Overall, the six Hayward Project and four Trego Project recreational locations were considered in good condition during the 2022 surveys. The inventory identified one facility and amenity that required maintenance and that was related to signage at the Hayward Canoe Portage Trail and Put-In. Most recreational facilities at the Hayward and Trego Projects received low to moderate use during the 2022 survey events. The lone exception was at the Hayward City Beach/Fishing Pier, which received periodic moderate to high use, particularly in June, July, and August. Despite the high use at the Hayward City Beach/Fishing Pier, based on the facility assessments, observations, spot counts, and user interviews, this facility does not appear to be overused and overcrowding is infrequent. With the exception of the Hayward City Beach/Fishing Pier, crowding or lack of capacity was not observed during the surveys.

A few respondents requested improved signage at NSPW-owned recreation locations (Tables 5-10 and 5-11). Improved signage was requested for both the Hayward Canoe Portage Take-Out and Carry-In Access and the Trego South Tailwater Access. The Hayward Canoe Portage Take-Out and Carry-In Access is visibly marked for recreation users both on the water and on land (Appendix 3, Photos 9, 12, 13, 14, 17, and 19). Therefore, additional signage is unnecessary at this time. Likewise, one respondent suggested that the signage at the Trego South Tailwater Access is faded (Appendix 3, Photo 120). While somewhat faded, the signage remains completely readable such that replacement is unnecessary at this time.

For the Hayward project, one individual suggested that an ADA parking and viewing area would benefit the public at the Hayward Canoe Portage Take-Out and Carry-In Access (Table 5-10). Given the open, level, and relatively obstacle free area at the Hayward Canoe Portage Take-Out and Carry-In Access, it is recommended that NSPW evaluate the possibility for an ADA parking and viewing area. In addition, one respondent requested that a picnic table be located along the Hayward Canoe Portage Trail and Put-In. Given the ample space available along the portage trail, near the take out, carry-in access, informal bank fishing access, or at the loop near the canoe portage put-in, it is recommended that NSPW evaluate the possibility of installing a picnic table near the Hayward Canoe Portage Trail and Put-In.

Three respondents suggested that the Trego North Tailwater Access and Trego South Tailwater Access fishing areas are in need of expansion (Table 5-11). However, based on actual observed use throughout the Trego recreation survey, the facilities are more than adequate to support the number of individuals visiting them. In fact, among the 16 surveys conducted, the number of individuals using the north or south tailwater fishing areas exceeded one individual on two occasions and in both cases there were two people using the access compared to eight surveys when no users were observed at either tailwater access (Appendix 6). Therefore, use of these resources suggests that expansion of the north and south tailwater fishing areas at the Trego Project is unnecessary.

While there may be legitimate needs for future improvement or expansion of recreational resources in the vicinity of the Projects, the low to moderate observed use during these surveys

suggests that the capacity of the Hayward and Trego recreational resources is sufficient now and in the foreseeable future.

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WATER QUALITY MONITORING TURTLE STUDY REPORT

STUDY REPORT

for

Hayward Hydroelectric Project (FERC Project No. 2417) and Trego Hydroelectric Project (FERC Project No. 2711)

Water Quality Monitoring Study

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February 7, 2023

TABLE OF CONTENTS

List of Tables

List of Figures

List of Appendices

PROJECT INFORMATION AND BACKGROUND

Northern States Power Company, a Wisconsin corporation (NSPW or Licensee), currently holds licenses issued by the Federal Energy Regulatory Commission (FERC or Commission) to operate and maintain the Hayward and Trego Hydroelectric Projects (Project or Projects). The Projects are owned, operated, and maintained by NSPW. The current licenses, which designate the Projects as FERC Nos. 2417 (Hayward) and 2711 (Trego), expire on November 30, 2025. To obtain new licenses, NSPW must submit a Final License Application (FLA) to FERC no later than November 30, 2023. The FLA, in part, must include an evaluation of the existing water quality associated with the Project.

On March 11, 2021, NSPW held a Joint Agency Meeting to present information about the Project. At the meeting, and during the 60-day comment period immediately following, NSPW received comments and study requests from several entities. The Wisconsin Department of Natural Resources (WDNR) requested that NSPW complete a water quality study at both Projects.

WDNR indicated that data be collected and analyzed using river monitoring protocols upstream of the impoundments and downstream of the dams. Lake protocols should be applied to the deep hole of the impoundments. NSPW developed a study plan to include monitoring for all parameters requested by WDNR with the exception of cyanobacteria, methyl mercury, and sediment accumulation. The study plan was otherwise consistent with the WDNR request.

On behalf of NSPW, and under the direction of Mead and Hunt, Inc., Great Lakes Environmental Center, Inc. (GLEC) conducted a Water Quality Monitoring Study at the Hayward and Trego Projects during 2022 to determine if waters within the Project boundaries meet current state water quality standards. The work was completed in accordance with the Study Plan provided by Mead and Hunt.

STUDY AREA

The study included water quality monitoring at three locations for each Project. One site was located downstream of the powerhouse outside of the mixing zone, one was located in the deep hole within the reservoir, and one was located upstream of the main impoundment in a riverine area.

At the Hayward Project, site 1 was located approximately 3,600 feet upstream of the Highway 77 bridge, site 2 was located in the deep hole at existing WDNR Monitoring Station 83131, and site 3 was located near the canoe portage put-in at existing WDNR Monitoring Station 583001.

At the Trego Project, site 1 was located just upstream of the Highway 53 bridge at existing WDNR Monitoring Station 10022021, site 2 was located in the deep hole at existing WDNR Monitoring Station 663162, and site 3 was located approximately 250 feet downstream of the Trego Dam.

Figures 1, 2, and 3 illustrate the sampling locations at each Project.

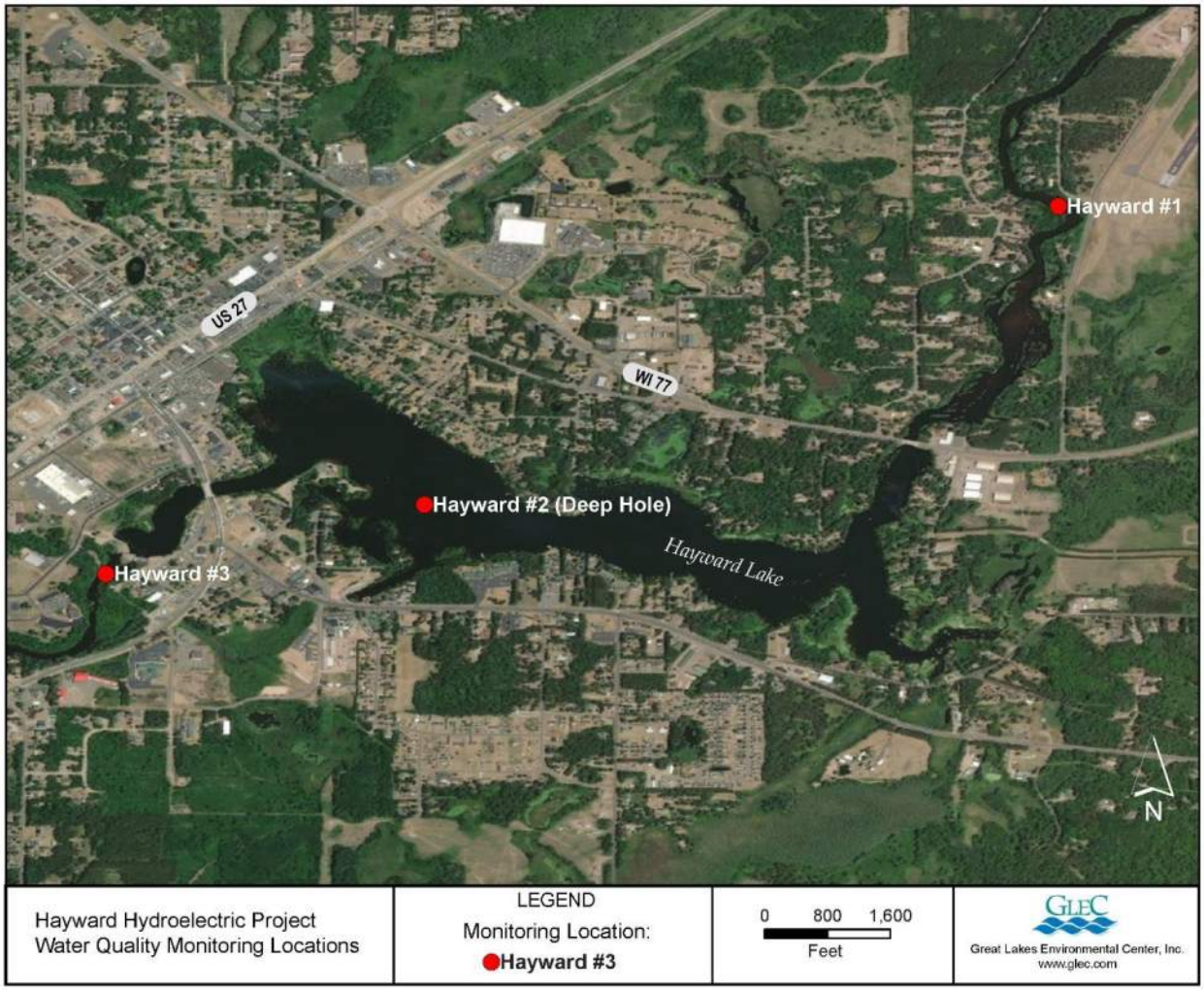

FIGURE 1. HAYWARD SAMPLING LOCATIONS FOR THE 2022 WATER QUALITY ASSESSMENT. HAYWARD #1: 46.01897, -91.45208, HAYWARD #2: 46.00855, -91.47421, HAYWARD #3: 46.00614, -91.48534

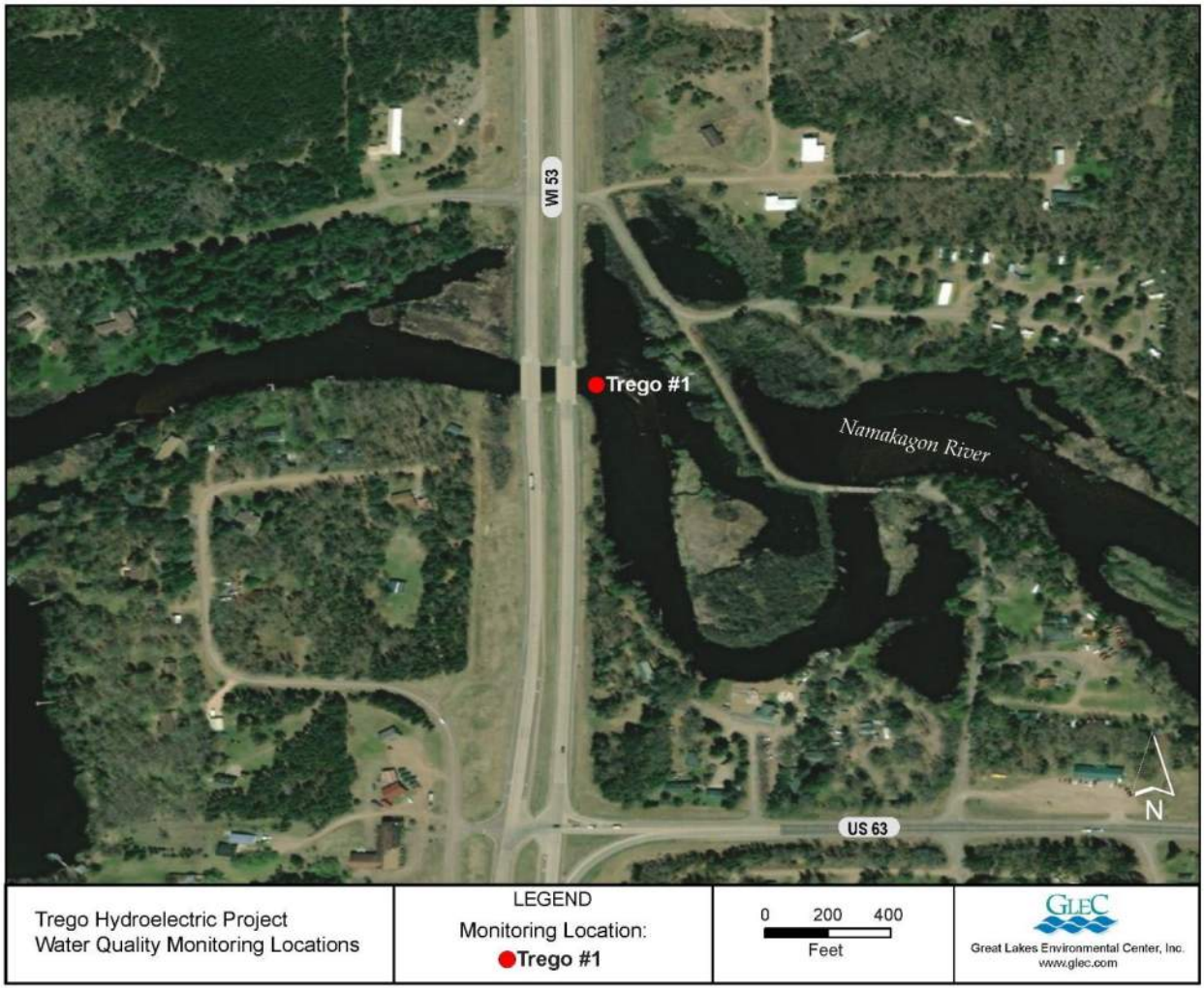

FIGURE 2. TREGO #1 SAMPLING LOCATION FOR THE 2022 WATER QUALITY ASSESSMENT. TREGO #1: 45.90951, -91.82713

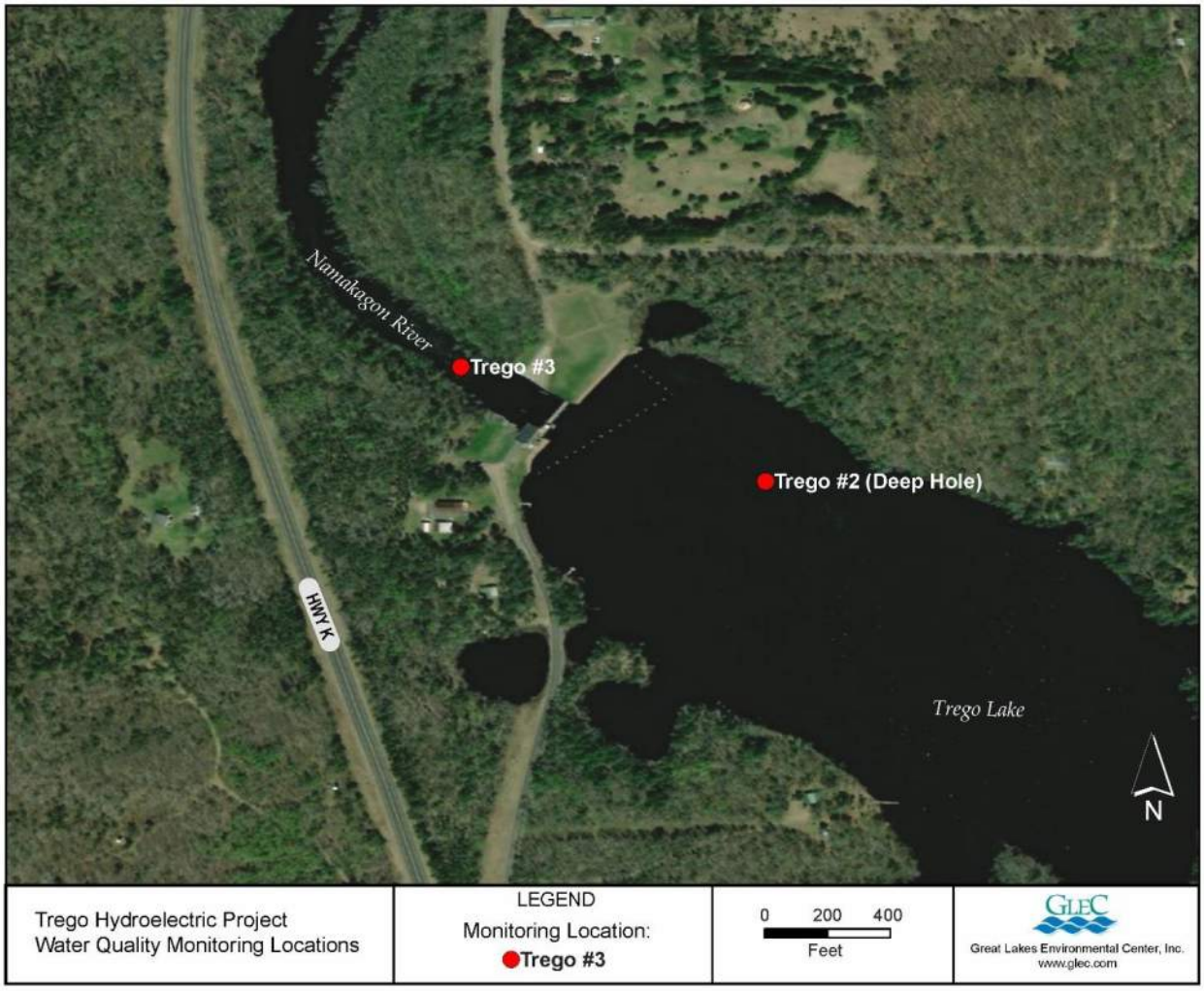

FIGURE 3. TREGO #2 AND TREGO #3 SAMPLING LOCATIONS FOR THE 2022 WATER QUALITY ASSESSMENT. TREGO #2: 45.94750, -91.88639, TREGO #3: 45.94850, -91.88905

METHODOLOGY

The objective of the water quality monitoring study was to determine if the Projects meet current state water quality standards. Since Hayward Lake and Trego Lake are classified as impounded flowing waters, with a residence time of less than 14 days, WDNR indicated that the data should be collected and/or analyzed using river monitoring protocols at the upstream and downstream monitoring locations for each Project. However, lake monitoring protocols should be applied to both Projects when analyzing the deep hole within the impoundments.

River monitoring protocols were implemented at the following four locations:

- Hayward #1: 46.01897, -91.45208, 3,600 feet upstream of the Highway 77 bridge,

- Hayward #3: 46.00614, -91.48534, near the canoe portage put-in at existing WDNR Monitoring Station 583001,
- Trego #1: 45.90951, -91.82713, upstream of the Highway 53 bridge at existing WDNR Monitoring Station 10022021, and
- Trego #3: 45.94850, -91.88905, approximately 250 feet downstream of the Trego Dam.

Lake monitoring protocols were implemented at the following two locations:

- Hayward #2: 46.00855, -91.47421, deep hole at existing WDNR Monitoring Station 83131, and
- Trego #2: 45.94750, -91.88639, deep hole at existing WDNR Monitoring Station 663162.

NSPW developed the study plan to include monitoring for all parameters requested by WDNR with the exception of cyanobacteria, methyl mercury, and sediment accumulation. A summary of the Hayward and Trego water quality assessment plans is shown in Figure 4 for the upstream and downstream monitoring locations and in Figure 5 for the deep hole locations. At each upstream and downstream location, the following was collected and/or recorded at the frequency outlined in Figure 4:

- Ammonia
- Bacteria (*Escherichia coli* (*E. coli*))
- Chloride
- Chlorophyll *a*
- Conductivity
- Dissolved Oxygen (DO)
- Dissolved Phosphorus
- Nitrate (plus Nitrite)
- pH
- Sulfate
- Total Mercury
- Temperature
- Total Nitrogen
- Total Phosphorus
- Total Suspended Solids

At each deep hole location, the following was collected and/or recorded at the frequency outlined in Figure 5:

- Ammonia
- Bacteria (*Escherichia coli* (*E. coli*))
- Chloride
- Chlorophyll *a*
- Color
- Conductivity
- Dissolved Oxygen (DO)
- Dissolved Phosphorus
- Iron
- Manganese
- Nitrate (plus Nitrite)
- pH
- Secchi Depth
- Sulfate
- Sulfide
- Total Mercury
- Temperature
- Total Nitrogen
- Total Phosphorus
- Total Suspended Solids

The analysis of the above parameters was completed following written Standard Operating Procedures (SOPs) which are based upon USEPA analytical methods and WDNR Nutrient Grab Sample Protocols located online at https://dnr.wi.gov/water/wsSWIMSDocument.ashx?documentSeqNo=114118765. GLEC staff and the GLEC Nutrient Chemistry laboratory (Traverse City, MI) completed the analysis for:

- Ammonia
- Bacteria (*E. coli*)
- Chlorophyll *a*
- Conductivity
- Color
- Dissolved Oxygen
- Dissolved Phosphorus
- Nitrate (plus Nitrite)
- pH
- Secchi Depth
- Temperature
- Total Nitrogen
- Total Phosphorus
- Total Suspended Solids

The analysis for the remaining parameters, listed below, was completed by Pace and ALS Laboratories (Green Bay, WI and Holland, MI, respectively).

- Chloride
- Iron
- Sulfate
- Total Mercury
- Sulfide
- Manganese

The analysis for bacteria (*E. coli*) was completed using the IDEXX Colilert methodology (IDEXX Colilert 2022). All field collection and subsequent analyses were conducted by individuals with prior water quality monitoring training and experience.

Discrete Multi-parameter Water Quality Measurements and Hydrographic Profiles

Discrete multi-parameter water quality measurements of temperature, DO, pH, and specific conductance were collected at each monitoring station during each visit using a calibrated YSI ProDSS multi-parameter meter. The data was collected according to the schedule outlined in Figures 4 and 5.

A hydrographic profile for temperature, DO, pH, and specific conductance was developed using a calibrated YSI ProDSS multi-parameter meter in the deepest part of each impoundment (Hayward #2 and Trego #2) beginning at the water surface and continuing at 1-meter intervals until the impoundment bed was reached. These profiles were completed following the schedule outlined in Figure 5.

Parameter	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*	3 total	Lab			x	x	x	
Conductivity	Continuous July-Sept.	Field Measurement			x	x	x	
DO	Continuous July-Sept.	Field Measurement			x	x	x	
Dissolved Phosphorus	6 total	Lab	x	x	x	x	x	x
Nitrate (plus nitrite)	6 total	Lab	x	x	x	x	x	x
pH	Continuous July-Sept.	Field Measurement			x	x	x	
Sulfate	1 total	Lab	x					
Total Mercury	1 total	Lab	x					
Temperature	Continuous May-Oct.	Field Measurement	x	x	x	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

FIGURE 4. HAYWARD AND TREGO UPSTREAM AND DOWNSTREAM LOCATIONS, WATER QUALITY ASSESSMENT PLAN (2022)

Parameter	Samples	Type of Sampling	Sampling Frequency			
			May	July	Aug.	Sept.
Ammonia	1 total	Lab		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		
DO	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
Sulfide	4 total	Lab	x	x	x	x
Nitrate (plus nitrite)	1 total	Lab		x		
pH	4 total	Field Profile	x	x	x	x
Secchi depth	4 total	Field	x	x	x	x
Sulfate	1 total	Lab	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

FIGURE 5. HAYWARD AND TREGO DEEP HOLE LOCATIONS, WATER QUALITY ASSESSMENT PLAN (2022)

Continuous Monitoring of Water Temperature, pH, DO, and Specific Conductance

Continuous (hourly) temperature data was collected at the upstream and downstream locations of each Project from May 17 to October 11, 2022 using Onset HOBO Tidbit Temperature Data Loggers.

Continuous (hourly) temperature, DO, pH, and specific conductance data was collected at the upstream and downstream locations of each Project from July 12 or 13 to September 28, 2022 using calibrated YSI EXO3 Multi-parameter sondes. Due to a field technician error while downloading data from the YSI EXO3 sondes, no continuous data was collected between July 29 and August 16, 2022 at Hayward Location #1 (upstream), Hayward Location #3 (downstream), or Trego Location #3 (downstream). The sonde at Trego Location #1 (upstream) remained in operation during that time. These deviations from the study plan are discussed further in the Results section.

Field staff downloaded data from the sondes at each monitoring station directly onto a laptop computer. During each visit, all equipment was checked for operation, calibration, battery life, and any necessary adjustments to the instruments were made based on manufacturer's specifications. Each sonde was also cleaned and the cable, housing, and other installation materials were visually inspected for damage and repaired as necessary.

Applicable Water Quality Standards

Data was collected and analyzed using the WDNR Wisconsin Consolidated Assessment and Listing Methodology (WisCALM Guidance) located online at the following web address: https://dnr.wisconsin.gov/topic/SurfaceWater/WisCALM.html. The WisCALM Guidance references Chapter NR 102, Water Quality Standards for Wisconsin Surface Waters from the Wisconsin State Administrative Codes (https://docs.legis.wisconsin.gov/code/admin_code/nr/100/102). The water quality standards for dissolved oxygen, pH and temperature applicable to the Hayward and Trego Hydroelectric Projects are summarized in Table 1.

TABLE 1. WATER QUALITY STANDARDS FOR THE HAYWARD AND TREGO HYDROELECTRIC PROJECTS

<table>
<tr><th>Wisconsin Administrative Code Chapter</th><th>Parameter</th><th>Criteria for Fish and Aquatic Life</th></tr>
<tr><td>NR 102.04</td><td>Dissolved Oxygen (Trego)</td><td>…surface waters shall attain a minimum dissolved oxygen concentration of 5 mg/L at all times.</td></tr>
<tr><td>NR 102.04</td><td>Dissolved Oxygen for Cold+ Waters (Hayward)</td><td>(a.) A minimum dissolved oxygen concentration of 6.0 mg/L at all times.
(b.) A minimum dissolved oxygen concentration of 7.0 mg/L when cold water fish are spawning through fry emergence from their redds, or gravel nests. (for Hayward, this period is from September 15 thru May 15)</td></tr>
<tr><td>NR 102.04</td><td>pH</td><td>The pH shall be within the range of 6.0 to 9.0, with no change greater than 0.5 units outside the estimated natural seasonal maximum and minimum.</td></tr>
<tr><td>NR 102.25</td><td>Ambient Water Temperature for Non-Specific (Warm-Large*) Waters (Trego)</td><td>The values listed shall be the applicable ambient temperatures, sub-lethal and acute water quality criteria for temperature for the protection of fish and aquatic life unless other values specified in subs. (3) to (5) are applicable or approved by the department…
<table>
<tr><td>Month</td><td>May</td><td>June</td><td>July</td><td>Aug</td><td>Sept</td><td>Oct</td></tr>
<tr><td>Ta (°F)</td><td>60</td><td>71</td><td>75</td><td>74</td><td>65</td><td>52</td></tr>
<tr><td>Ta (°C)</td><td>15.6</td><td>21.7</td><td>23.9</td><td>23.3</td><td>18.3</td><td>11.1</td></tr>
</table></td></tr>
<tr><td>NR 102.25</td><td>Ambient Water Temperature for Cold+ Waters (Hayward)</td><td>The values listed shall be the applicable ambient temperatures, sub-lethal and acute water quality criteria for temperature for the protection of fish and aquatic life unless other values specified in subs. (3) to (5) are applicable or approved by the department…
<table>
<tr><td>Month</td><td>May</td><td>June</td><td>July</td><td>Aug</td><td>Sept</td><td>Oct</td></tr>
<tr><td>Ta (°F)</td><td>56</td><td>62</td><td>64</td><td>63</td><td>57</td><td>49</td></tr>
<tr><td>Ta (°C)</td><td>13.3</td><td>16.7</td><td>17.8</td><td>17.2</td><td>13.9</td><td>9.4</td></tr>
</table></td></tr>
</table>

*Warm-Large = waters with a fish and aquatic life use designation of "warm water sport fish community" or "warm water forage fish community" and unidirectional 7Q10 flows ≥ 200 cubic feet per second (129 million gallons/day)
+ Cold = waters with a fish and aquatic life use designation of "cold water community"
Ta = ambient temperature

Data Analysis and Processing

Upon completion of the field data collection, all data was reviewed for errors and omissions. Verified data is presented as tables and/or plots to illustrate the information.

Equipment Calibration and Quality Assurance

The field measurement equipment used during this study included the following:

- Onset HOBO Tidbit Temperature Data Loggers were used to monitor continous (hourly) temperature. The water temperature sensor is accurate to ±0.2°C from 0° to 70°C.
- A YSI ProDSS Multi-parameter Meter was outfitted with temperature, specific conductance, pH and DO sensors. It was used to collect discrete multi-paramter water quality data and hydrographic profile data. The accuracy of the YSI ProDSS's sensor array as specified by the manufacturer is presented in Table 2 below.
- YSI EXO3 Multi-parameter Sondes were used to collect continous (hourly) measurements of temperature, specific conductance, pH and DO at the upstream and downstream locations at each Project. The accuracy of the YSI EXO3's sensor array as specified by the manufacturer is presented in Table 3 below.

TABLE 2. YSI PRODSS SENSOR SPECIFICATIONS

Sensor	Accuracy
Temperature	± 0.2°C
DO	0 to 20 mg/L: ± 0.1 mg/L or 1% of reading, whichever is greater
Specific Conductance	0 to 100 mS/cm: ±0.5% of reading or 0.001 mS/cm, whichever is greater
pH	± 0.2 pH units

TABLE 3. YSI EXO3 SENSOR SPECIFICATIONS

Sensor	Accuracy
Temperature	-5 to 35°C: ± 0.01°C
DO	0 to 20 mg/L: ± 0.1 mg/L or 1% of reading, whichever is greater
Specific Conductance	0 to 200 mS/cm: ±0.5% of reading or 0.001 mS/cm, whichever is greater
pH	± 0.1 pH units within ±10°C of calibration temp; ±0.2 pH units for entire temp range

STUDY RESULTS

Field measurements and water samples collected for analysis were completed as outlined in the Study Plan and followed written Standard Operating Procedures. Monitoring was conducted on May 17, June 14-15, July 12-13, and July 24 (Trego #2 resample for sulfide only), August 16-17, September 12, and October 11, 2022. Water quality characteristics and conditions at both Projects are detailed in this section. Several water quality plots are included as appendices to this report as specified below.

Discrete Multi-parameter Water Quality Measurements and Hydrographic Profiles

Summaries of the laboratory analyses of the water samples are provided in Tables 5 and 7 for Hayward and Trego, respectively. Summaries of the field data are provided in Tables 6 and 8 for Hayward and Trego, respectively. Field data (DO, pH, and temperature) in bold font in Tables 6 and 8 indicate parameters that were outside of the Water Quality Criteria for Fish and Aquatic Life as defined in Table 1.

Depth profiles for temperature, pH, DO, and specific conductance were completed at both deep hole locations (Hayward #2 and Trego #2) per the study plan. Figures displaying depth profiles for temperature, dissolved oxygen, and pH are presented in Appendix A for both the Hayward and Trego deep hole locations. Specific conductance was not plotted and varied little from surface to bottom. Monthly minimum and maximum specific conductance readings recorded during the hydrographic profiling at both Projects are presented in Table 4.

TABLE 4. MINIMUM AND MAXIMUM SPECIFIC CONDUCTANCE (µS/CM) RECORDED DURING PROFILING

	May		July		August		September	
	Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Hayward #2	274	282	169	173	178	182	185	192
Trego #2	279	285	196	198	194	196	207	208

TABLE 5. SUMMARY OF WATER QUALITY PARAMETER SAMPLE ANALYSIS FOR THE HAYWARD HYDROELECTRIC PROJECT (2022)

	Hayward Location #1 (Upstream)						Hayward Location #2 (Deep Hole)						Hayward Location #3 (Downstream)					
Parameter	**May**	**June**	**July**	**Aug.**	**Sept.**	**Oct.**	**May**	**June**	**July**	**Aug.**	**Sept.**	**Oct.**	**May**	**June**	**July**	**Aug.**	**Sept.**	**Oct.**
Ammonia (µg/L)	73.9	<30.3	52.1	31.5	30.0	36.0	NC[2]	NC	<30.0	NC	NC	NC	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	NC	TE[3]	12.1	9.7	NC	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	NC	4.9	4.6	0.7	NC	6.1	6.0	11.1	6.4	6.0	5.2
Chlorophyll-*a* (µg/L)	NC	NC	2.18	1.45	1.12	NC	NC	NC	2.71	1.20	1.68	NC	NC	NC	2.53	1.31	1.82	NC
Color (PCU)[1]	NC	NC	NC	NC	NC	NC	NC	NC	41	NC	NC	NC	NC	NC	NC	NC	NC	NC
Dissolved Phosphorus (µg/L)	2.0	2.8	1.8	<1.5	2.0	2.6	<1.5	NC	3.0	3.1	3.1	NC	1.6	6.5	3.2	2.6	2.5	<1.5
Iron (µg/L)	NC	NC	NC	NC	NC	NC	330	NC	296	215	276	NC	NC	NC	NC	NC	NC	NC
Manganese (µg/L)	NC	NC	NC	NC	NC	NC	45.0	NC	35.2	31.1	33.4	NC	NC	NC	NC	NC	NC	NC
Nitrate+ nitrite (µg/L)	66.4	11.0	37.6	21.7	49.5	77.9	NC	NC	6.4	NC	NC	NC	61.1	16.2	21.8	17.6	22.6	25.0
Sulfide (mg/L)	NC	NC	NC	NC	NC	NC	1.2	NC	<1.2	<1.2	<2.4	NC	NC	NC	NC	NC	NC	NC
Sulfate (mg/L)	2.1	NC	NC	NC	NC	NC	0.75	NC	NC	NC	NC	NC	<0.71	NC	NC	NC	NC	NC
Total Mercury (µg/L)	<0.16	NC	NC	NC	NC	NC	<0.16	NC	NC	NC	NC	NC	<0.16	NC	NC	NC	NC	NC
Total Nitrogen (mg/L)	0.49	0.55	0.39	0.33	0.35	0.37	NC	NC	0.43	NC	NC	NC	0.55	0.53	0.38	0.34	<0.021	0.38
Total Phosphorus (µg/L)	4.2	6.4	8.3	10.3	14.5	9.5	4.6	NC	9.1	6.8	15.0	NC	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	NC	3.3	4.4	4.9	NC	3.6	3.1	5.8	3.9	5.1	6.3

[1] PCU = Platinum Cobalt Units, [2] NC = Not Collected per Study Plan, [3]TE = Technician Error – E. coli processing time exceeded; value not used.

TABLE 6. SUMMARY OF WATER QUALITY FIELD PARAMETER RESULTS FOR THE HAYWARD HYDROELECTRIC PROJECT (2022)

Field Measurements[1]	Hayward Location #1 (Upstream)						Hayward Location #2 (Deep Hole)						Hayward Location #3 (Downstream)					
	May	**June**	**July**	**Aug.**	**Sept.**	**Oct.**	**May**	**June**	**July**	**Aug.**	**Sept.**	**Oct.**	**May**	**June**	**July**	**Aug.**	**Sept.**	**Oct.**
Specific Conductance (µS/cm)	133	NC[2]	168	179	183	186	274	NC	173	178	192	NC	133	NC	173	179	196	190
DO (mg/L)	9.78	NC	9.01	10.85	6.73*	10.93	9.74	NC	8.93	9.71	8.71	NC	9.39	NC	8.39	9.16	8.83	10.88
pH (s.u.)	7.86	NC	7.83	8.44	8.17	7.73	7.75	NC	8.09	8.24	7.88	NC	7.60	NC	7.97	8.04	7.83	7.91
Secchi depth (inches)	NC	NC	NC	NC	NC	NC	80	NC	87	115	102	NC	NC	NC	NC	NC	NC	NC
Temperature (ºC)	**17.3**	**22.4**	17.4	**19.5**	**15.6**	9.3	**16.9**	NC	**21.5**	**21.0**	**18.4**	NC	**16.6**	**20.7**	**21.6**	**19.7**	**18.5**	**10.3**

[1] Near Surface Measurements Only

[2] NC = Not Collected per Study Plan

Bolded results are over the water quality criteria limits as defined in Chap NR 102 of the Wisc. Admin. Code.

*Result recorded on September 12, 2022. DO limit for this date is 6 mg/L.

TABLE 7. SUMMARY OF WATER QUALITY PARAMETER SAMPLE ANALYSIS FOR THE TREGO HYDROELECTRIC PROJECT (2022)

	Trego Location #1 (Upstream)						Trego Location #2 (Deep Hole)						Trego Location #3 (Downstream)					
Parameter	**May**	**June**	**July**	**Aug.**	**Sept.**	**Oct.**	**May**	**June**	**July**	**Aug.**	**Sept.**	**Oct.**	**May**	**June**	**July**	**Aug.**	**Sept.**	**Oct.**
Ammonia (µg/L)	44.1	34.3	33.4	24.2	33.0	51.0	NC[2]	NC	67.5	NC	NC	NC	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	NC	2.0	2.0	<1.0	NC	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	NC	6.6	6.4	6.7	NC	5.7	6.7	5.2	6.6	7.0	7.0
Chlorophyll-*a* (µg/L)	NC	NC	2.80	1.20	1.08	NC	NC	NC	1.49	1.27	0.98	NC	NC	NC	2.10	1.81	1.26	NC
Color (PCU)[1]	NC	NC	NC	NC	NC	NC	NC	NC	34	NC	NC	NC	NC	NC	NC	NC	NC	NC
Dissolved Phosphorus (µg/L)	4.1	2.7	3.6	1.5	5.8	2.3	2.5	NC	4.1	4.4	6.2	NC	1.9	3.2	3.4	2.3	5.3	3.3
Iron (µg/L)	NC	NC	NC	NC	NC	NC	470	NC	188	180	202	NC	NC	NC	NC	NC	NC	NC
Manganese (µg/L)	NC	NC	NC	NC	NC	NC	77.0	NC	61.3	38.5	48.2	NC	NC	NC	NC	NC	NC	NC
Nitrate + nitrite (µg/L)	139.2	122.4	118.2	92.3	91.6	112.1	NC	NC	46.4	NC	NC	NC	114.2	68.1	63.5	41.1	78.9	77.2
Sulfide (mg/L)	NC	NC	NC	NC	NC	NC	<1.0	NC	<1.2	<1.2	<1.2	NC	NC	NC	NC	NC	NC	NC
Sulfate (mg/L)	<0.71	NC	NC	NC	NC	NC	<0.71	NC	NC	NC	NC	NC	<0.71	NC	NC	NC	NC	NC
Total Mercury (µg/L)	<0.16	NC	NC	NC	NC	NC	<0.16	NC	NC	NC	NC	NC	<0.16	NC	NC	NC	NC	NC
Total Nitrogen (mg/L)	0.58	0.62	0.40	0.37	0.31	0.31	NC	NC	0.47	NC	NC	NC	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	NC	6.2	6.1	11.6	NC	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	NC	5.5	3.3	3.8	NC	2.6	4.8	5.2	2.6	4.8	9.2

[1] PCU = Platinum Cobalt Units, [2] NC = Not Collected per Study Plan

TABLE 8. SUMMARY OF WATER QUALITY FIELD PARAMETER RESULTS FOR THE TREGO HYDROELECTRIC PROJECT (2022)

Field Measurements[1]	Trego Location #1 (Upstream)						Trego Location #2 (Deep Hole)						Trego Location #3 (Downstream)					
	May	**June**	**July**	**Aug.**	**Sept.**	**Oct.**	**May**	**June**	**July**	**Aug.**	**Sept.**	**Oct.**	**May**	**June**	**July**	**Aug.**	**Sept.**	**Oct.**
Specific Conductance (µS/cm)	293	NC[2]	187	191	205	204	279	NC	197	194	207	NC	280	NC	197	195	207	205
DO (mg/L)	8.77	NC	7.37[3]	7.79	8.75	10.20	7.87	NC	7.27[3]	9.28	7.58	NC	9.05	NC	6.29[3]	8.16	7.95	10.41
pH (s.u.)	7.51	NC	7.74	7.67	7.64	7.78	7.47	NC	7.84	8.17	7.76	NC	7.53	NC	7.62	7.72	7.71	7.79
Secchi depth (inches)	NC	NC	NC	NC	NC	NC	57	NC	87	114	150	NC	NC	NC	NC	NC	NC	NC
Temperature (ºC)	14.3	**21.9**	19.6	19.4	14.7	9.4	**18.8**	NC	**24.6**	22.5	**19.6**	NC	**17.9**	19.8	23.5	20.9	**19.0**	**11.6**

[1] Near Surface Measurements Only

[2] NC = Not Collected per Study Plan

[3] Value calculated using DO (% saturation), water temperature, and elevation

Bolded results are over the water quality criteria limits as defined in Chap NR 102 of the Wisc. Admin. Code.

Continuous Monitoring of Water Temperature, pH, DO, and Specific Conductance

Continuous temperature data was collected at the upstream and downstream locations at both Projects using Hobo Tidbits from May 17 to October 11, 2022. Continuous DO, pH, and conductivity data was collected at the upstream and downstream locations of each Project, using YSI EXO3 sondes, from July 12 or 13 to September 28, 2022, with some deviations from the study plan as discussed below.

Recorded water temperatures were compared to the monthly ambient water temperature limits for non-specific (warm-large) waters (Trego) and cold waters (Hayward) as defined in chapter NR 102 of the Wisconsin Administrative Code. Hourly DO readings for Trego were compared to the minimum attainment value of 5 mg/L. Hourly DO readings for Hayward were compared to the criteria for cold waters which states that cold surface waters shall attain (a.) a minimum dissolved oxygen concentration of 6.0 mg/L at all times, and (b.) a minimum dissolved oxygen concentration of 7.0 mg/L when cold water fish are spawning through fry emergence from their redds, or gravel nests. For Hayward, this period is from September 15 through May 15. pH readings were compared with the range of 6.0 to 9.0 as defined in chapter NR 102 of the Wisconsin Administrative Code. The range, mean, and median of temperature, pH, DO, and specific conductance readings collected during continuous (hourly) monitoring are presented in Tables 9 (Hayward) and 10 (Trego). Plots of the hourly data collected are presented in Appendix B.

Hayward Hydroelectric Project

Water temperatures displayed consistent daily and seasonal patterns and ranged from a minimum of 6.24 °C to a maximum of 26.21 °C, with both readings recorded at Location #1. The average (19.24°C Hobo Tidbit recording, 19.95°C sonde recording) and median (20.15°C Hobo Tidbit recording, 20.47°C sonde recording) water temperatures were higher at Location #3 than at Location #1. The water temperatures collected by the Hobo Tidbit and YSI EXO3 sonde displayed almost identical patterns for both Hayward locations (see water temperature plots in Appendix B).

Water temperatures recorded at Hayward Locations #1 and #3 were above the month-by-month state regulatory thresholds for cold waters for at least one hourly measurement per day for almost all of the deployment period (see plots in Appendix B). Days when all of the hourly temperature measurements fell below the state regulatory threshold for Location #1 include:

- May 22, 26
- August 13
- September 23-24, 26-30

Days when all of the hourly temperature measurements fell below the state regulatory threshold for Location #3 include:

- September 27-30

There were no instances at Location #1 or Location #3 of DO readings below the 6.0 mg/L attainment threshold between sonde deployment and September 14, 2022. The minimum DO recorded during this time was 6.15 mg/L (Location #1). There were no instances at Location #1

or Location #3 of DO readings below the 7.0 mg/L attainment threshold between September 15 and sonde retrieval. The minimum DO recorded during this time was 7.54 mg/L (Location #1). DO at Location #1 ranged from 6.15 mg/L to 11.85 mg/L with an average and median DO of 8.92 mg/L and 8.81 mg/L, respectively. DO at Location #3 ranged from 6.46 mg/L to 10.32 mg/L with an average and median DO of 8.39 mg/L and 8.45 mg/L, respectively.

Specific conductance ranged from 148.7 µS/cm to 199.7 µS/cm at Location #1 and averaged 184.9 µS/cm. At Location #3, specific conductance ranged from 163.6 µS/cm to 221.40 µS/cm and averaged 192.4 µS/cm. A small jump in specific conductance occurred on August 25, 2022 for both Locations #1 and #3 (Appendix B). This jump was due to an in-field calibration performed on the sondes, necessary due to drift in specific conductance over time.

All pH values recorded at Location #1 and Location #3 fell within the range of 6.0 to 9.0 as defined in chapter NR 102 of the Wisconsin Administrative Code. pH at Location #1 ranged from 7.38 to 8.69 and averaged 7.84. pH at Location #3 ranged from 7.43 to 8.40 and averaged 7.82.

TABLE 9. RANGE OF CONTINUOUS TEMPERATURE, PH, DO, AND SPECIFIC CONDUCTANCE READINGS FOR HAYWARD HYDROELECTRIC PROJECT, MAY 17, 2022 TO OCTOBER 11, 2022

	Hayward Location #1 (Upstream)					Hayward Location #3 (Downstream)				
	Hobo Tidbit Temp (°C)	Temp (°C)	DO (mg/L)	Specific Conductance (µS/cm)	pH	Hobo Tidbit Temp (°C)	Temp (°C)	DO (mg/L)	Specific Conductance (µS/cm)	pH
Min	6.24	7.23	6.15	148.7	7.38	10.00	11.57	6.46	163.6	7.43
Max	26.21	25.60	11.85	199.7	8.69	25.50	25.31	10.32	221.4	8.40
Mean	17.43	17.66	8.92	184.9	7.84	19.24	19.95	8.39	192.4	7.82
Median	18.05	18.03	8.81	191.8	7.78	20.15	20.47	8.45	201.5	7.80

Trego Hydroelectric Project

Water temperatures at the Trego Hydroelectric Project ranged from 8.45°C (Hobo Tidbit recording) to 28.29°C (sonde recording), with both extremes recorded at Location #1. The average (20.31°C Hobo Tidbit recording, 21.21°C sonde recording) and median water temperatures (21.38°C Hobo Tidbit recording, 21.63°C sonde recording) were higher at Location #3 than at Location #1. The water temperatures collected by the Hobo Tidbit and YSI EXO3 sonde displayed almost identical patterns for both Trego locations (see water temperature plots in Appendix B).

Water temperatures recorded at Location #1 were above the month-by-month state regulatory thresholds for at least one hourly measurement per day for almost all of the deployment period (see plots in Appendix B). Days when all of the hourly temperature measurements fell below the state regulatory threshold for Location #1 include:

- May 22-23, 26
- June 1-13, 16
- July 2-4, 10-11, 13-14, 24-29

- August 7, 12-22, 24-31
- September 11, 22-30
- October 8, 11

Days when all of the hourly temperature measurements fell below the state regulatory threshold for Location #3 include:

- May 23-28
- June 1-18
- July 1-7, 13-16, 26-31
- August 1, 13-31
- September 24-30

There were no instances at Trego Locations #1 or #3 of DO readings below the 5.0 mg/L attainment threshold. DO at Location #1 ranged from 6.23 mg/L to 11.91 mg/L with an average of 8.83 mg/L and median of 8.68 mg/L. DO at Location #3 ranged from 5.69 mg/L to 9.94 mg/L with an average and median of 7.93 mg/L and 7.98 mg/L, respectively.

Specific conductance ranged from 168.0 µS/cm to 215.5 µS/cm at Location #1 and averaged 194.5 µS/cm. At Location #3, specific conductance ranged from 187.8 µS/cm to 221.9 µS/cm and averaged 207.5 µS/cm. A small jump in specific conductance occurred on August 25, 2022 for Locations #1 and #3 (Appendix B). This jump was due to an in-field calibration performed on the sondes, necessary due to drift in specific conductance over time.

All pH values recorded at Locations #1 and #3 fell in the range of 6.0 to 9.0 as defined in chapter NR 102 of the Wisconsin Administrative Code. pH at Location #1 ranged from 7.54 to 8.65 and averaged 7.96. pH at Location #3 ranged from 7.58 to 8.33 and averaged 7.81.

TABLE 10. RANGE OF CONTINUOUS TEMPERATURE, PH, DO, AND SPECIFIC CONDUCTANCE READINGS FOR TREGO HYDROELECTRIC PROJECT, MAY 17, 2022 TO OCTOBER 11, 2022

	Trego Location #1 (Upstream)					Trego Location #3 (Downstream)				
	Hobo Tidbit Temp (°C)	Temp (°C)	DO (mg/L)	Specific Conductance (µS/cm)	pH	Hobo Tidbit Temp (°C)	Temp (°C)	DO (mg/L)	Specific Conductance (µS/cm)	pH
Min	7.16	8.50	6.23	168.0	7.54	11.64	14.14	5.69	187.8	7.58
Max	28.28	28.29	11.91	215.5	8.65	26.23	26.19	9.94	221.9	8.33
Mean	19.10	20.19	8.83	194.5	7.96	20.31	21.21	7.93	207.5	7.81
Median	19.71	20.52	8.68	185.4	7.93	21.38	21.63	7.98	214.0	7.78

Raw field data, including field notes and depth profile data, are provided in Appendix C. Analytical data, including laboratory analysis results, are provided in Appendix D.

Deviations from the Study Plan

Due to field technician error while downloading data from the YSI EXO3 sondes, no continuous data was collected between July 29 and August 16, 2022 at Hayward Location #1, Hayward Location #3, or Trego Location #3. The sonde at Trego Location #1 remained in operation

during that time. The Hobo Tidbit water temperature data loggers were deployed at all monitoring locations from May 17 to October 11, 2022 with no interruption in data logging.

GLEC developed a regression model to predict DO and temperature for the missing data points based on temperature data bracketing the missing dates. By developing a simple linear regression for each downstream monitoring station, GLEC was able to determine that there is only a 5% chance (using the 95% prediction interval) that the true DO value fell outside of what was predicted with the regression. Figures 6 and 7 show the predicted DO values based on the simple linear regressions for each monitoring station. The data indicate that it is very unlikely that any of the missing DO data fell below the thresholds of 6.0 mg/L and 7.0 mg/L for Hayward and 5.0 mg/L for Trego. An explanation of the methods used to develop the regressions follows.

Regression Model Structure
To estimate the hourly DO values between July 29 and August 16, 2022, observed water temperature from the adjacent Hobo Tidbit temperature logger was used as a regressor variable for pairs of observed DO and water temperature. Regression analysis was performed on data collected at both Hayward Location #3 (downstream) and Trego Location #3 (downstream). Water temperature is a reasonably good predictor of DO if the nutrient-DO and ammonia-DO dynamics of a stream system are fairly simple and invariable. Other water quality parameters, such as pH, would have been better predictors for DO but that information also was not available.

Several linear, univariate model forms of DO and temperature were explored using ordinary least-squares regression (OLS), including a simple linear form, a quadratic form, a $\log_e$-temperature form, a $\log_e$-$\log_e$ model, and a square root of temperature form. None of the more complicated linear models offered any improvement compared to the simple linear model. A non-linear univariate model was also constructed. As in the more complex linear models, the non-linear model also did not show an improved model fit.

Regression diagnostics for the simple linear model of DO and water temperature for Hayward Location #3 and Trego Location #3 showed an R^2 of 0.5053 and 0.4963, respectively, and a residual standard error of 0.4867 and 0.6028, respectively.

Prediction Intervals
The upper and lower boundary of predicted hourly DO is termed a prediction interval (Figures 6 and 7). For a given, observed, hourly water temperature (using the Hobo Tidbit data in °C), a prediction of hourly DO (in mg/L) was made and an associated 90% or 95% prediction interval was calculated. Prediction intervals are based on predicting an individual DO value at a particular water temperature value. The 90% interval, for example, can be explained as given a large number of random samples (i.e., hourly data for the period July 12 to September 28, 2022, or 1,873 observations) from a population of all months and years of water temperature and DO observations for a location, then 90% of those prediction intervals would contain the true (unknown) DO for that single hourly DO value selected at random. The same explanation would apply for the 95% prediction interval.

In comparison to traditional confidence intervals, prediction intervals make use of the standard deviation of the *fitted value* as opposed to that of the *observed value*. Confidence intervals are used for estimating the population mean from the array of regressor variables.

Figures 6 and 7 display the hourly distribution of observed water temperature (Hobo Tidbit) and observed DO (YSI EXO3 sonde), including 24-hr moving averages to represent a "daily average" for the downstream locations at Hayward and Trego, respectively. Also shown is the fitted DO, using univariate OLS regression as a function of water temperature, and its corresponding 90% and 95% prediction interval. The prediction period extends from July 11 to September 28, 2022.

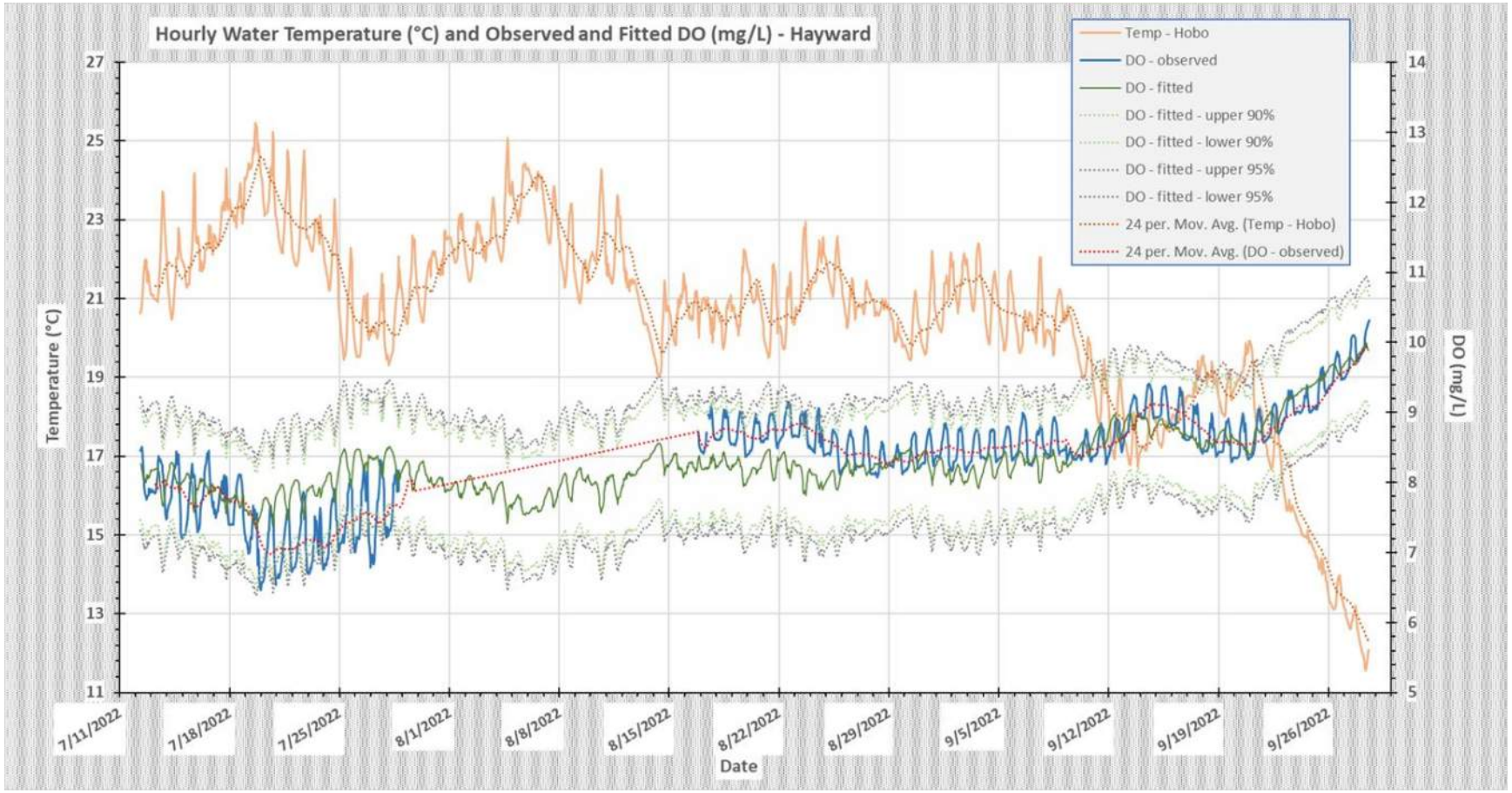

FIGURE 6. PREDICTION OF MISSED HOURLY DO VALUES FOR HAYWARD LOCATION #3 (DOWNSTREAM)

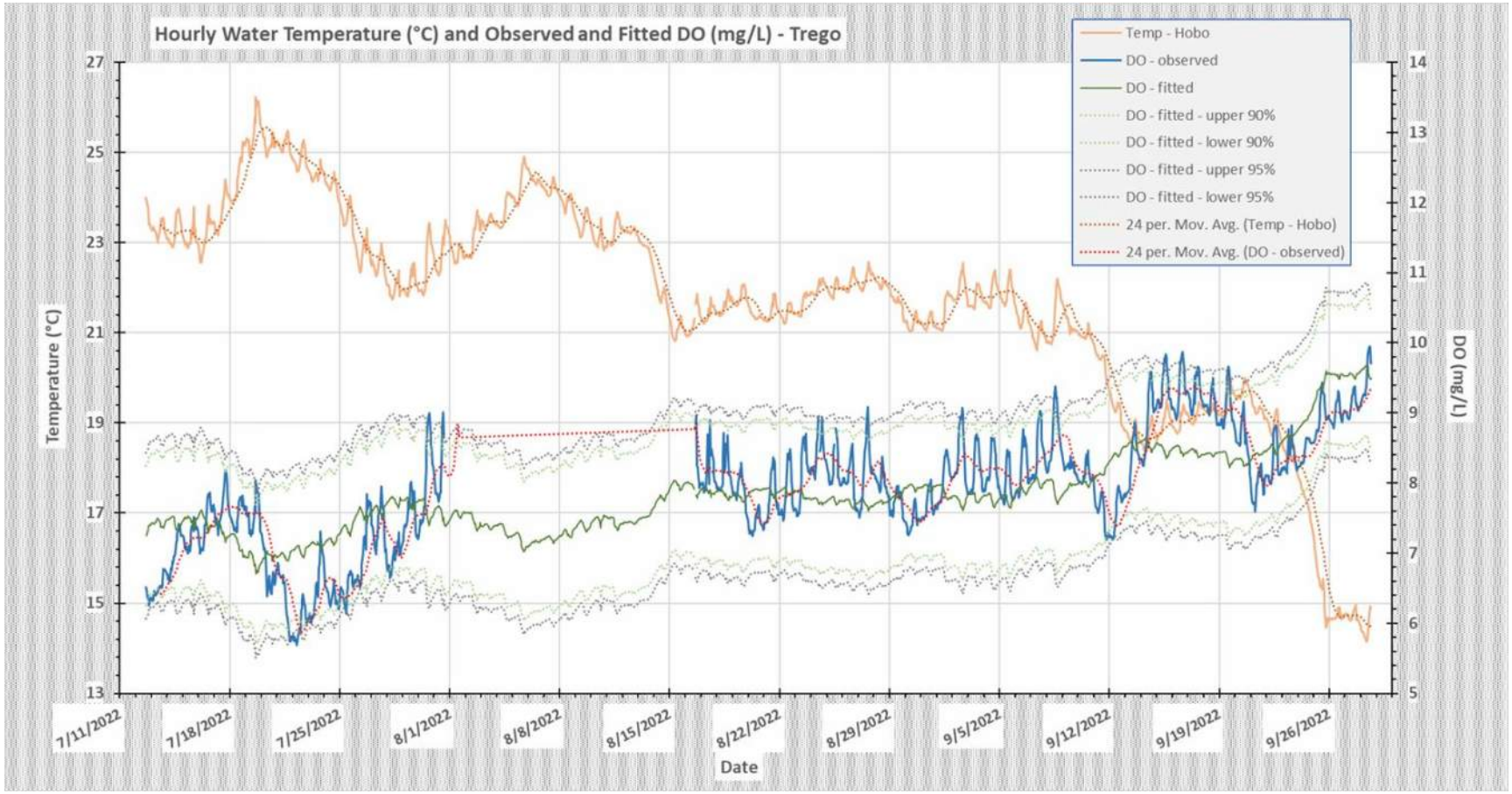

FIGURE 7. PREDICTION OF MISSED HOURLY DO VALUES FOR TREGO LOCATION #3 (DOWNSTREAM)

Analysis and Discussion

Hydrographic Profiles

Hydrographic profiles were conducted at the deep hole locations of the reservoirs for both Projects in May, July, August, and September, 2022 (Appendices A and C). Analysis of the hydrographic profile data collected at Hayward Location #2 (deep hole) indicate that the Hayward impoundment was not stratified in terms of temperature or dissolved oxygen throughout the study. In July, August, and September, water temperature in the Hayward impoundment showed a slight thermocline around 2 meters below the surface, but DO levels remained above 8 mg/L at the bottom of the impoundment for each profiling event.

Hydrographic profiles completed at Trego Location #2 (deep hole) showed no stratification in terms of water temperature with the exception of a slight thermocline in August around 3 meters below the surface. DO measured during the Trego impoundment profiling events generally remained above 6 mg/L with a few exceptions. Due to an error on the part of the field technician recording the data, in July the DO values were recorded in percent saturation instead of mg/L. DO values in mg/L were calculated for this event based on the water temperature, barometric pressure, and DO values recorded in percent saturation. These calculated DO values indicate that the DO in mg/L dropped by approximately 1 mg/L between four and five meters below the surface and DO at the bottom of the impoundment in July was below 5 mg/L. In August, DO values dropped by almost 2 mg/L between two and three meters below the surface. However, DO at the bottom of the impoundment was above 6 mg/L in August. The hydrographic profile taken at Trego #2 in September indicated that DO levels declined between three and four meters below the surface to around 5.8 mg/L, but then increased again towards the bottom of the impoundment. DO at the bottom of the impoundment measured almost 7 mg/L in September.

Overall, hydrographic profiles at the deep holes at both Hayward and Trego indicate that neither impoundment became stratified to the point where temperature or DO levels would have had an impact on aquatic life.

Discrete Multi-parameter Water Quality Measurements and Continuous Data Collection

Chapter NR 102 of the Wisconsin Administrative Code defines water quality standards and criteria for the protection of waterbody designated uses that are intended to protect human and ecosystem health (Figure 8).

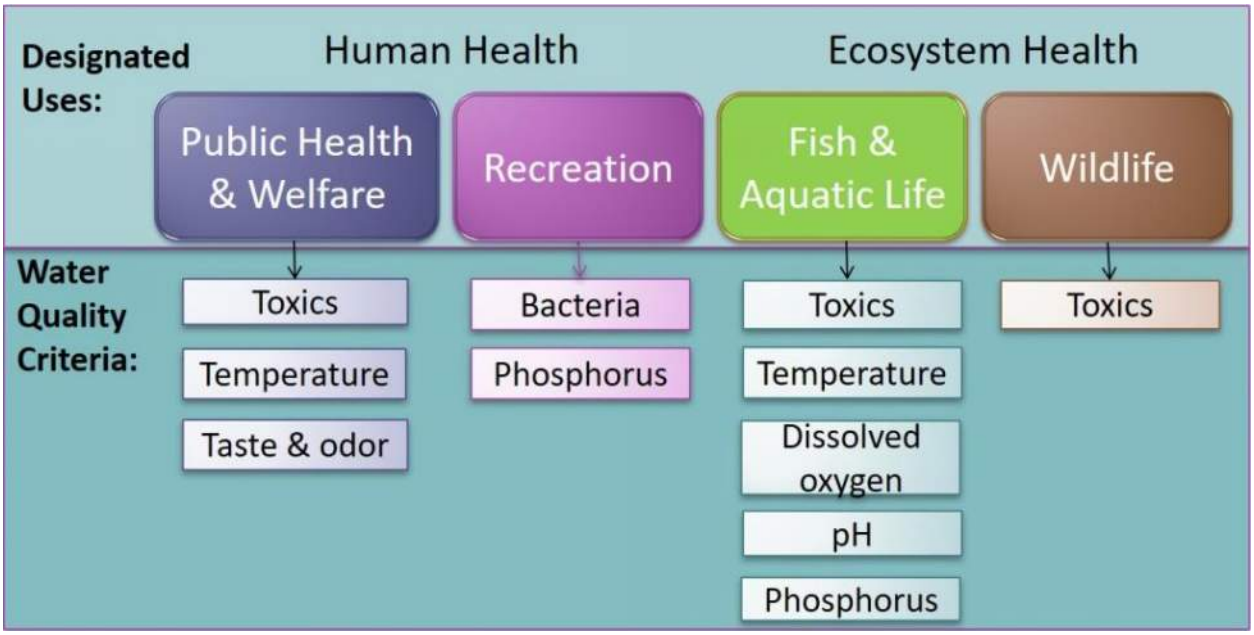

FIGURE 8. WISCONSIN GRAPHIC OF SURFACE WATER STANDARDS AND CRITERIA (Source: https://dnr.wisconsin.gov/topic/SurfaceWater/Standards.html)

Hayward Lake (impoundment) is listed by the Wisconsin DNR as a "Healthy Waterbody" and Trego Lake (impoundment) is listed as an "Impaired Waterbody" due to excess algal growth from nutrients and eutrophication (https://dnr.wisconsin.gov/topic/SurfaceWater/ConditionLists.html: Appendix E). None of the analyzed parameters or collected samples used in laboratory analysis exceeded Wisconsin water quality criteria or standards. A narrative for each measured parameter is provided in the following paragraphs and the corresponding recorded values are presented in Tables 5-8 and Appendix D.

Temperature

Wisconsin Administrative Code NR 102.24 and 102.29 states that temperature of a water of the state or a discharge to a water of the state may not be artificially raised or lowered at such a rate that it causes detrimental health or reproductive effects to fish or aquatic life of the water of the state. The temperature measurements collected from the Hayward Hydroelectric Project and the Trego Hydroelectric Project did not exceed this standard. Most of the temperatures recorded during the discrete measurements and/or the continuous measurements for Hayward were above the ambient temperature criteria for cold waters. There were also numerous instances at Trego when the discrete measurements and/or the continuous measurements were above the ambient temperature criteria for warm-large waters. However, it is unlikely that the impoundments caused artificial warming. Water temperature plots for both Hayward and Trego upstream and downstream locations (Appendix B) illustrate that when water was above the criteria in the downstream locations, it was also above the criteria in the upstream locations during the same time period.

pH

The purpose of a pH standard is to protect aquatic organisms from changes in pH that would affect their health and reproduction. Wisconsin Administrative Code NR 102.04 (c) states that the pH shall be within the range of 6.0 to 9.0, with no change greater than 0.5 units outside the estimated natural seasonal maximum and minimum. None of the pH measurements collected at either the Hayward or Trego Hydroelectric Projects exceeded this standard.

Dissolved Oxygen

Chapter NR 102.04 of the Wisconsin Administrative Code states that, for Trego, the dissolved oxygen content in surface waters may not be lowered to less than 5 mg/L at any time. None of the surface water dissolved oxygen measurements taken from Trego were lower than 5 mg/L. For Hayward, the code states that surface waters shall attain (a.) a minimum dissolved oxygen concentration of 6.0 mg/L at all times and (b.) a minimum dissolved oxygen concentration of 7.0 mg/L when cold water fish are spawning through fry emergence from their redds, or gravel nests. For Hayward, this period is from September 15 through May 15. None of the surface water dissolved oxygen measurements recorded at the Hayward Hydroelectric Project were lower than 6.0 mg/L from sonde deployment through September 14, 2022 and no measurements below 7.0 mg/L between September 15 and sonde retrieval.

Iron

Iron (Fe) is a trace element required by both plants and animals. It is a vital part of the oxygen transport mechanism in the blood (hemoglobin) of all vertebrates and some invertebrate animals. Ferrous (Fe^{2+}) and ferric (Fe^{3+}) ions are the primary ions of concern in the aquatic environment. The ferrous ion (Fe^{2+}) can persist in water devoid of dissolved oxygen and usually originates from groundwater or mines that are pumped or drained. Black or brown swamp waters may contain iron concentrations of several mg/L in the presence (ferric iron) or absence (ferrous iron) of dissolved oxygen, but these iron ions have little effect on aquatic life. The concentration of total iron during the study ranged between 215 and 330 µg/L at the Hayward deep hole location and between 180 and 470 µg/L at the Trego deep hole location, which is typical of waterbodies in this area of Wisconsin.

Manganese

Manganese is primarily regulated as a secondary drinking water standard because it can create aesthetic problems with the use of the water. These problems include the presence of black particles (MnO_2), black coatings and films on porcelain, a bitter/ metallic taste to the water, stains on laundry, and black films on automatic dishwashers and on dishes.

Manganese and iron together may affect the role of reduction and oxidation (redox) processes in lake and reservoir sediments in the vicinity of a redox boundary such as at the sediment water interface at the bottom of the reservoir. Mechanisms of redox include the role of micro-organisms, however, they appear to play a smaller role in the transport of trace metals and

phosphorus than what was once believed. Various lacustrine environments, sediments, the sediment-water interface and anoxic and oxygenated waters, are considered within a unifying context of the processes occurring at a redox boundary. The concentration of total manganese in this study ranged between 31.1 and 45.0 µg/L at the Hayward deep hole location and between 38.5 and 77.0 µg/L at the Trego deep hole location which is typical of waterbodies in this area of Wisconsin.

Total Mercury

Mercury is a naturally occurring metal that is released through the weathering of rock. It can also be released into the environment through coal combustion and industrial waste. Mercury is of concern because it is easily absorbed into the food chain. Total mercury levels were measured both Projects during the May sampling event only and results for all samples were below detection.

Chloride

Chloride is present in rainwater, streams, groundwater, seawater, wastewater, urban runoff, humans, geologic formations, and animal waste streams. Chloride is commonly associated with other ions, such as sodium, potassium, carbonates, and sulfate. Elevated chloride levels can be associated with oil/natural gas drilling, saltwater intrusion, landfill leachate, fertilizers, septic system effluent, road salt storage, salt mining, deicing agents, and saline/brine water deposits. The concentration of total chloride in this study ranged between 0.7 and 11.1 mg/L for Hayward and between 5.2 and 7.5 mg/L for Trego, which is typical of waterbodies in this area of Wisconsin. At these concentrations, there is no evidence of anthropogenic input.

Chlorophyll *a*

Chlorophyll *a* is tested in lakes to determine how much algae is in the lake. Algae is an important factor in the health of lakes because it adds oxygen to the water as a by-product of photosynthesis. However, if there is too much algae in a lake it can produce a foul odor and be unpleasant for swimming. The concentration of Chlorophyll *a* in this study ranged between 1.12 and 2.71 µg/L for Hayward and 0.98 and 2.80 µg/L for Trego, which are very low concentrations and typical of waterbodies in this area of Wisconsin.

Sulfide and Sulfate

Sulfides are stable in low oxygen environments whereas sulfates are stable in high oxygen environments. When sulfides are exposed to a high oxygen environment, or when sulfates move into a low oxygen environment, the ions can end up in water as they change to a more stable form in the new environment.

Certain bacteria can take advantage of the oxidation or reduction of sulfur because such chemical changes are a source of energy. Sulfur-reducing bacteria thrive when sulfate-rich water moves into a low oxygen environment. Such bacteria mediate the transformation of sulfate into hydrogen sulfide which, being a gas, can dissolve into water; this is the important exception to

sulfides being very insoluble in water. Sulfur-oxidizing bacteria do the opposite, deriving energy by mediating the oxidation of sulfides into sulfates in oxygen-rich environments. The concentrations of sulfide and sulfate at both the Hayward and Trego Projects were below or just above detection.

Bacteria (*E. coli*)

E. coli is part of the total coliform group of bacteria which is a gram-negative, rod-shaped facultative anaerobic coliform bacteria. These bacteria tend to inhabit the gastrointestinal system of warm-blooded animals in a symbiotic relationship where the bacteria aid in making available vitamin K to the host organism. There are a number of subspecies of *E. coli*, but only a few are pathogenic or disease causing.

Humans can be exposed to *E. coli* bacteria through a number of routes including foodborne or waterborne vectors. The Wisconsin recreational standard for *E. coli* is under the WDNR's beach advisory program. A beach advisory is issued when a beach reaches the "Beach Action Value" of 235 counts per 100 mL and a beach closure is issued at 1000 counts per 100 mL, unless site-specific conditions indicate use of an alternate metric. Using the IDEXX methodology, *E. coli* concentration is given as a "Most Probable Number" or MPN that is equivalent to colony counts per 100 mL, *E. coli* colony counts for Hayward ranged between 2.0 and 24.3 MPN and counts for Trego ranged between <1.0 and 114.5 MPN. Consequently, the Wisconsin standard for *E. coli* was not exceeded at either the Hayward or Trego Project.

Total and Dissolved Phosphorus

Phosphorus is usually measured in two ways in lakes; ortho-phosphate (soluble reactive phosphorus or dissolved phosphorus) and total phosphorus. Ortho-phosphate is the chemically active dissolved form of phosphorus that is taken up directly by plants. Ortho-phosphate levels fluctuate daily and are typically low in lakes because it is incorporated into plants quickly. Total phosphorus (TP) is a better way to measure phosphorus in lakes because it includes both ortho-phosphate and the phosphorus in plant and animal fragments suspended in lake water. TP levels are more stable, and an annual mean can be a good indicator of the lake's water quality and trophic state.

Another means by which phosphorus can enter a lake is from the sediment on the lakebed. When the bottom of a lake is anoxic (usually in late summer and late winter), chemical processes at the sediment/water interface cause phosphorus to be released from the sediments. This phenomenon is called internal loading because the phosphorus is coming from within the lake (from the sediment). When the lake mixes again, this increased phosphorus fuels algae growth.

For stratified reservoirs, total phosphorus criterion is 30 µg/L. For reservoirs that are not stratified, total phosphorus criterion is 40 µg/L (Wisc. Adm Code 102.04(5)). Phosphorus is a nutrient important for plant growth. In most lakes, phosphorus is the limiting nutrient, which means that everything that plants and algae need to grow is available in excess (sunlight, warmth, water, nitrogen, etc.), with the exception of phosphorus. This means that phosphorus

has a direct effect on plant and algal growth in lakes – the more phosphorus that is available, the more plants and algae there are in the lake.

Phosphorus originates from a variety of sources, many of which are related to human activities. Major sources include human and animal wastes, soil erosion, detergents, septic systems and runoff from farmland or fertilized lawns. The concentration of total phosphorus and dissolved phosphorus at Hayward and Trego is far less than the concentration that would support unwanted plant growth. In this study, total phosphorus ranged from 4.0 to 17.1 µg/L at Hayward and 4.3 to 16.4 at Trego. Dissolved phosphorus ranged from <1.5 to 6.5 µg/L at Hayward and 1.5 to 6.2 µg/L at Trego.

Color

Lakes exist in many sizes and shapes, but often the most obvious characteristic of a lake is its color. The differences in color or transparency between lakes can be rather striking due to geology, surrounding wetlands and suspended solids. Lake color can tell you many things about the waterbody including nutrient load, algal growth, water quality and the surrounding landscape. There are three main categories of lake color: blue water lakes, green water lakes and brown water lakes. Hayward Lake and Trego Lake would be considered brown water lakes due to the input of tannins from adjacent wetlands and the surrounding geologic characteristics of the watershed. Color was measured once (in July) at Hayward (41 PCU) and Trego (34 PCU). According to Wisconsin Administrative NR 102.04, "Materials producing color, odor, taste or unsightliness shall not be present in such amounts as to interfere with public rights in waters of the state." The color values for Hayward and Trego are typical of lakes in this region.

Nitrate/Nitrite

Nitrates, a form of nitrogen, are found in several different forms in terrestrial and aquatic ecosystems. These forms of nitrogen include ammonia (NH_3), nitrates (NO_3), and nitrites (NO_2). Nitrates are essential plant nutrients, but in excess amounts they can cause significant water quality problems. Together with phosphorus, nitrates in excess amounts can accelerate eutrophication, causing dramatic increases in aquatic plant growth and changes in the types of plants and animals that live in a waterbody. This, in turn, affects dissolved oxygen, temperature, and other environmental indicators.

Excess nitrates can also cause hypoxia (low levels of dissolved oxygen) and can become toxic to warm-blooded animals at high concentrations (10 mg/L or higher) under certain conditions. The natural level of ammonia or nitrate in surface water is typically low (less than 1 mg/L Nitrate/Nitrite). Total nitrogen at Hayward ranged between <0.021 and 0.55 mg/L. Total nitrogen at Trego ranged between 0.31 and 0.69 mg/L. Nitrate-nitrite concentrations ranged from 6.4 to 77.9 µg/L (0.0064 to 0.0779 mg/L) at Hayward and 41.1 to 139.2 µg/L (0.0411 to 0.1392 mg/L) at Trego. Consequently, total nitrogen and nitrate/nitrite concentrations are not a concern at either Project.

Ammonia

Ammonia is one of several forms of nitrogen that exist in aquatic environments. Unlike other forms of nitrogen, which can cause nutrient over-enrichment of a waterbody at elevated concentrations and indirect effects on aquatic life, ammonia may cause direct toxic effects on aquatic life. Ammonia is produced for commercial fertilizers and other industrial applications. Natural sources of ammonia include the decomposition or breakdown of organic waste matter, gas exchange with the atmosphere, forest fires, animal and human waste, and nitrogen fixation processes.

Ammonia can enter the aquatic environment via direct means such as municipal effluent discharges and the excretion of nitrogenous wastes from animals, and indirect means such as nitrogen fixation, air deposition, and runoff from agricultural lands. When ammonia is present in water at high levels, it is difficult for aquatic organisms to sufficiently excrete the toxicant, leading to toxic buildup in internal tissues and blood, and potentially death. Environmental factors, such as pH and temperature, can affect ammonia toxicity to aquatic animals. Ammonia concentrations at Hayward ranged between <13.0 and 80.6 µg/L (0.0130 and 0.0806 mg/L, respectively). At Trego, ammonia concentrations ranged between 24.2 and 92.6 µg/L (0.0242 and 0.0926 mg/L, respectively). These concentrations are far below the toxicity threshold of freshwater aquatic organisms. For example, the 2013 EPA Final Acute Value (weighted average acute toxicity) for freshwater organisms is 33.52 mg/L (USEPA 2013).

Total Suspended Solids (TSS)

Total suspended solids (TSS) are waterborne particles that exceed 2 microns (µm) in size. Any particle that is smaller than 2 microns is considered a total dissolved solid (TDS). The majority of total suspended solids are comprised of inorganic materials; however, algae and bacteria may also be considered TSS. TSS could be anything that floats or "suspends" in water, including sand, sediment, and plankton. When certain water sources are contaminated with decaying plants or animals, the organic particles released into the water are usually suspended solids. While some sediment will settle at the bottom of a waterbody, other TSS will float on the water's surface or remain suspended somewhere in between. TSS affects water clarity; the higher a water source's TSS content, the less clear it will be. Water typically appears clear when the TSS concentration is 20 mg/L or less. TSS at Hayward ranged between 3.1 and 6.3 mg/L and TSS at Trego ranged between 2.6 and 9.2 mg/L. TSS concentrations in this range are considered very low.

Agency Correspondence and Consultation

There was no correspondence with any agency during the study.

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Wisconsin Department of Natural Resources (WDNR). 2022. Surface Water Quality Standards. https://dnr.wisconsin.gov/topic/SurfaceWater/Standards.html

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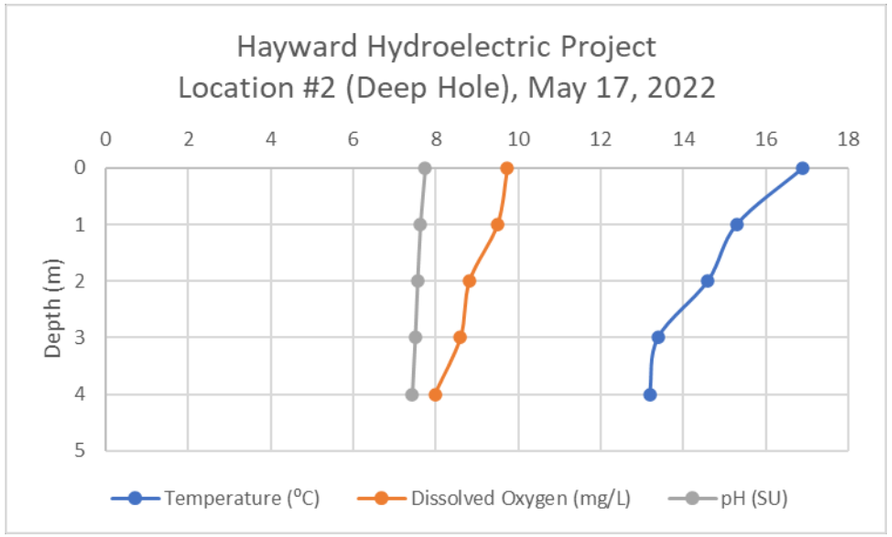
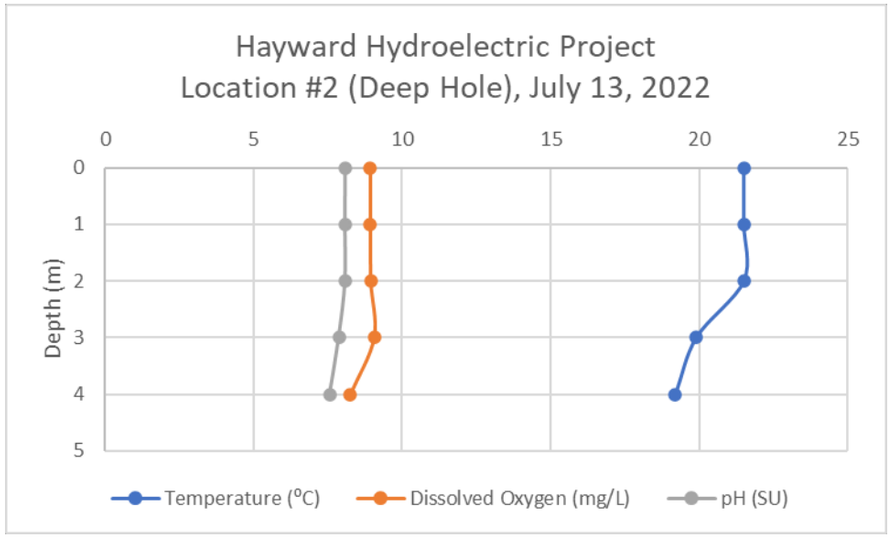
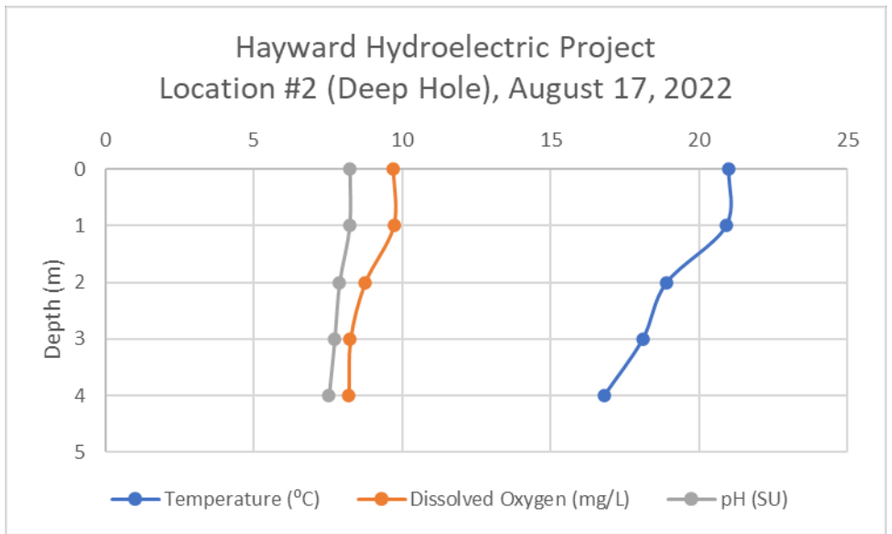
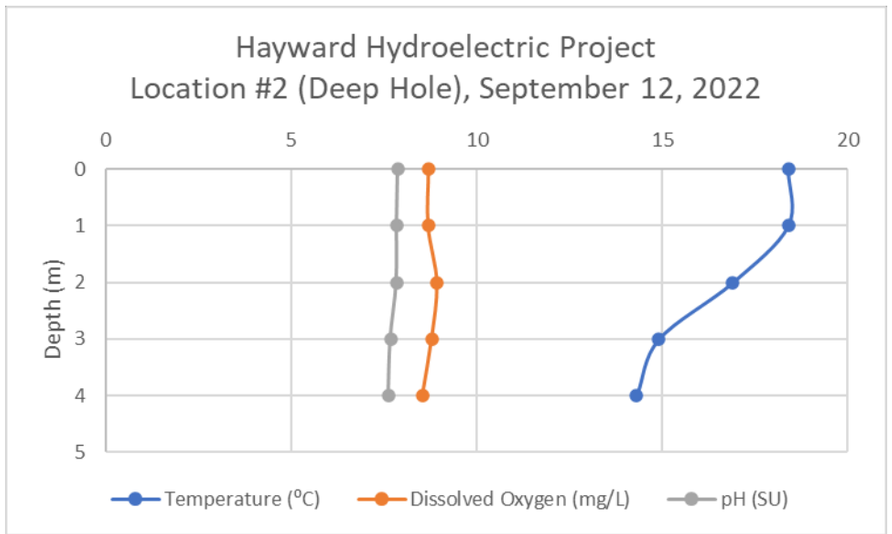
APPENDIX A

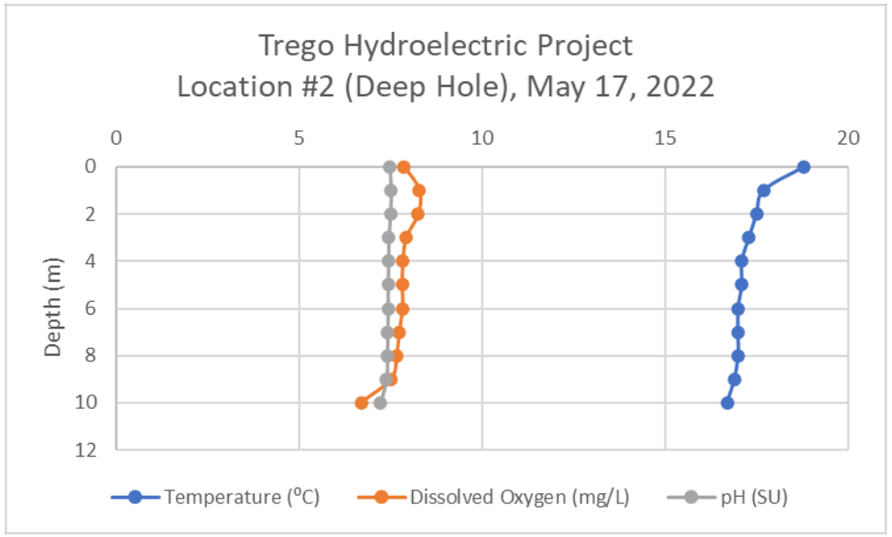
Temperature, Dissolved Oxygen, and pH Depth Profiles

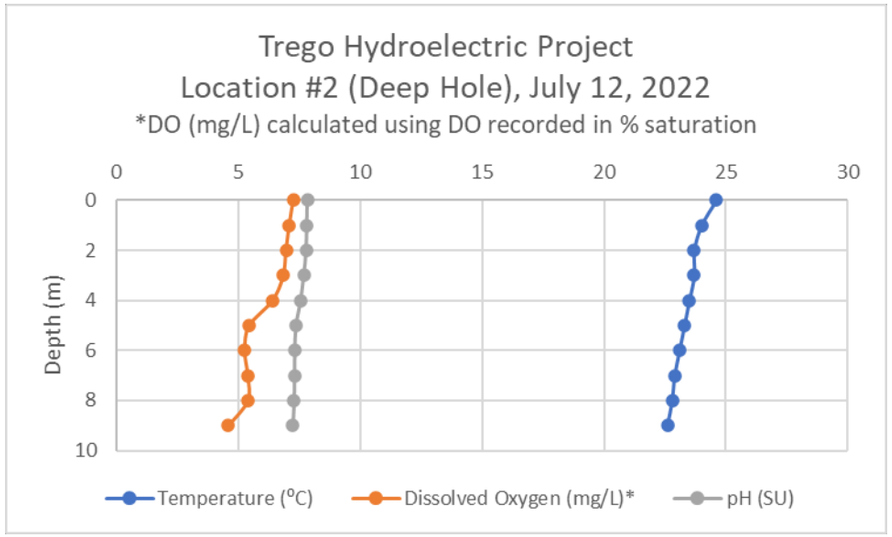

Hayward Hydroelectric Project
Location #2 (Deep Hole), May 17, 2022
0 2 4 6 8 10 12 14 16 18
Depth (m)
0 1 2 3 4 5
Temperature (°C)
Dissolved Oxygen (mg/L)
pH (SU)

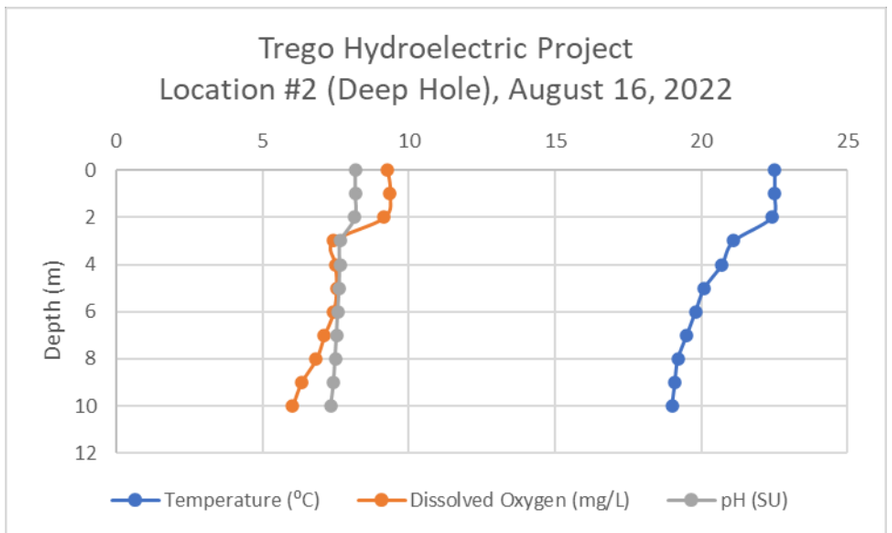

Hayward Hydroelectric Project
Location #2 (Deep Hole), July 13, 2022
0 5 10 15 20 25
Depth (m)
0 1 2 3 4 5
Temperature (°C)
Dissolved Oxygen (mg/L)
pH (SU)

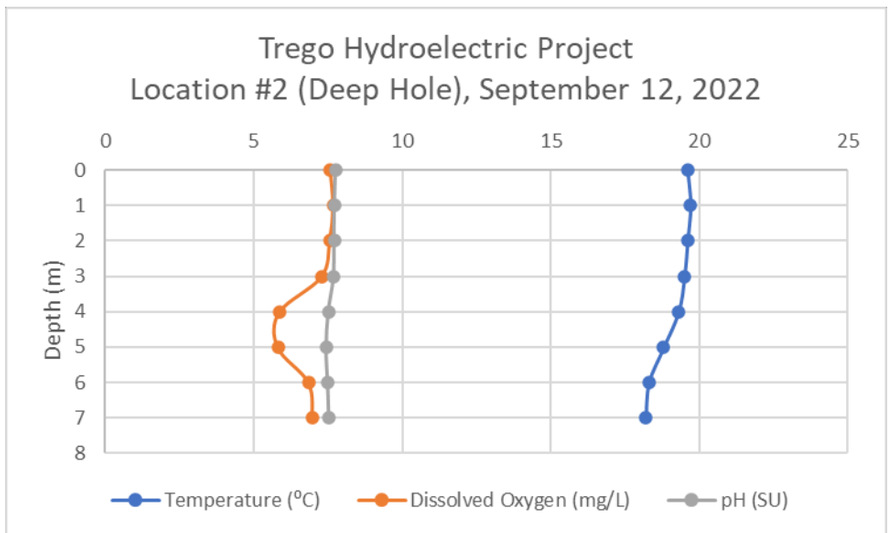

Hayward Hydroelectric Project
Location #2 (Deep Hole), August 17, 2022
0 5 10 15 20 25
Depth (m)
0 1 2 3 4 5
Temperature (°C)
Dissolved Oxygen (mg/L)
pH (SU)


Hayward Hydroelectric Project
Location #2 (Deep Hole), September 12, 2022
0 5 10 15 20
Depth (m)
0 1 2 3 4 5
Temperature (°C)
Dissolved Oxygen (mg/L)
pH (SU)


Trego Hydroelectric Project
Location #2 (Deep Hole), May 17, 2022
0
5
10
15
20
0
2
4
6
8
10
12
Depth (m)
Temperature (°C)
Dissolved Oxygen (mg/L)
pH (SU)

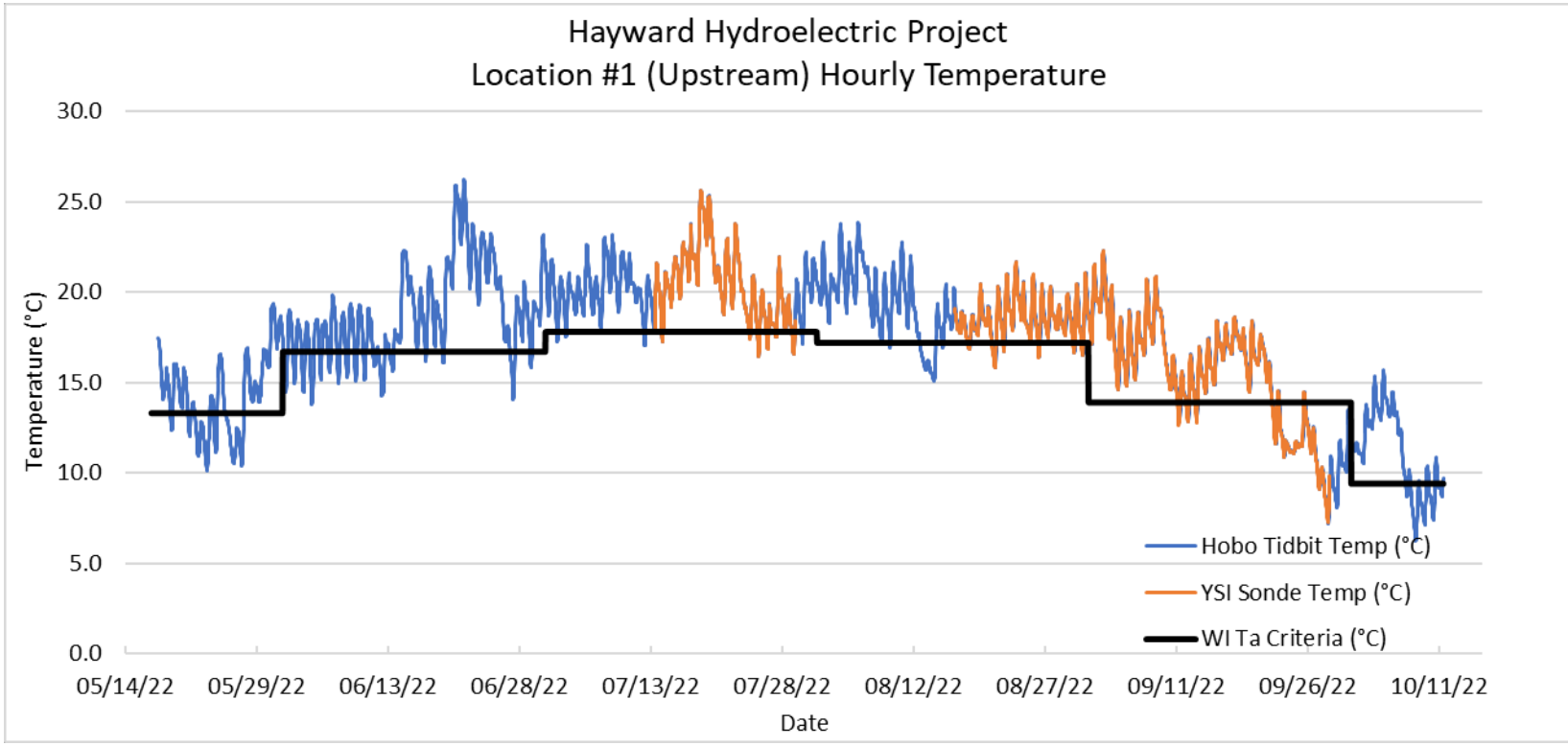

Trego Hydroelectric Project
Location #2 (Deep Hole), July 12, 2022
*DO (mg/L) calculated using DO recorded in % saturation
0
5
10
15
20
25
30
0
2
4
6
8
10
Depth (m)
Temperature (°C)
Dissolved Oxygen (mg/L)*
pH (SU)

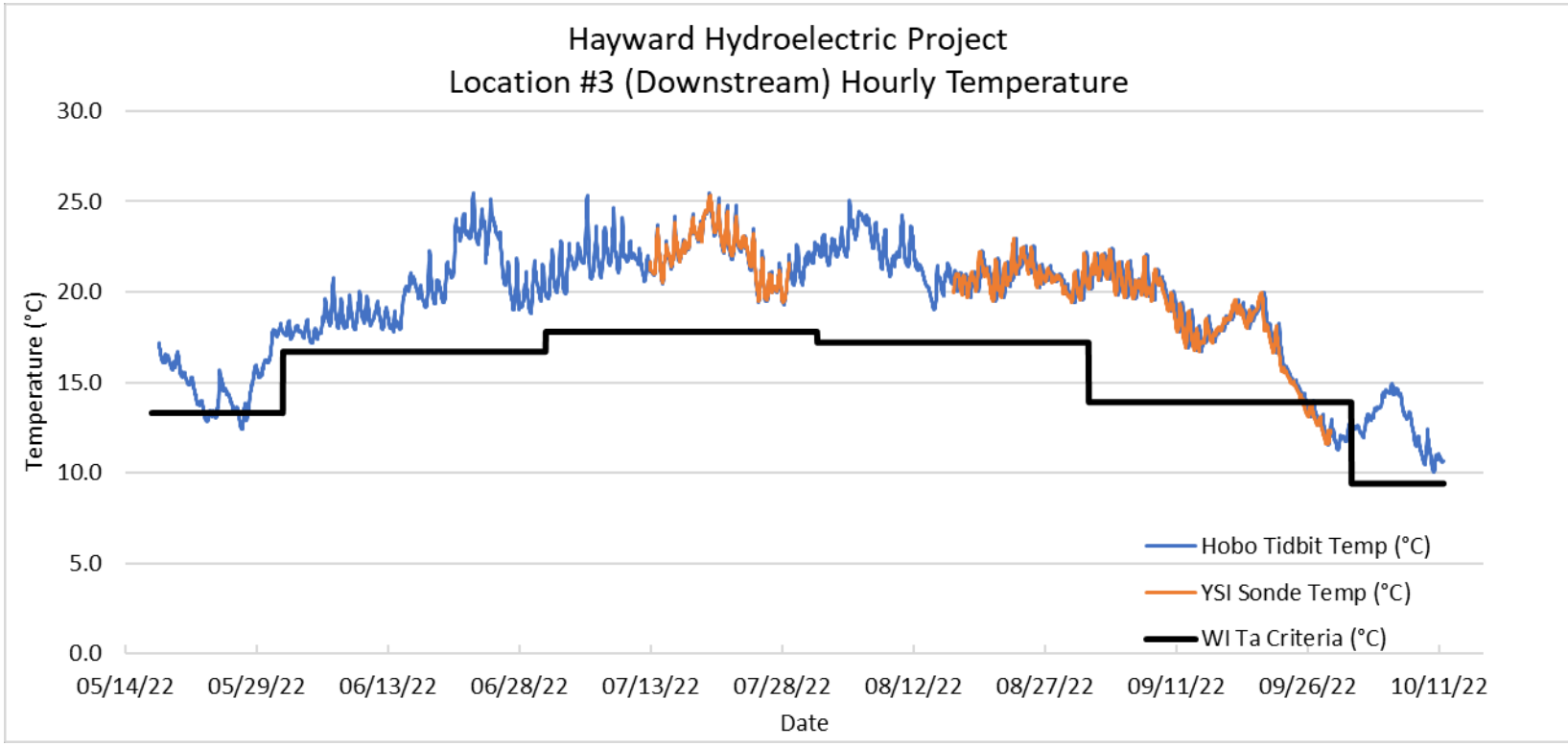

Trego Hydroelectric Project
Location #2 (Deep Hole), August 16, 2022
0
5
10
15
20
25
0
2
4
6
8
10
12
Depth (m)
Temperature (°C)
Dissolved Oxygen (mg/L)
pH (SU)

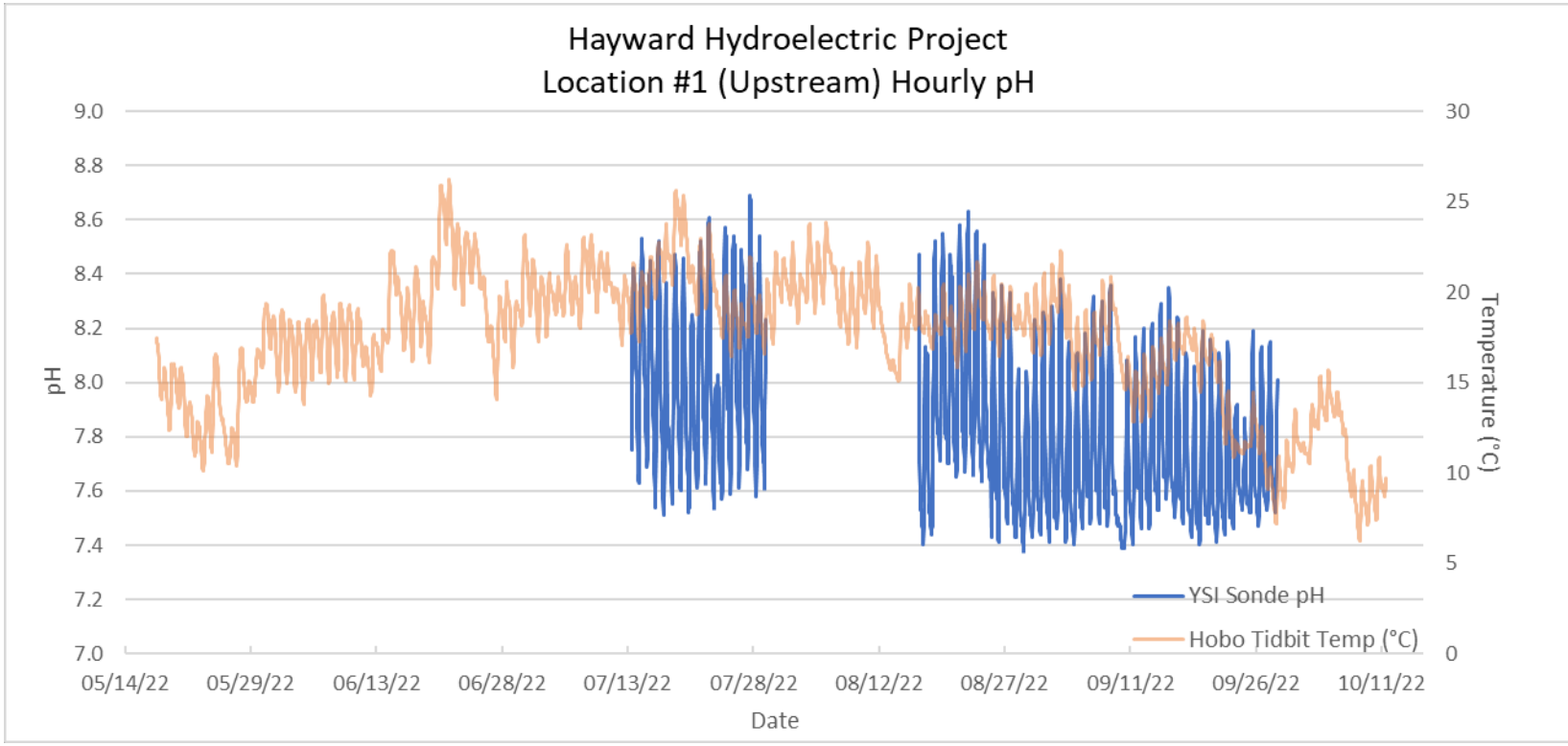

Trego Hydroelectric Project
Location #2 (Deep Hole), September 12, 2022
0
5
10
15
20
25
0
1
2
3
4
5
6
7
8
Depth (m)
Temperature (°C)
Dissolved Oxygen (mg/L)
pH (SU)

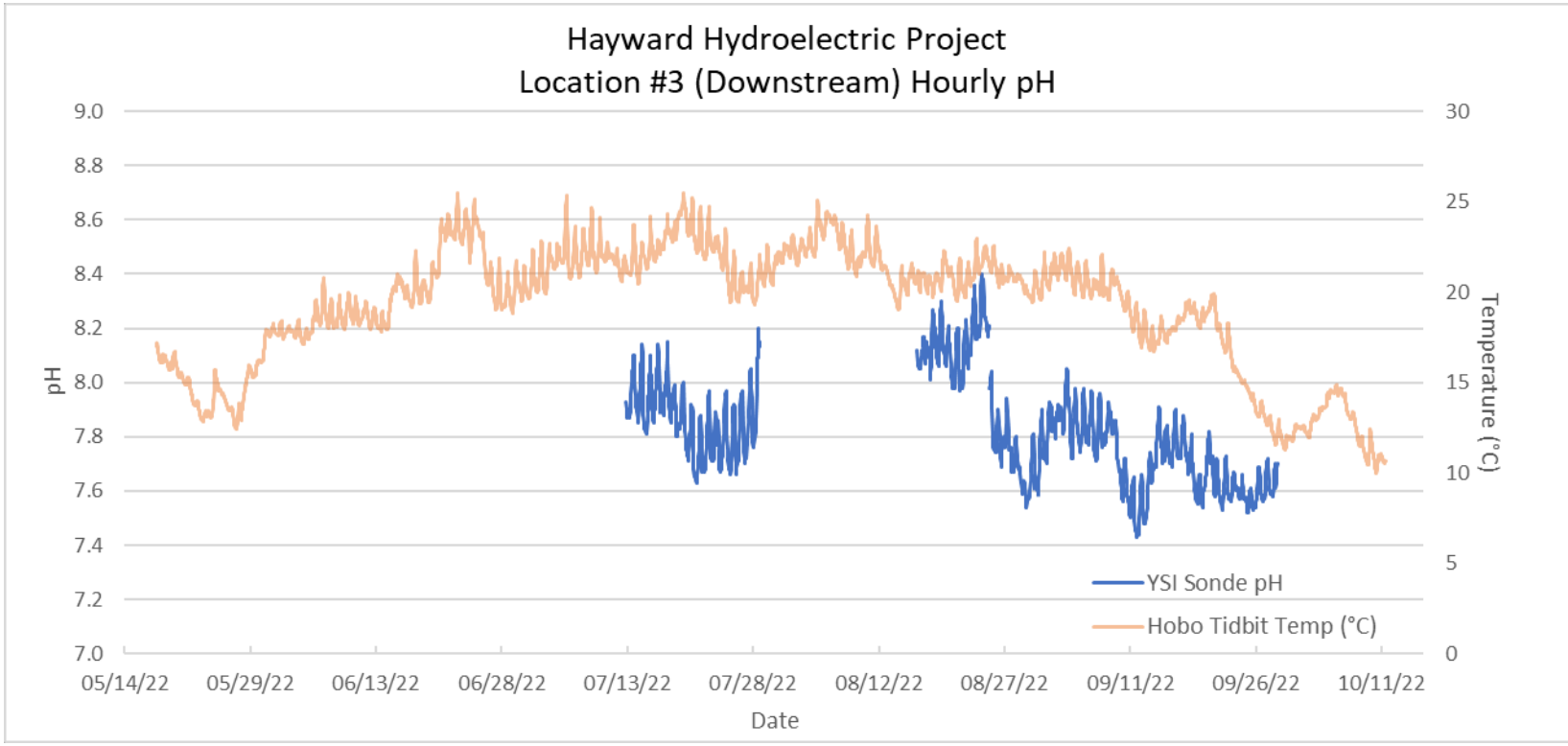
APPENDIX B

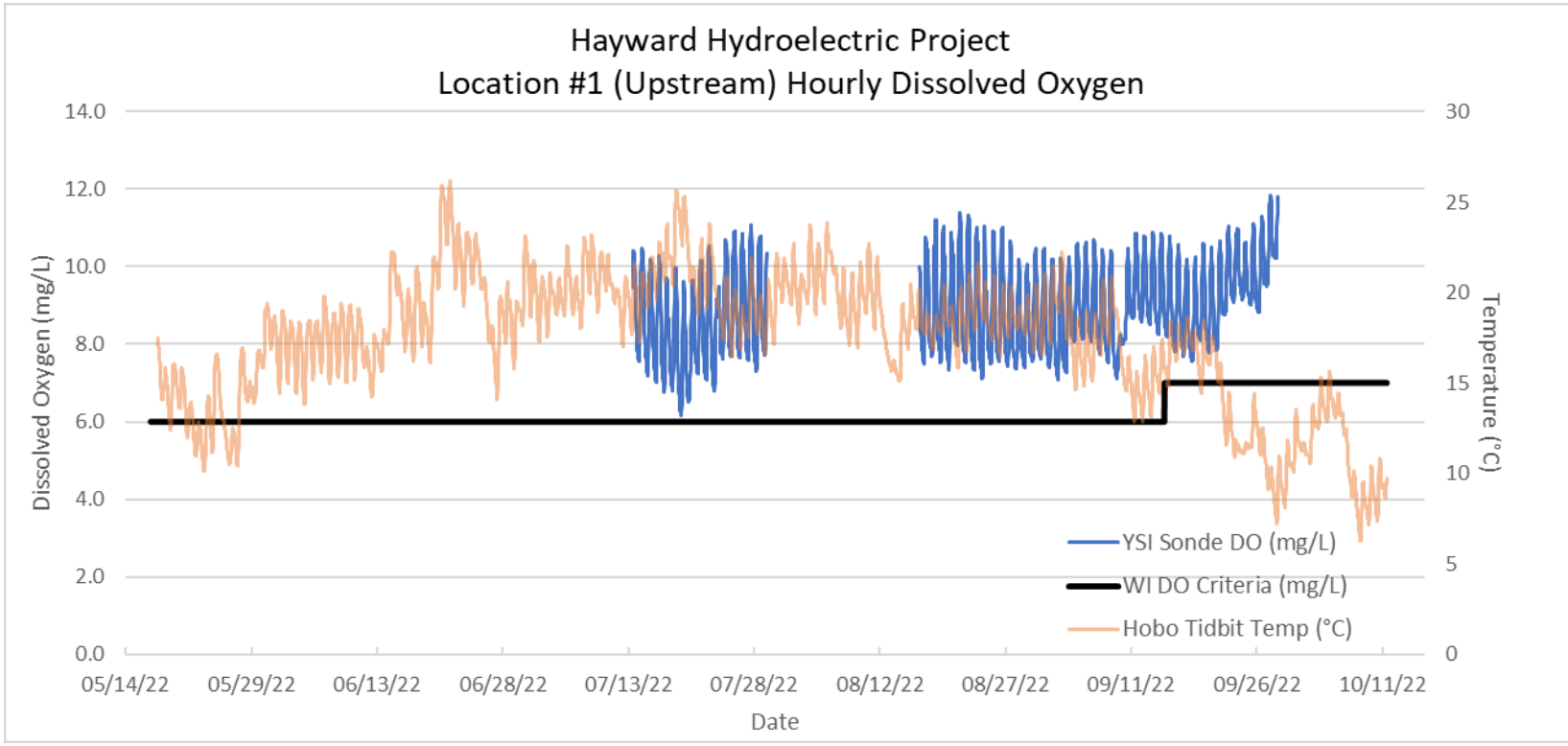
Continuous Temperature, DO, pH and Conductivity Plots

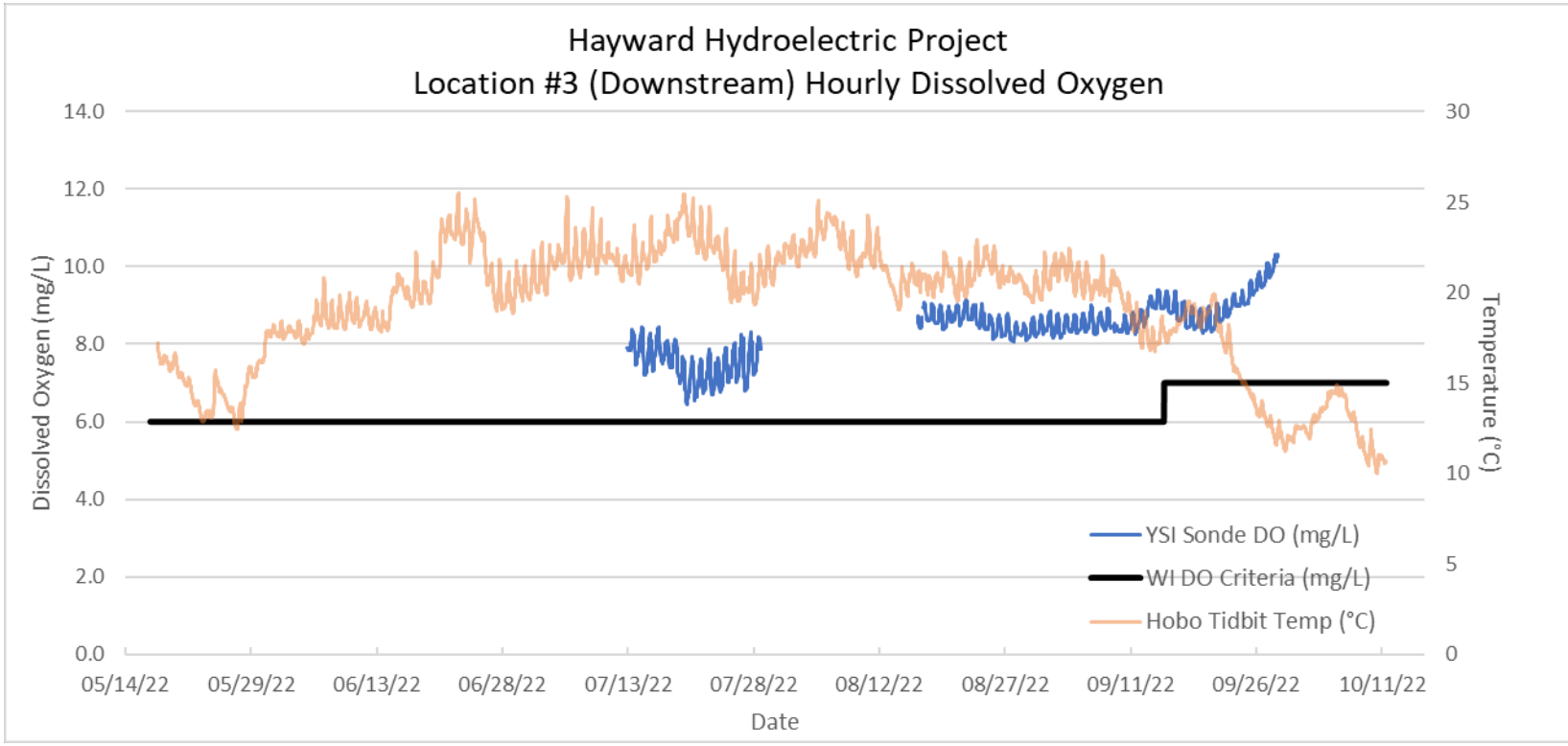

Hayward Hydroelectric Project
Location #1 (Upstream) Hourly Temperature
Temperature (°C)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
05/14/22
05/29/22
06/13/22
06/28/22
07/13/22
07/28/22
08/12/22
08/27/22
09/11/22
09/26/22
10/11/22
Date
Hobo Tidbit Temp (°C)
YSI Sonde Temp (°C)
WI Ta Criteria (°C)

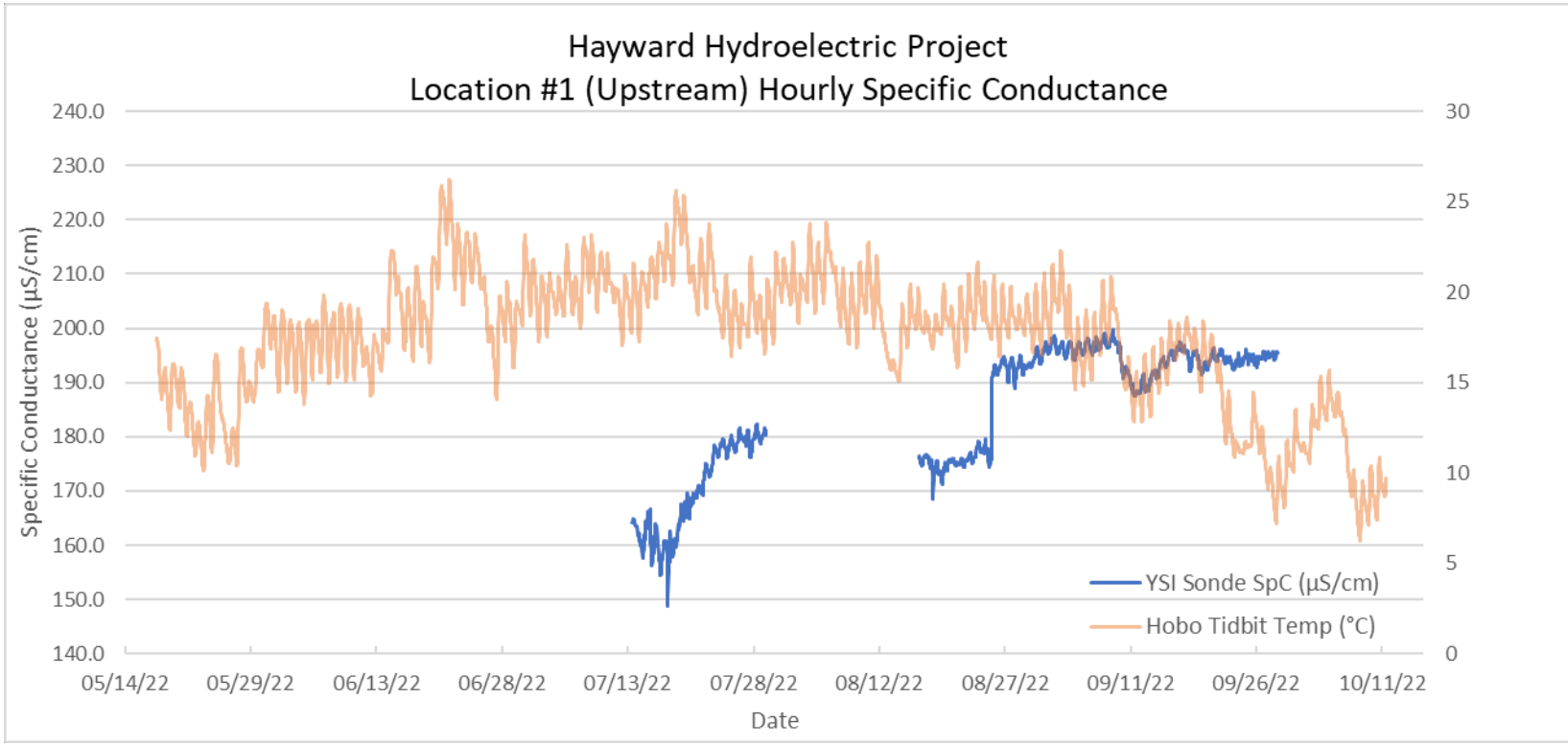

Hayward Hydroelectric Project
Location #3 (Downstream) Hourly Temperature
Temperature (°C)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
05/14/22
05/29/22
06/13/22
06/28/22
07/13/22
07/28/22
08/12/22
08/27/22
09/11/22
09/26/22
10/11/22
Date
Hobo Tidbit Temp (°C)
YSI Sonde Temp (°C)
WI Ta Criteria (°C)

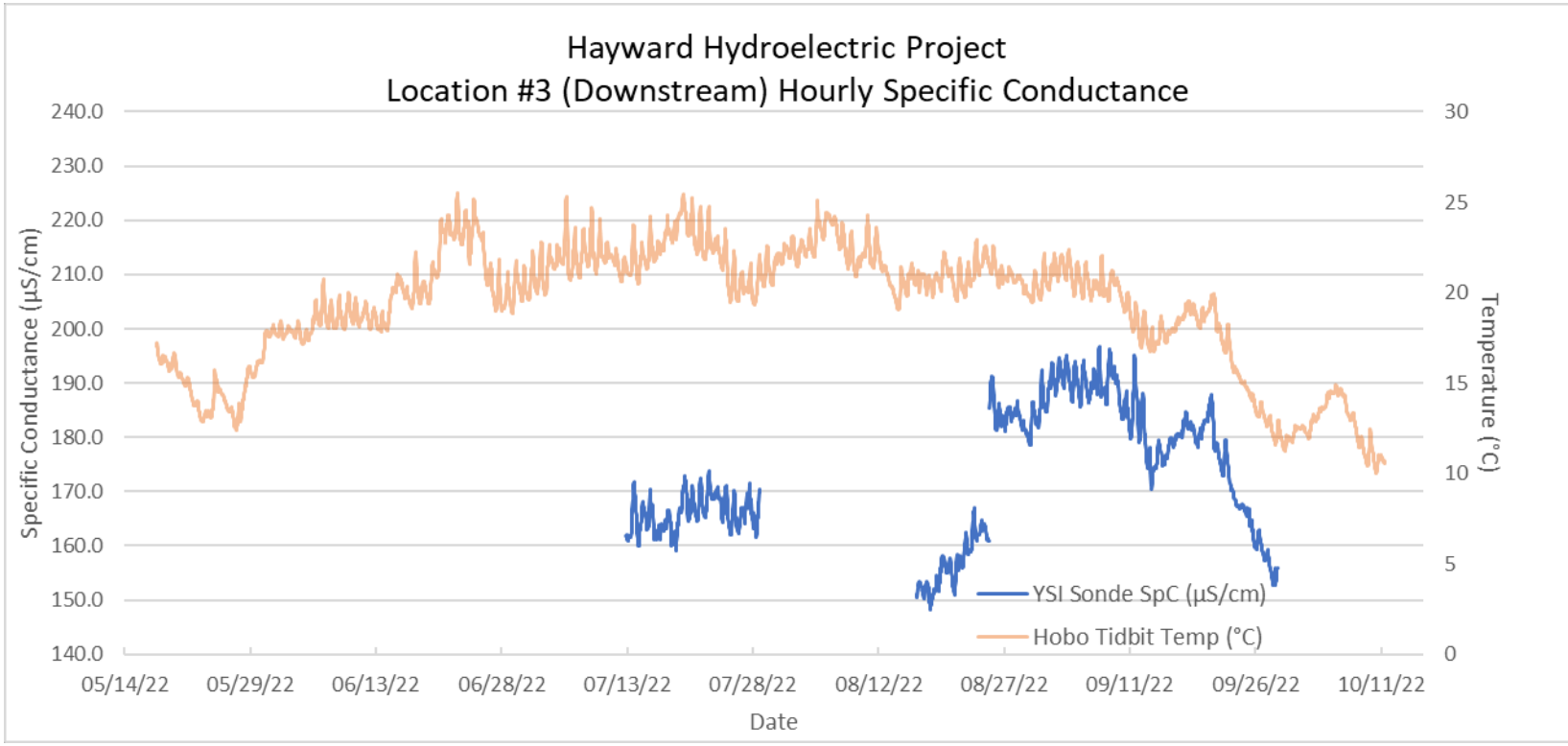

Hayward Hydroelectric Project
Location #1 (Upstream) Hourly pH
9.0
8.8
8.6
8.4
8.2
8.0
7.8
7.6
7.4
7.2
7.0
pH
30
25
20
15
10
5
0
Temperature (°C)
05/14/22
05/29/22
06/13/22
06/28/22
07/13/22
07/28/22
08/12/22
08/27/22
09/11/22
09/26/22
10/11/22
Date
YSI Sonde pH
Hobo Tidbit Temp (°C)

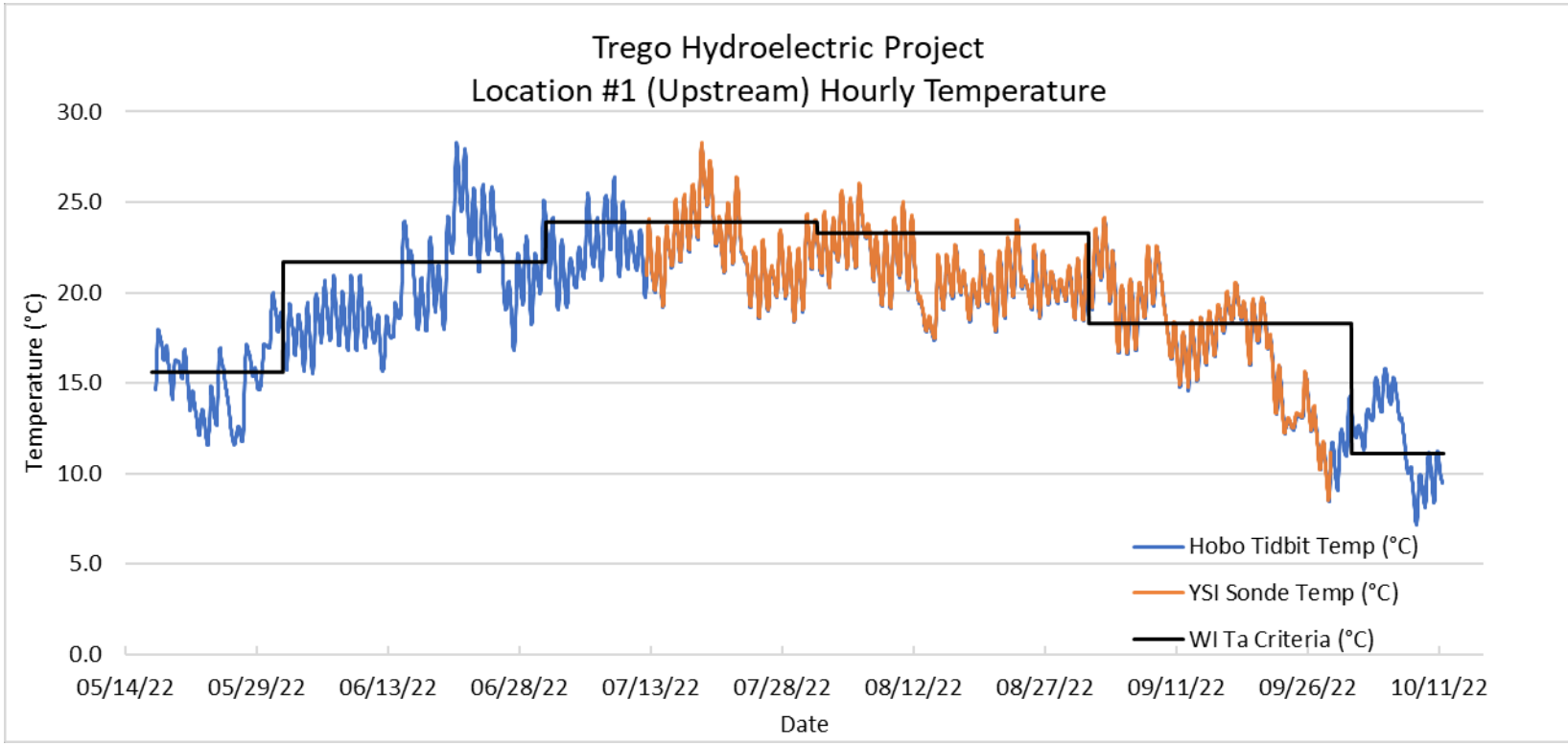

Hayward Hydroelectric Project
Location #3 (Downstream) Hourly pH
9.0
8.8
8.6
8.4
8.2
8.0
7.8
7.6
7.4
7.2
7.0
pH
30
25
20
15
10
5
0
Temperature (°C)
05/14/22
05/29/22
06/13/22
06/28/22
07/13/22
07/28/22
08/12/22
08/27/22
09/11/22
09/26/22
10/11/22
Date
YSI Sonde pH
Hobo Tidbit Temp (°C)

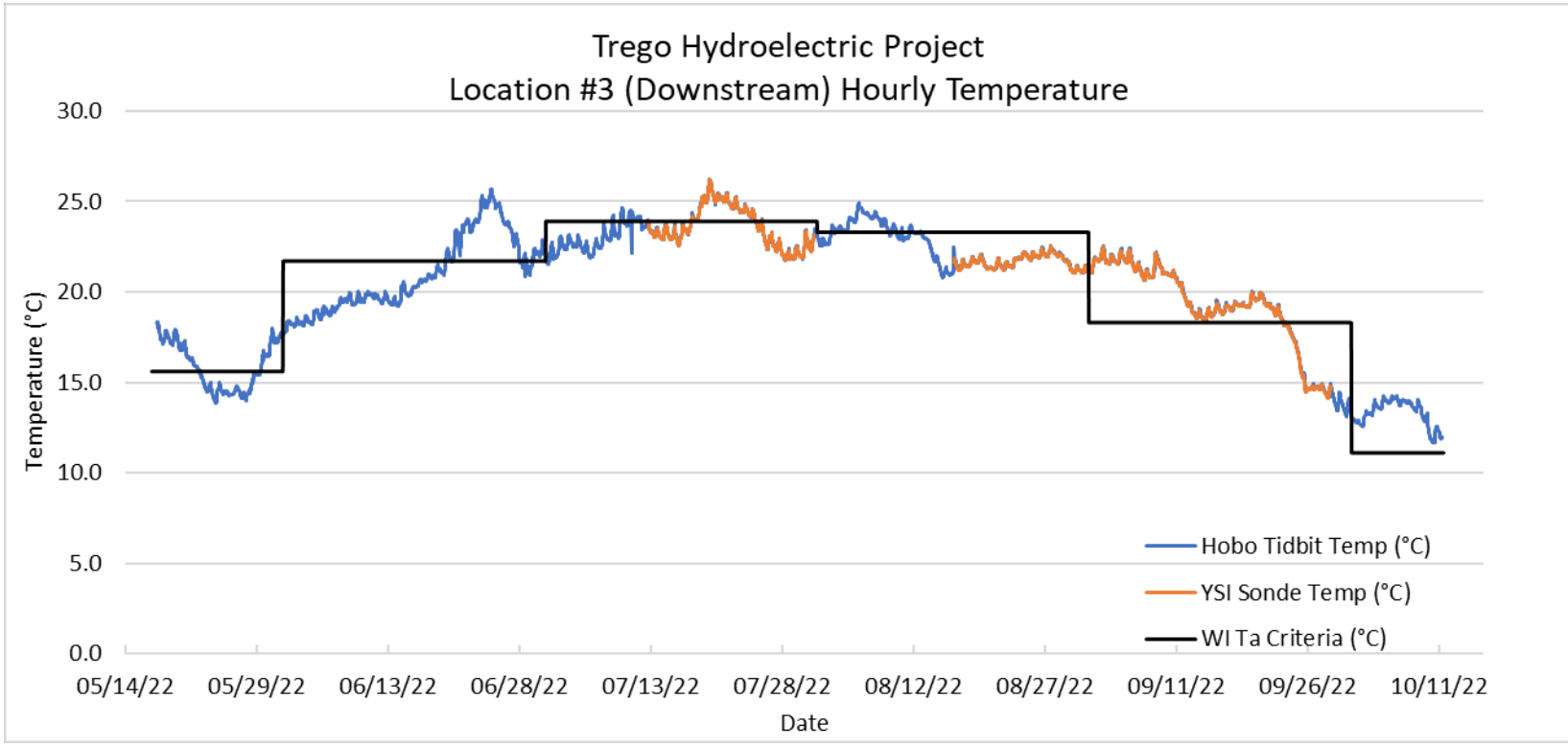

Hayward Hydroelectric Project
Location #1 (Upstream) Hourly Dissolved Oxygen
Dissolved Oxygen (mg/L)
Temperature (°C)
Date
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
30
25
20
15
10
5
0
05/14/22
05/29/22
06/13/22
06/28/22
07/13/22
07/28/22
08/12/22
08/27/22
09/11/22
09/26/22
10/11/22
YSI Sonde DO (mg/L)
WI DO Criteria (mg/L)
Hobo Tidbit Temp (°C)

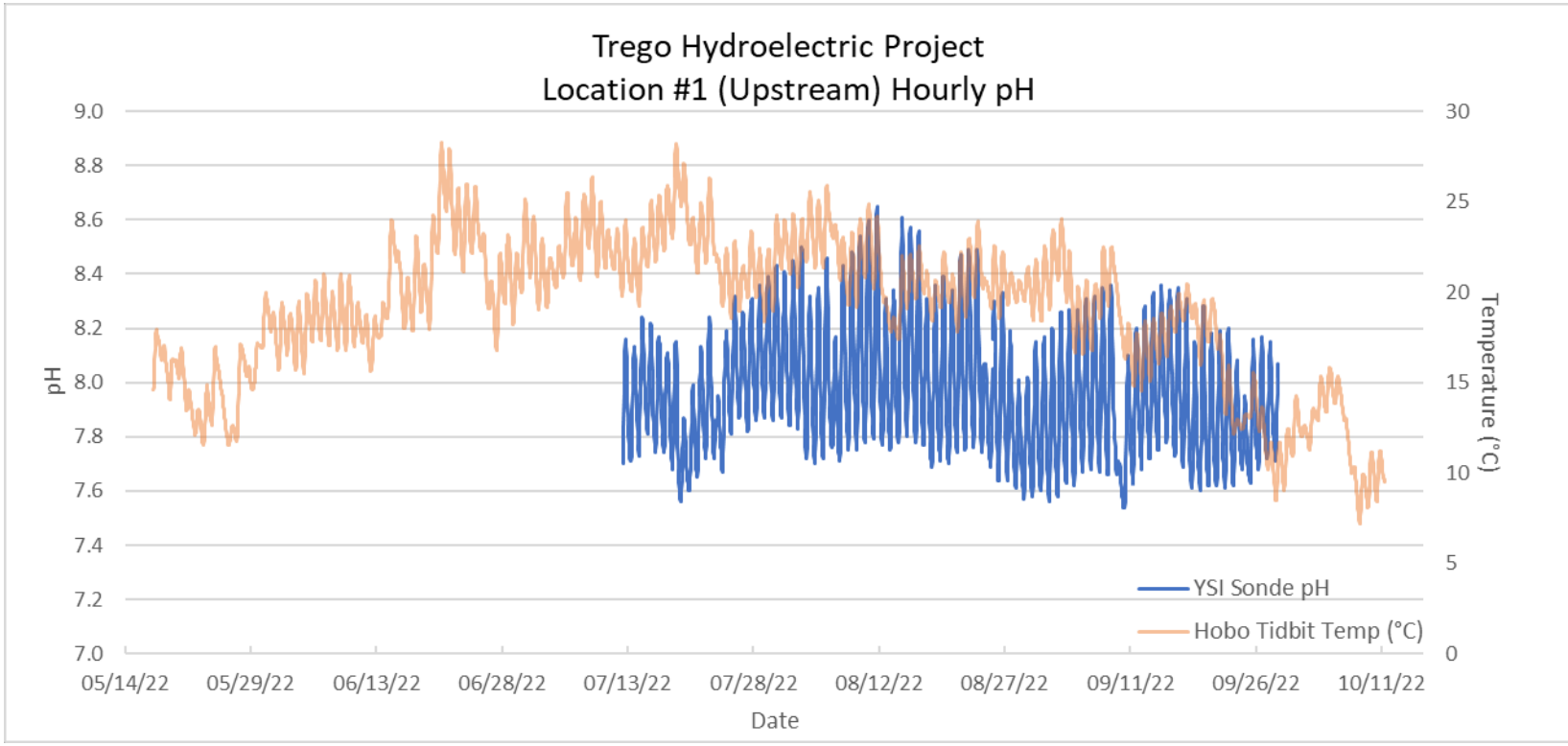

Hayward Hydroelectric Project
Location #3 (Downstream) Hourly Dissolved Oxygen
Dissolved Oxygen (mg/L)
Temperature (°C)
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
30
25
20
15
10
5
0
05/14/22
05/29/22
06/13/22
06/28/22
07/13/22
07/28/22
08/12/22
08/27/22
09/11/22
09/26/22
10/11/22
Date
YSI Sonde DO (mg/L)
WI DO Criteria (mg/L)
Hobo Tidbit Temp (°C)

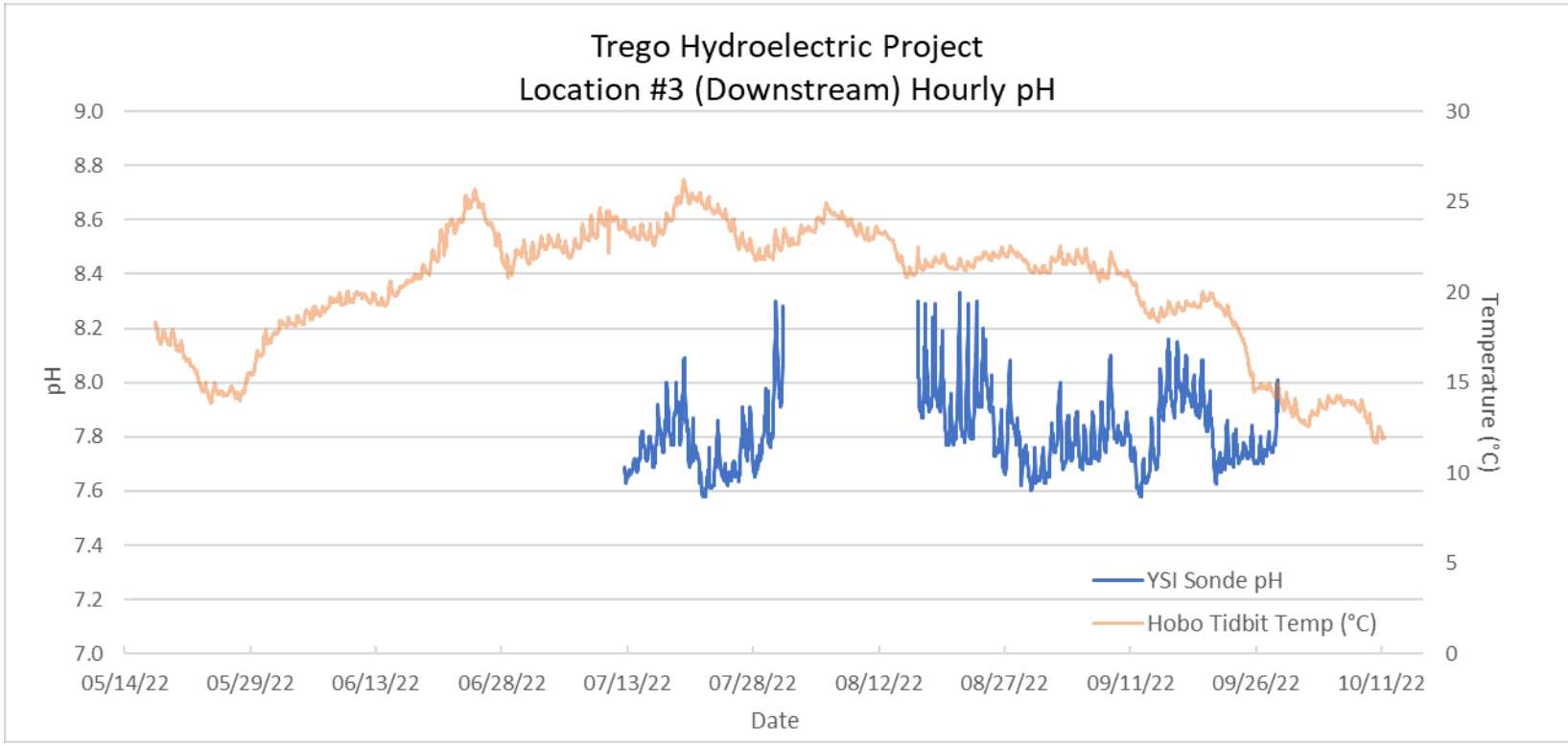

Hayward Hydroelectric Project
Location #1 (Upstream) Hourly Specific Conductance
Specific Conductance (µS/cm)
240.0
230.0
220.0
210.0
200.0
190.0
180.0
170.0
160.0
150.0
140.0
30
25
20
15
10
5
0
05/14/22
05/29/22
06/13/22
06/28/22
07/13/22
07/28/22
08/12/22
08/27/22
09/11/22
09/26/22
10/11/22
Date
YSI Sonde SpC (µS/cm)
Hobo Tidbit Temp (°C)

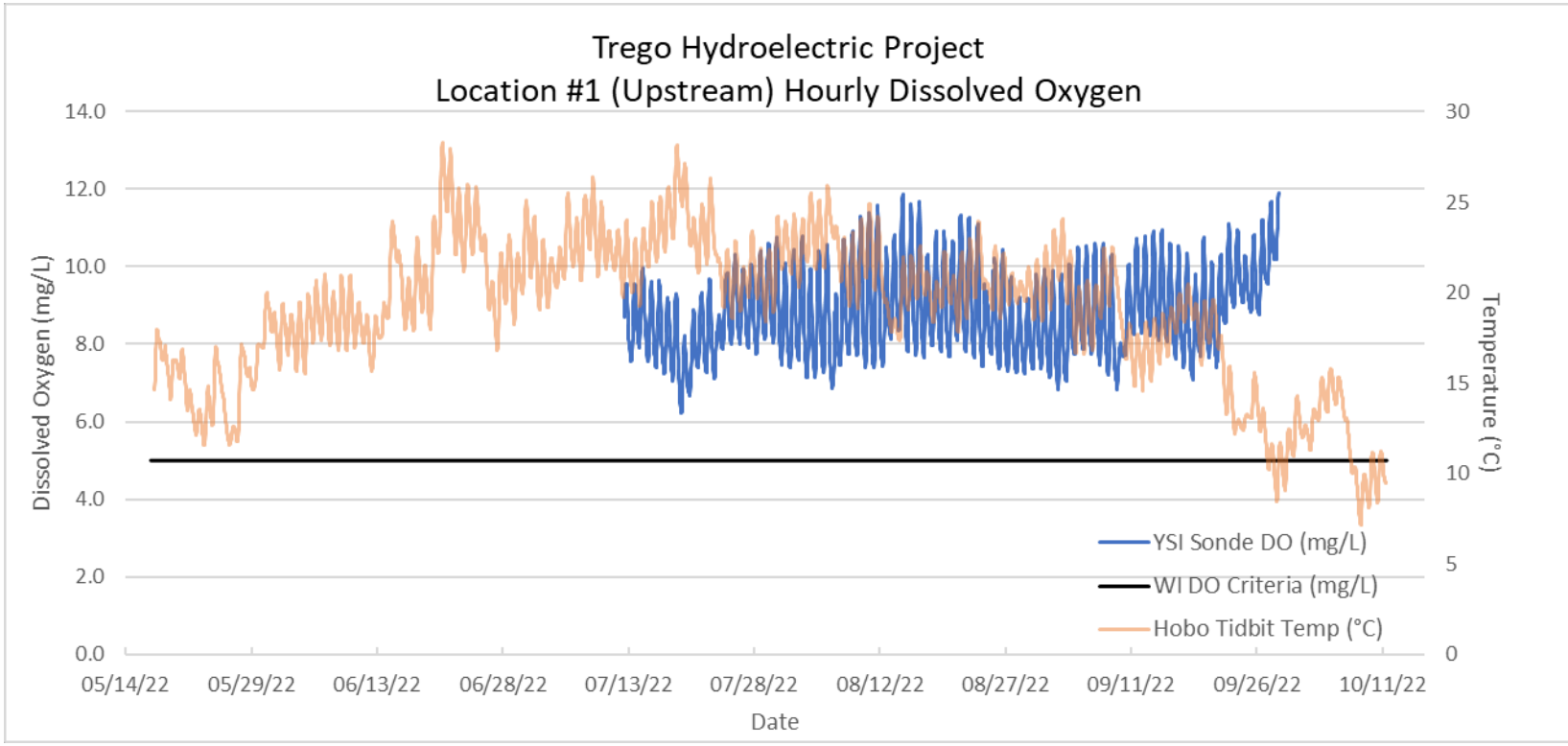

Hayward Hydroelectric Project
Location #3 (Downstream) Hourly Specific Conductance
Specific Conductance (µS/cm)
Temperature (°C)
240.0
230.0
220.0
210.0
200.0
190.0
180.0
170.0
160.0
150.0
140.0
30
25
20
15
10
5
0
05/14/22
05/29/22
06/13/22
06/28/22
07/13/22
07/28/22
08/12/22
08/27/22
09/11/22
09/26/22
10/11/22
Date
YSI Sonde SpC (µS/cm)
Hobo Tidbit Temp (°C)

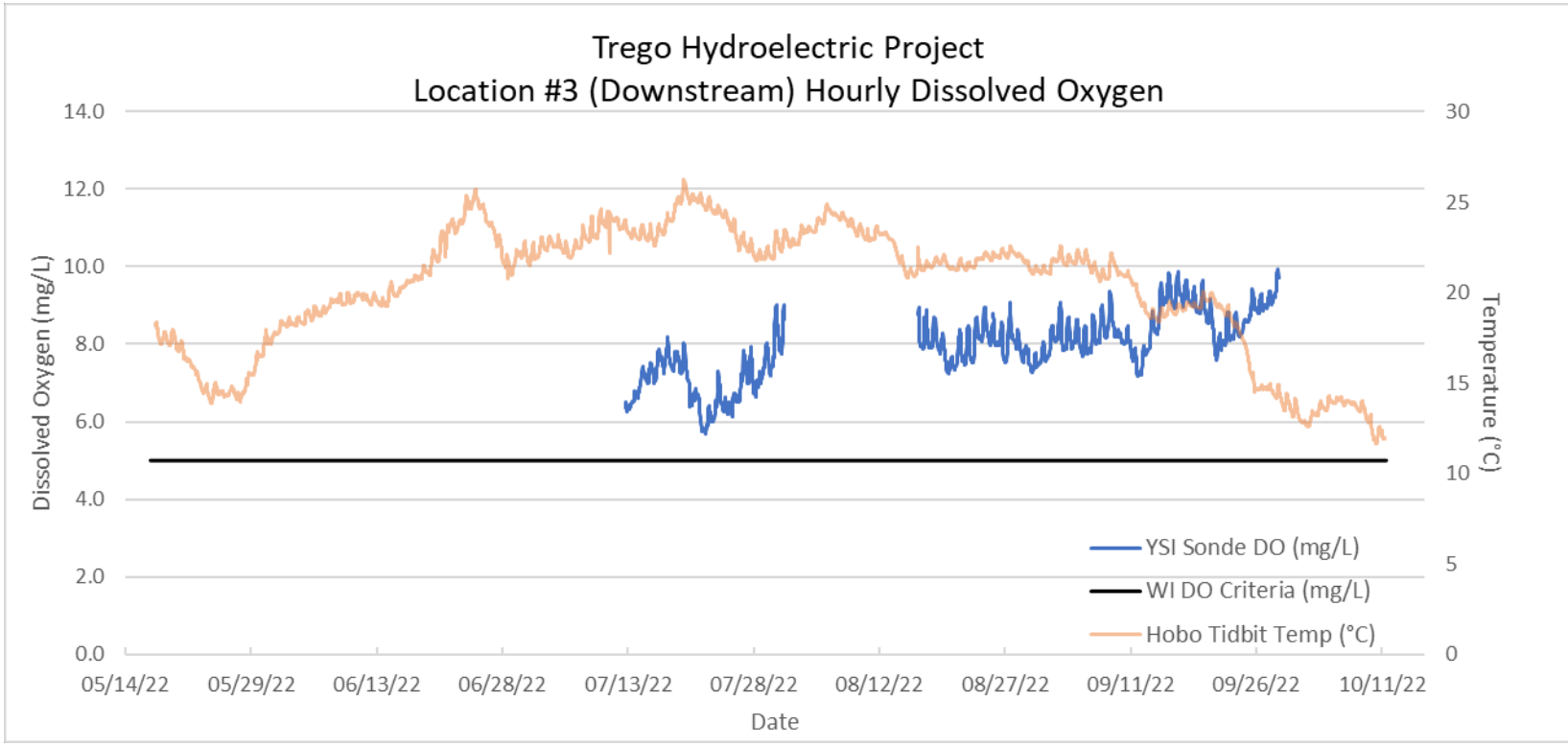

Trego Hydroelectric Project
Location #1 (Upstream) Hourly Temperature
Temperature (°C)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
05/14/22
05/29/22
06/13/22
06/28/22
07/13/22
07/28/22
08/12/22
08/27/22
09/11/22
09/26/22
10/11/22
Date
Hobo Tidbit Temp (°C)
YSI Sonde Temp (°C)
WI Ta Criteria (°C)

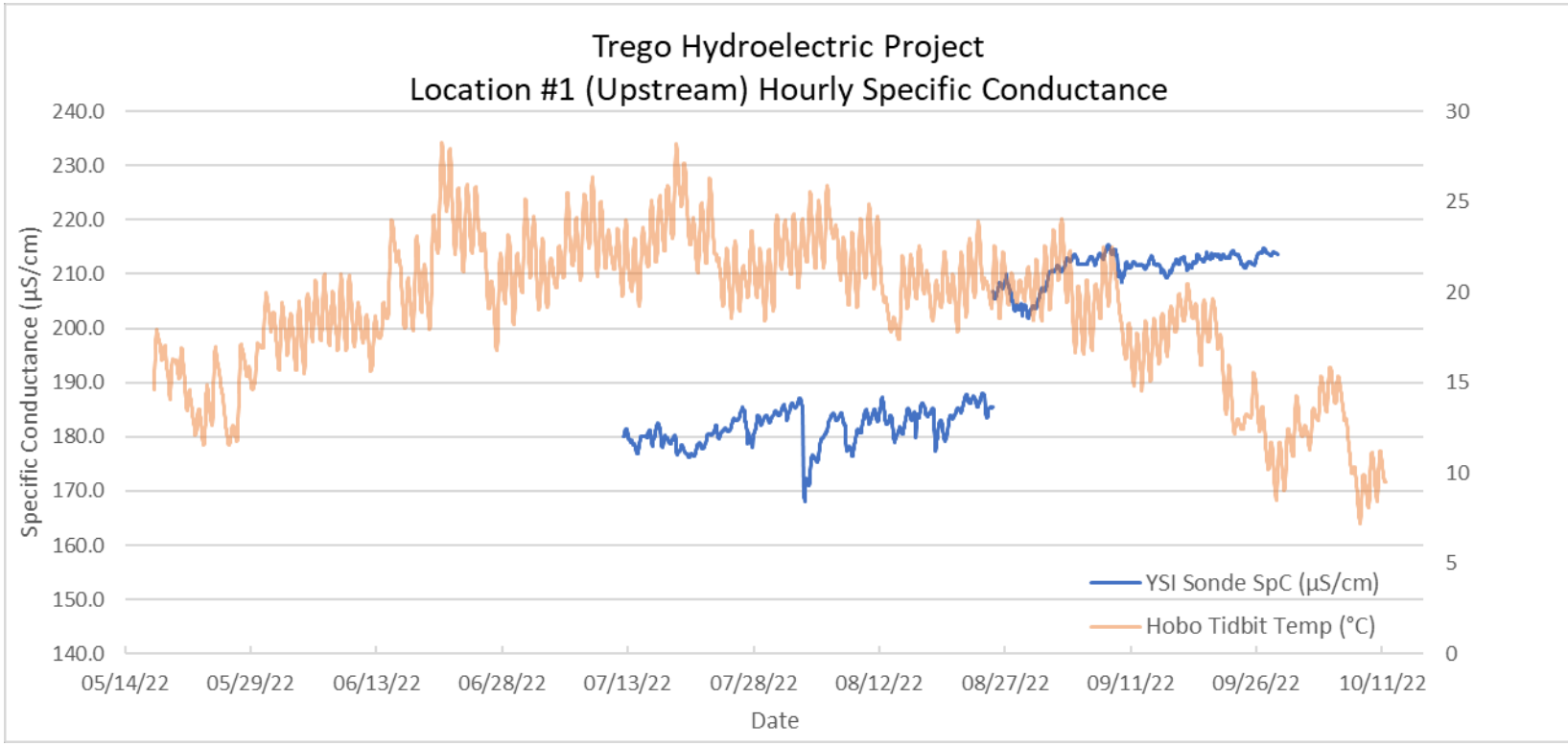

Trego Hydroelectric Project
Location #3 (Downstream) Hourly Temperature
Temperature (°C)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
05/14/22
05/29/22
06/13/22
06/28/22
07/13/22
07/28/22
08/12/22
08/27/22
09/11/22
09/26/22
10/11/22
Date
Hobo Tidbit Temp (°C)
YSI Sonde Temp (°C)
WI Ta Criteria (°C)

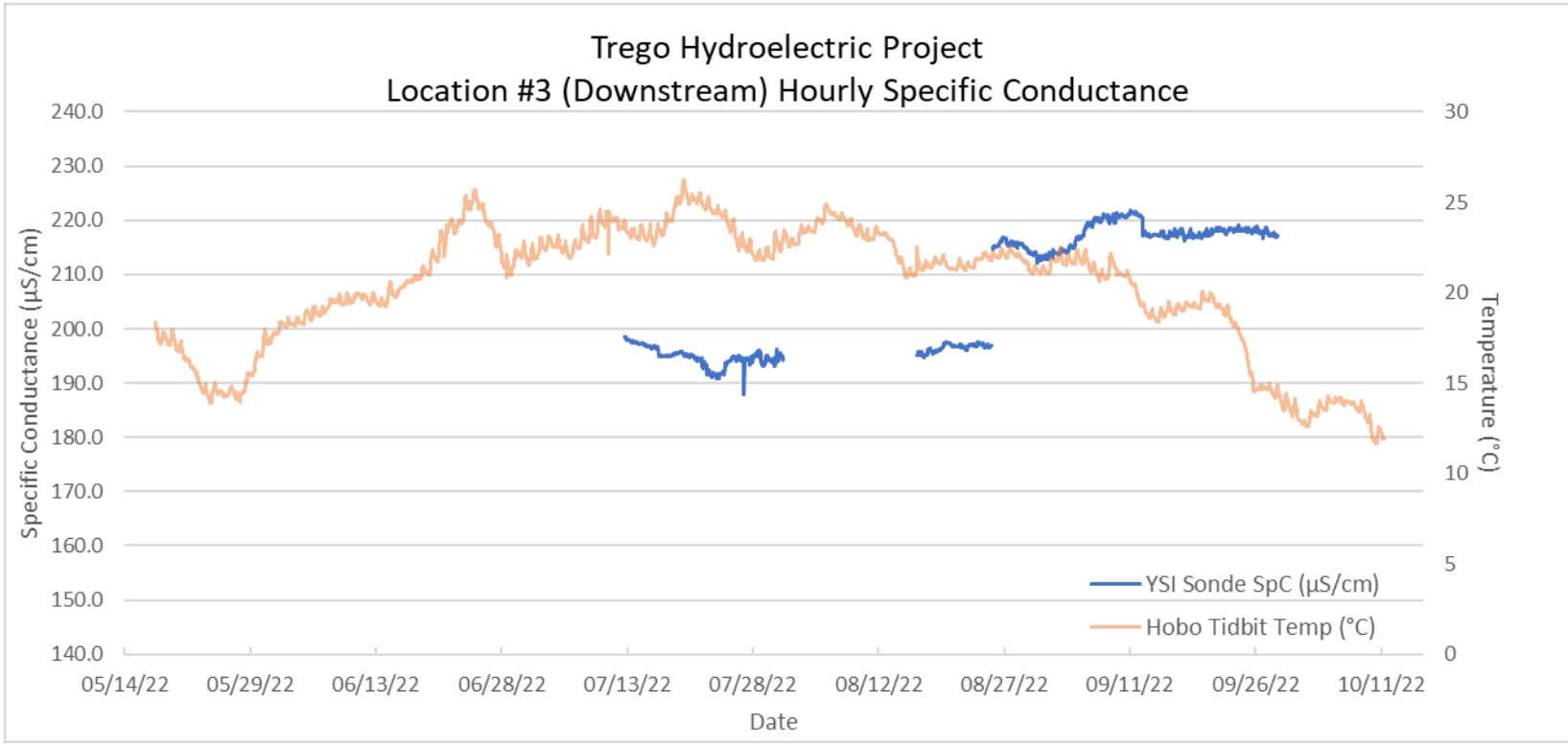

Trego Hydroelectric Project
Location #1 (Upstream) Hourly pH
9.0
8.8
8.6
8.4
8.2
8.0
7.8
7.6
7.4
7.2
7.0
pH
30
25
20
15
10
5
0
Temperature (°C)
05/14/22
05/29/22
06/13/22
06/28/22
07/13/22
07/28/22
08/12/22
08/27/22
09/11/22
09/26/22
10/11/22
Date
YSI Sonde pH
Hobo Tidbit Temp (°C)


Trego Hydroelectric Project
Location #3 (Downstream) Hourly pH
9.0
8.8
8.6
8.4
8.2
8.0
7.8
7.6
7.4
7.2
7.0
pH
30
25
20
15
10
5
0
Temperature (°C)
05/14/22
05/29/22
06/13/22
06/28/22
07/13/22
07/28/22
08/12/22
08/27/22
09/11/22
09/26/22
10/11/22
Date
YSI Sonde pH
Hobo Tidbit Temp (°C)


Trego Hydroelectric Project
Location #1 (Upstream) Hourly Dissolved Oxygen
Dissolved Oxygen (mg/L)
Temperature (°C)
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
30
25
20
15
10
5
0
05/14/22
05/29/22
06/13/22
06/28/22
07/13/22
07/28/22
08/12/22
08/27/22
09/11/22
09/26/22
10/11/22
Date
YSI Sonde DO (mg/L)
WI DO Criteria (mg/L)
Hobo Tidbit Temp (°C)


Trego Hydroelectric Project
Location #3 (Downstream) Hourly Dissolved Oxygen
Dissolved Oxygen (mg/L)
Temperature (°C)
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
30
25
20
15
10
5
0
05/14/22
05/29/22
06/13/22
06/28/22
07/13/22
07/28/22
08/12/22
08/27/22
09/11/22
09/26/22
10/11/22
Date
YSI Sonde DO (mg/L)
WI DO Criteria (mg/L)
Hobo Tidbit Temp (°C)


Trego Hydroelectric Project
Location #1 (Upstream) Hourly Specific Conductance
Specific Conductance (µS/cm)
240.0
230.0
220.0
210.0
200.0
190.0
180.0
170.0
160.0
150.0
140.0
30
25
20
15
10
5
0
05/14/22
05/29/22
06/13/22
06/28/22
07/13/22
07/28/22
08/12/22
08/27/22
09/11/22
09/26/22
10/11/22
Date
YSI Sonde SpC (µS/cm)
Hobo Tidbit Temp (°C)


Trego Hydroelectric Project
Location #3 (Downstream) Hourly Specific Conductance
Specific Conductance (µS/cm)
Temperature (°C)
240.0
230.0
220.0
210.0
200.0
190.0
180.0
170.0
160.0
150.0
140.0
30
25
20
15
10
5
0
05/14/22
05/29/22
06/13/22
06/28/22
07/13/22
07/28/22
08/12/22
08/27/22
09/11/22
09/26/22
10/11/22
Date
YSI Sonde SpC (µS/cm)
Hobo Tidbit Temp (°C)

APPENDIX C

Raw Field Data Including Field Notes and Depth Profile Data (sent as a separate Excel file)

APPENDIX D

Analytical Data Including Laboratory Analysis Results (sent as a separate Excel file)

WOOD & BLANDING'S TURTLE STUDY REPORT

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Lake Hayward and Trego Lake Wood and Blanding's Turtle Nesting Habitat Study Report

Northern States Power Company
Hayward and Trego Hydroelectric Projects

GAI Project Number: R220323.02
| FERC Nos. 2417 and 2711
January 2023

Prepared by:
GAI Consultants, Inc.
3313 S Packerland Drive, Suite E
De Pere, Wisconsin 54115

Prepared on behalf of:
Mead & Hunt
1702 Lawrence Drive
De Pere, Wisconsin 54115

Lake Hayward and Trego Lake Wood and Blanding's Turtle Nesting Habitat Study Report

Northern States Power Company
Hayward Hydroelectric Project (FERC Project No. 2417)
Trego Hydroelectric Project (FERC Project No. 2711)

GAI Project Number: R220323.02
FERC #s: 2417, 2711

January 2023

Prepared for:
Mead & Hunt
1702 Lawrence Drive
De Pere, WI 54115

Prepared by:
GAI Consultants, Inc.
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Report Authors:

Laura Sass
Senior Project Environmental Specialist

Mary Rohde
Senior Environmental Manager / Associate

Table of Contents

1.0 Project Overview

The Hayward and Trego Hydroelectric Projects (Project or Projects) are located in the Town of Hayward, Sawyer County, Wisconsin and the Town of Trego, Washburn County, Wisconsin, respectively (Figures 1 and 2). The Projects are owned, operated, and maintained by Northern States Power Company, a Wisconsin corporation (Licensee) and operate under the authority of the Federal Energy Regulatory Commission (FERC). The current FERC license for both Hayward and Trego expire on November 30, 2025. As part of the relicensing process, the Wisconsin Department of Natural Resources (WDNR) requested the Licensee complete a wood and Blanding's turtle nesting habitat study to identify areas with suitable nesting habitat within the existing and proposed Project boundaries. On behalf of Mead & Hunt, GAI is pleased to submit the results of a Wood and Blanding's Turtle Nesting Habitat Study (Study or Studies) conducted June 6-8, 2022, to fulfill this request. This Study report provides baseline data on available suitable nesting habitat in the following areas for both Projects:

- Reservoir shorelines upstream (surveyed by boat) and downstream (surveyed on foot) of the Hayward and Trego dams,
- Upland shoreline owned by the Licensee and open to the public (Figure 3; surveyed on foot), and
- Upland areas within 200 feet of the river's edge for wood turtles and at least 984 feet for Blanding's turtles (surveyed on foot where feasible, and via remote desktop where access was not appropriate (i.e., private lands not owned by Licensee).

2.0 Introduction

Lake Hayward is a 191-acre impoundment located in the middle of the Namekagon River Watershed which is primarily forest and wetland. It is considered an outstanding/exceptional resource water under NR102 under the WDNR Fisheries Program. The city of Hayward, and in effect the lake's namesake, came from the last name of its founder who realized the potential of this area of the Namekagon River as a mill pond for timber storage. Dams were first constructed in 1882 for this purpose, a year after the railroad was constructed in this area. The large wood posts from the old railway that transported the lumber are still present in the lake today, now fulfilling a purpose as fish habitat.

Trego Lake is a 383-acre impoundment, also located in the middle of the Namekagon River Watershed and is considered an outstanding/exceptional resource water under NR102. As with most communities in the area, the Town of Trego was created in part by the railroads and a need for logging in the 1800s. The area is now popular for recreational activities. Trego Lake is managed for power generation, fishing, and swimming but is currently considered impaired due to excess algal growth per the WDNR Surface Water Data Viewer. Since 1989, the Trego Lake District has been working to improve the lake and water quality.

Both lakes are located on the mainstem of the Namekagon River, placing them within the St. Croix National Scenic Riverway.

The wood turtle (G*lyptemys insculpta*) is a state threatened species known to be present within the boundaries of both Projects. Wood turtles prefer flowing rivers and streams with adjacent wetlands and upland deciduous forests. The turtle is unique in that it is more terrestrial than many other turtles of Wisconsin, preferring to forage in open wet meadows and shrub-carr habitats. They overwinter in river areas that are protected from freezing solid such as deep holes and undercut banks. After emerging in the spring, these turtles will forage up to 300 meters (984 feet) from their waterbody. Wood turtles will build nests from late May to early July within 61 meters (200 feet) from water's edge, in open gravel or sandy areas. The young hatch the same summer and do not overwinter in the nest as some Wisconsin turtle species (WDNR 2015).

The Blanding's turtle (*Emydoidea blandingii*) is a Wisconsin special concern species that is also known to be present near both Projects. Blanding's turtles are most commonly found in shallow, slow-moving waters that have plentiful vegetation. Marshes that are adjacent to rivers provide ideal habitat. During the active season, adults prefer shallow water, and for overwintering, they prefer deeper water, up to 3 feet. Blanding's turtles are only be found in uplands when moving between wetlands, nesting, or moving to overwintering sites. Adults will travel up to several miles during the active season when foraging. Nesting occurs from mid-late May through early July and hatchlings emerge from early August through mid-October. Hatchlings do not typically overwinter in nests. Blanding's turtles have the slowest maturation of any turtle in the state, reaching sexual maturity between 17-20 years of age (WDNR 2017).

While wood turtles and Blanding's turtles are known to be present within or near both Project boundaries, and known suitable habitat is present for both species in the vicinity of both Projects, survey data is limited. As part of the relicensing process, the WDNR requested a wood and Blanding's turtle study to further the knowledge of turtle distribution within the watershed. This Study identifies areas of suitable wood turtle nesting habitat within 200 feet of the shoreline of Lake Hayward and Trego Lake and within 984 feet of the shoreline for Blanding's turtles. Surveys for presence/absence of basking and nesting wood turtles along the shoreline were conducted concurrently with the mapping efforts. This report summarizes the results of the 2022 Wood Turtle and Blanding's Turtle Nesting Habitat Study.

3.0 Methodology

Prior to performing the field work, GAI mapped 200-foot and 984-foot buffers of the shorelines within the Projects' areas (Figures 4 and 5). Topography maps and parcel ownership were then reviewed for terrestrial access feasibility. A portion of the buffer of the Hayward Project is predominantly urban-residential, defined by the WDNR as ground cover that consists of impermeable surfaces, landscaped areas, and manicured lawns having consistent grass coverage with height less than 6 inches between mowing. This landcover type is not considered suitable habitat for nesting turtles, and therefore was not surveyed (Figure 6).

Shorelines within the existing and proposed boundaries of each Project were surveyed for the presence of wood and Blanding's turtle nesting habitat. The reservoirs' shorelines were surveyed by boat, moving slowly, parallel to the shore and using binoculars to provide a good view into the riparian and upland areas (Figures 6 and 7). The bypassed reach at Hayward and the Namekagon River downstream of the Trego dam were surveyed on foot, as were the areas accessible to the public (Figure 3). Roads within the nesting buffers were driven to identify suitable nesting habitat in upland areas such as road shoulders, roads, driveways, and on private property that could be seen from the road.

Suitable turtle nesting habitat was mapped using a Trimble R1 GNSS Receiver with a GPS device. Any additional areas (i.e., those areas which could not be viewed from a publicly accessible vantage point) were assessed via desktop using the information gained from the road and boat surveys to approximate the extent of suitable nesting habitat as completely as possible. Surveys took place at Trego on June 6 and 8, and at Hayward on June 6 and 7, 2022 when air temperatures were between 50 - 80 degrees Fahrenheit (° F). High temperatures ranged from 69° F to 77° F. Suitable nesting habitat included a sand or gravel substrate that was either unvegetated or sparsely vegetated, received sun exposure for most of the day during late spring or summer, and was within 984 feet of the river's edge.

In addition to mapping the nesting habitat, the presence and species of any basking turtles was recorded as was any observed evidence of turtle nesting activity within the survey area. Visual encounter surveys (VES) for presence/absence of basking and nesting wood and Blanding's turtles on shorelines and along roadways were conducted concurrently, approximating WDNR survey guidelines

(WDNR PUB-ER-684, WDNR PUB-ER-683). Shoreline VES were completed by motoring around the perimeter of each lake by boat.

Licensee-owned property open to the public within 984 feet of the water was meandered on foot (Figure 3). Within these areas, two surveyors walked abreast approximately 10-15 meters apart along the shoreline, adjusting the intervals to accommodate for topography and vegetation restrictions. Roads within the nesting buffers were driven to look for turtles on road shoulders, roads, driveways, and on private property that could be seen from the road. Because the wood and Blanding's turtles are known to be present within the vicinity of both Projects, and it was assumed that the species are also present within the Project boundaries, the surveys to identify nesting and basking wood and Blanding's turtles were conducted only once, concurrent with the nesting habitat surveys.

4.0 Results and Discussion

During the visual encounter surveys, no wood or Blanding's turtles were observed at either the Hayward or Trego Projects. Basking painted turtles were observed at Hayward and were restricted to the eastern half of the lake, which contains substantially more natural shoreline and basking areas. Many painted turtles (*Chrysemys picta*), softshell turtles (*Apalone* spp.) and snapping turtles (*Chelydra serpentina)* were observed in the Trego Project area. The Trego Project had a higher number of turtles observed than the Hayward Project. On one log alone, 17 painted turtles and 1 snapping turtle were observed. Turtles were present throughout the lake and basking logs along the shoreline of Trego Lake were plentiful. Fewer logs and turtles were observed upstream where the project is more riverine. Observed species consisted primarily of painted turtles; however snapping and softshell turtles were also seen in more than one location. Photographs of turtle nesting habitat around Hayward and Trego Lakes can be found in Attachment A.

4.1 Hayward Project

A total of 1,529,800 square feet (35.12 acres) of turtle nesting habitat was mapped within 984 feet of Lake Hayward and therefore suitable for Blanding's turtle nesting; 278,653 square feet (6.40 acres) of this nesting habitat was within 200 feet of the shore and therefore suitable for wood turtle nesting (Figure 6). The majority of nesting habitat mapped consisted of gravel roads, road shoulders, driveways, and parking lots. Lake Hayward has a heavily developed shoreline and minimal suitable nesting habitat is present. Shoreline residential areas were generally dominated by manicured lawns and devoid of basking logs in the water; only a few residential property shorelines had small sandy areas that could be suitable for turtle nesting.

Wood and Blanding's turtles have been previously documented in the river below the Hayward Dam. This area presents high quality habitat for both turtles, providing flowing water, varied in-stream habitat, natural shorelines, and forage areas, yet suitable nesting area is relatively low in the more natural areas. The shoreline below the dam is mostly thick vegetation and alder thicket. The downstream shoreline also had an area of steep sloped bank, a creek, and an area having standing water. This type of habitat provides basking and forage habitat for both species.

While wood and Blanding's turtles are likely using the river where they have been documented below the Hayward Dam, and possibly the riverine area upstream of the impoundment (currently undocumented), it is less likely that they are using the lake proper. Shoreline development around the lake, lack of flow and shallow water, and lack of basking areas make Lake Hayward undesirable for both species. It is possible, however, that the turtles are using the lake to overwinter.

Aside from roads, driveways, and parking areas, only two very small natural areas were mapped below the dam as potential nesting habitat. High levels of open sandy/gravel areas associated with human transportation may increase human induced mortality, however, a

recent study has suggested that anthropogenic perturbation of this sort may actually increase turtle nesting success (Murphy et al. 2022).

4.2 Trego Project

A total of 1,190,355 square feet (27.33 acres) of turtle nesting habitat was mapped within 984 feet of the Project area shoreline and therefore suitable for Blanding's turtle nesting. Suitable wood turtle nesting habitat within 200 ft of the shoreline comprised approximately 210,344 square feet or 4.83 acres (Figure 7). As with the Hayward Project, most of the suitable nesting habitat mapped within the Trego Project boundary buffers were areas of human disturbance, including roads, roadsides, driveways, parking lots, and single-track off-road routes. However, overall residential development along the shoreline and throughout the buffers was much lower. Several natural sandy areas along the shoreline provided suitable nesting habitat as well as one beach area where basking softshell turtles were observed on multiple occasions.

Overall, high quality and varied habitat is present for turtles throughout the Project buffer, and it is likely that wood and Blanding's turtles are selectively using the adjacent riverine and wetland habitats. Wood turtles have been previously documented in the river below the dam, above the impoundment, and in Mackay Creek. Blanding's turtles have been reported within a mile of the Project, but not within the Namekagon River in this area. The Namekagon River presents high quality habitat for both turtle species, providing flowing water, varied in-stream habitat, natural shorelines, adjacent upland and wetland forage areas, and overwintering habitat. Mackay Creek flowing into the Project area also provides good flow, clear water, and varied natural habitat. This area is bordered by heathy wild rice beds and emergent marsh plants. It is likely that both turtle species are using the river and creek in the Project boundary, and likely to a lesser extent the lake. The lake is deeper than either turtle prefers, and flow velocity in the lake is low. Due to the ample prime habitat in adjacent areas, it is expected that the areas of deep water and low flow are not being selected by these turtles. It is possible that the turtles are using the lake to overwinter, but the adjacent riverine habitats also provide suitable overwintering areas.

5.0 Conclusion

No nesting wood or Blanding's turtles were observed, and no wood or Blanding's turtle nests were found during this survey. While the surveyors on this project did not document nesting turtles or turtle nests of any species, it is likely that nesting success is occurring, an assumption made based on the availability of open sandy/gravel areas that are associated with no or very low human transportation. The lack of observance is likely reflective of the time of day and the short period of time surveys were conducted. Turtles are generally more active in the early mornings and late evenings and possibly after storm events.

Recent research suggests the tradeoff between human induced turtle mortality along roads may be offset by the decrease of predation of nests in these areas (Murphy et al. 2022). Natural landscape in the area was historically wooded with few areas of exposed sandy/gravely substrate suitable for nesting. When suitable nesting areas are limited, many turtles nest in the same area, and predators can easily find the aggregate nests. As anthropogenic development increases, areas of exposed sand and gravel, turtles are able to spread out their nests. Additionally, predation was found to be lower on nests occurring along a road in a linear fashion.

Nest site fidelity and other nesting ecological traits may put the wood turtle at risk (Walde et al. 2007). Female wood turtles have been found to have high nesting site fidelity. In addition, they may stage in an area for several days before completing a nest. Staging, nest-site fidelity, and a relatively short nesting season make them vulnerable to anthropogenic disturbances.

Comparatively, fewer turtles were observed at Hayward than Trego. A lack of basking logs was observed in Hayward compared to Trego. Turtle density has been correlated with the availability of

basking areas and lack of basking logs may have a detrimental effect on turtle densities (Lindeman 1999).

Overall, habitat for both wood and Blanding's turtles was observed to be present and of high quality in both locations. More undeveloped area was present within the Trego Project than the Hayward Project; Hayward having a great amount of anthropogenic development in the 984-foot buffer of that Project. Both Blanding's and wood turtles have been documented within or in the vicinity of each Project boundary, and while ample suitable habitat was mapped in each area, most of it was the result of roads and parking lots. Presence of naturally occurring suitable nesting habitat was low within both Project boundaries; Trego having more than Hayward.

6.0 References

Lindeman, Peter V. 1999. Surveys of basking map turtles *Graptemys* spp. in three river drainages and the importance of deadwood abundance. Biological Conservation 88: 33-42.

Murphy, Rowan E., Amanda E. Martin, and Lenore Fahrig. 2022. Reduced Predation on Roadside Nests Can Compensate for Road Mortality in Road-Adjacent Turtle Populations." Ecosphere13(2): e3946. https://doi.org/10.1002/ecs2.3946.

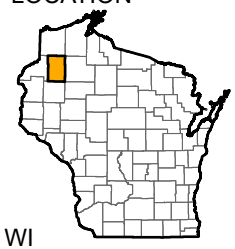
Walde, Andrew D., J.R. Bider, D. Masse, R.A. Saumure, and R.D. Titman. 2007. Nesting ecology and hatching success of the wood turtle, G*lyptemys insculpta*, in Québec. Herpetological Conservation and Biology 2(1):49-60

Wisconsin Department of Natural Resources. 2015. Wood Turtle (*Glyptemys insculpta*) Species Guidance. Bureau of Natural Heritage Conservation, Wisconsin Department of Natural Resources, Madison, Wisconsin. PUB-ER-684.

Wisconsin Department of Natural Resources. 2017. Blanding's Turtle (*Emydoidea blandingii*) Species Guidance. Bureau of Natural Heritage Conservation, Wisconsin Department of Natural Resources, Madison, Wisconsin. PUB-ER-683.

FIGURE 1
Hayward Hydroelectric Project Location Map

PROJECT LOCATION



SAWYER COUNTY, WI

REFERENCE: ESRI USA TOPO Maps
100k Quadrangles: Spooner (1982) and Solon Springs (1981),
Accessed 8/30/2022. WDNR Counties, 2011.
WISLR Community Boundary 2021.

LEGEND

- Shoreline within Project Area
- Community Boundary
- County Boundary

0 4,000 8,000 16,000 Feet

FIGURE 1
HAYWARD HYDROELECTRIC PROJECT LOCATION MAP

HAYWARD WOOD AND BLANDING'S TURTLE NESTING HABITAT STUDY

gai consultants | Mead & Hunt

DRAWN BY: EMW | DATE: 8/30/2022
CHECKED: TDB | APPROVED: LLS

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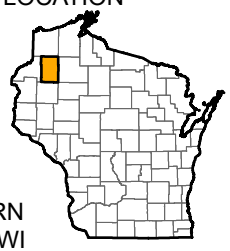
FIGURE 2
Trego Hydroelectric Project Location Map

PROJECT LOCATION



WASHBURN COUNTY, WI

REFERENCE: ESRI USA TOPO Maps
100k Quadrangles: Spooner (1982) and Solon Springs (1981),
Accessed 8/30/2022. WDNR Counties, 2011.
WISLR Community Boundary 2021.

LEGEND

- Shoreline within Project Area
- County Boundary
- Community Boundary

0 4,000 8,000 16,000 Feet

FIGURE 1
TREGO HYDROELECTRIC PROJECT LOCATION MAP

TREGO WOOD AND BLANDING'S TURTLE NESTING HABITAT STUDY

gai consultants

Mead & Hunt

DRAWN BY: EMW DATE: 8/30/2022
CHECKED: TDB APPROVED: LLS

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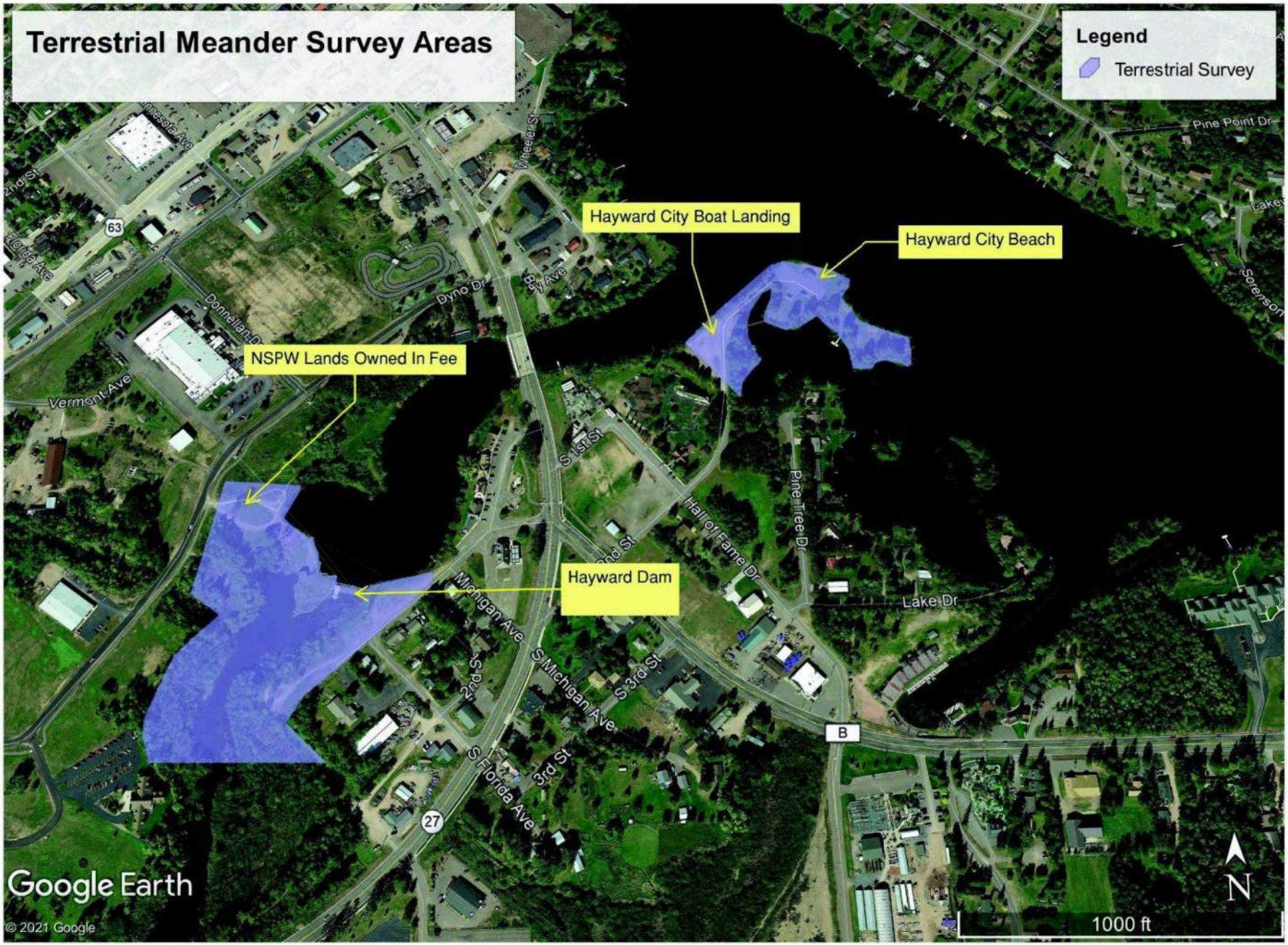
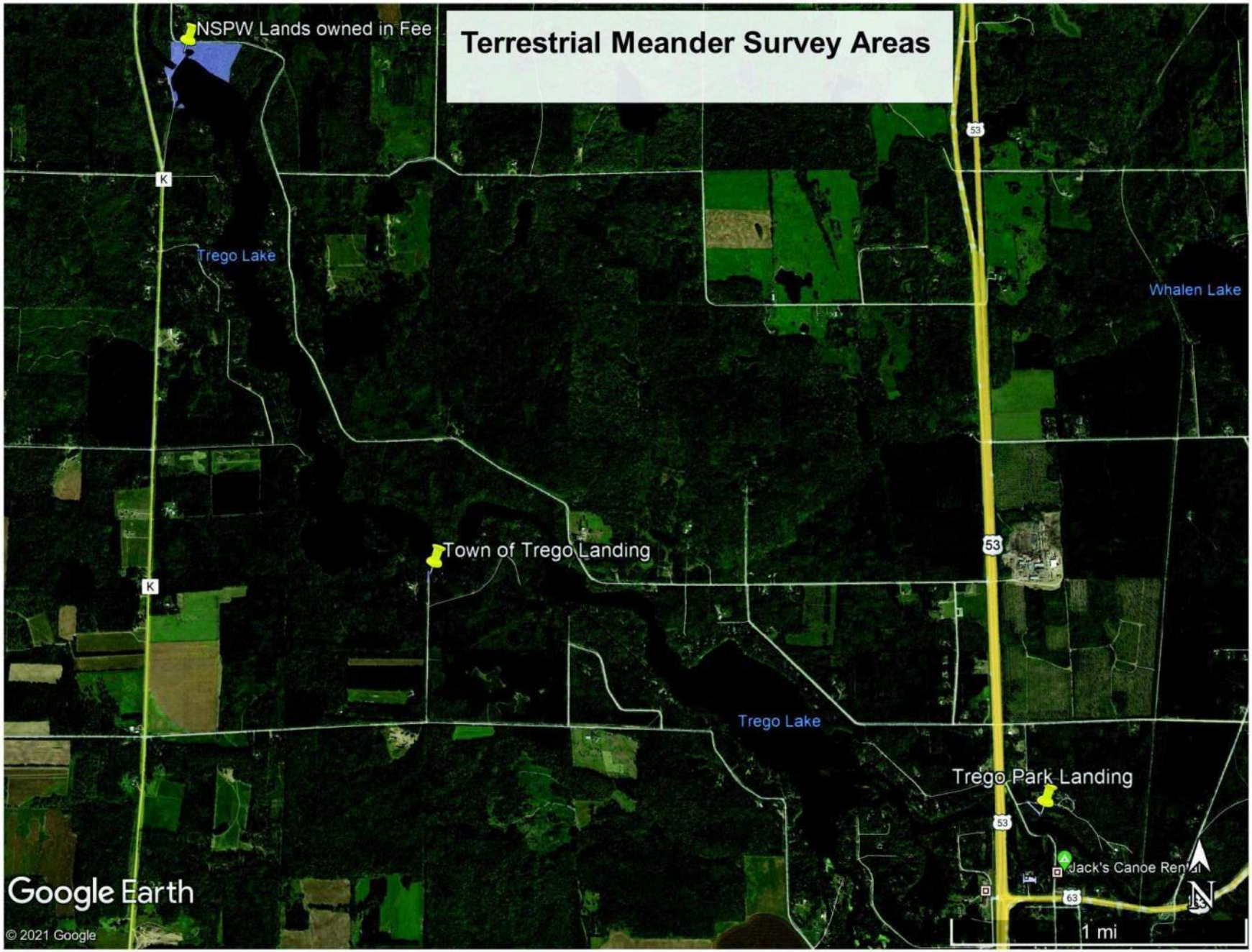
FIGURE 3

Hayward and Trego Lands Owned by Licensee and Open to the Public

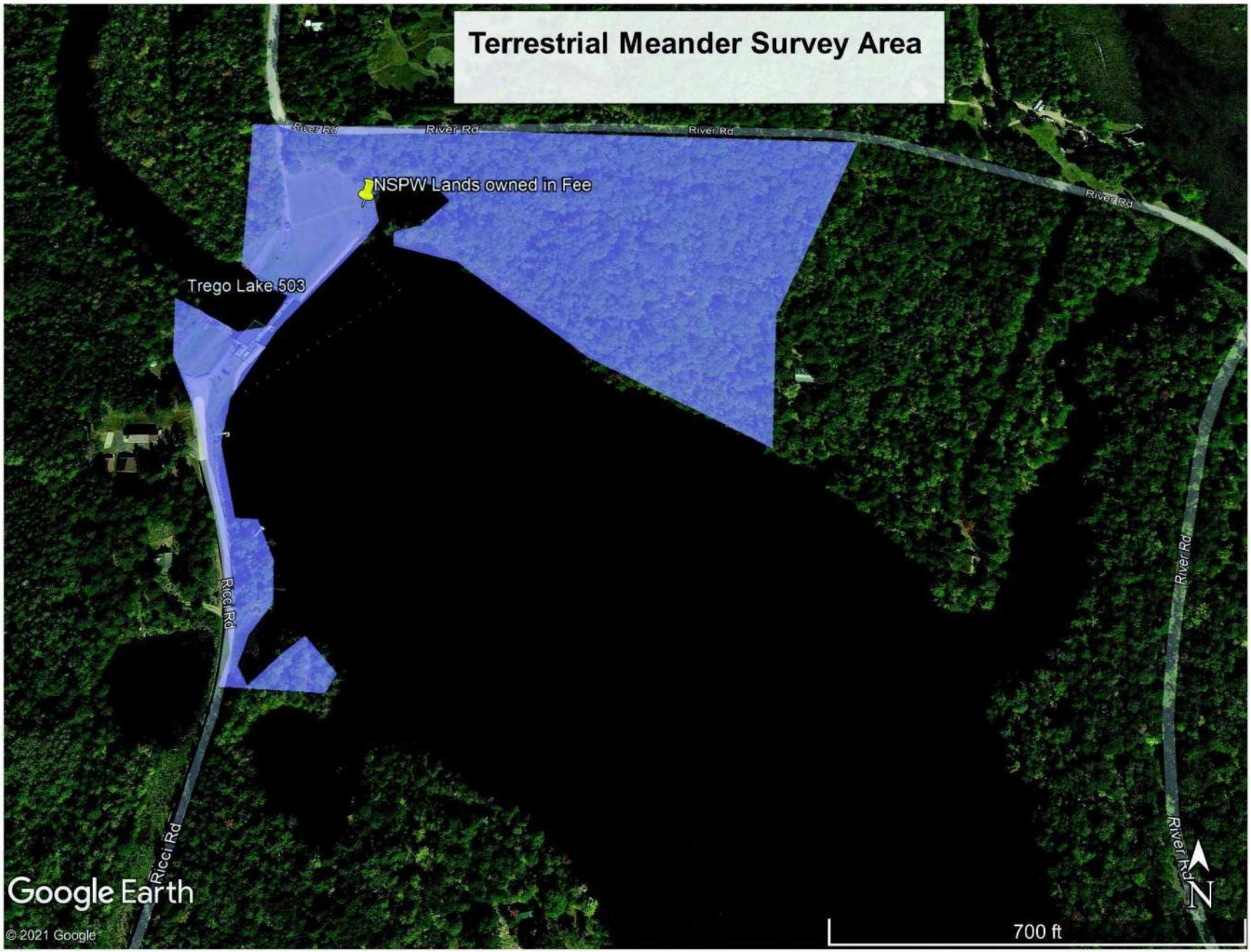
Hayward Hydroelectric Project



Trego Hydroelectric Project



Trego Hydroelectric Project



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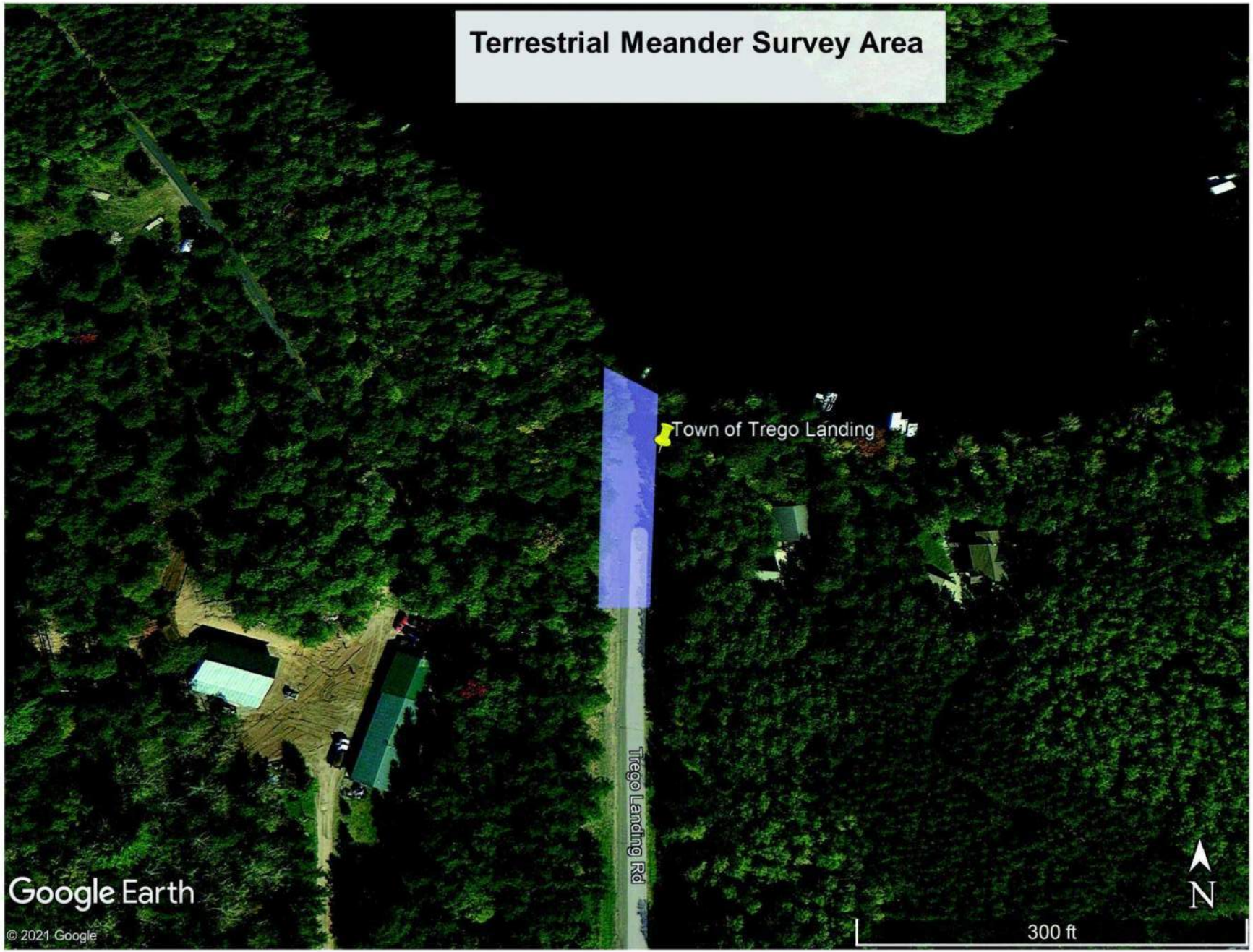


Trego Hydroelectric Project

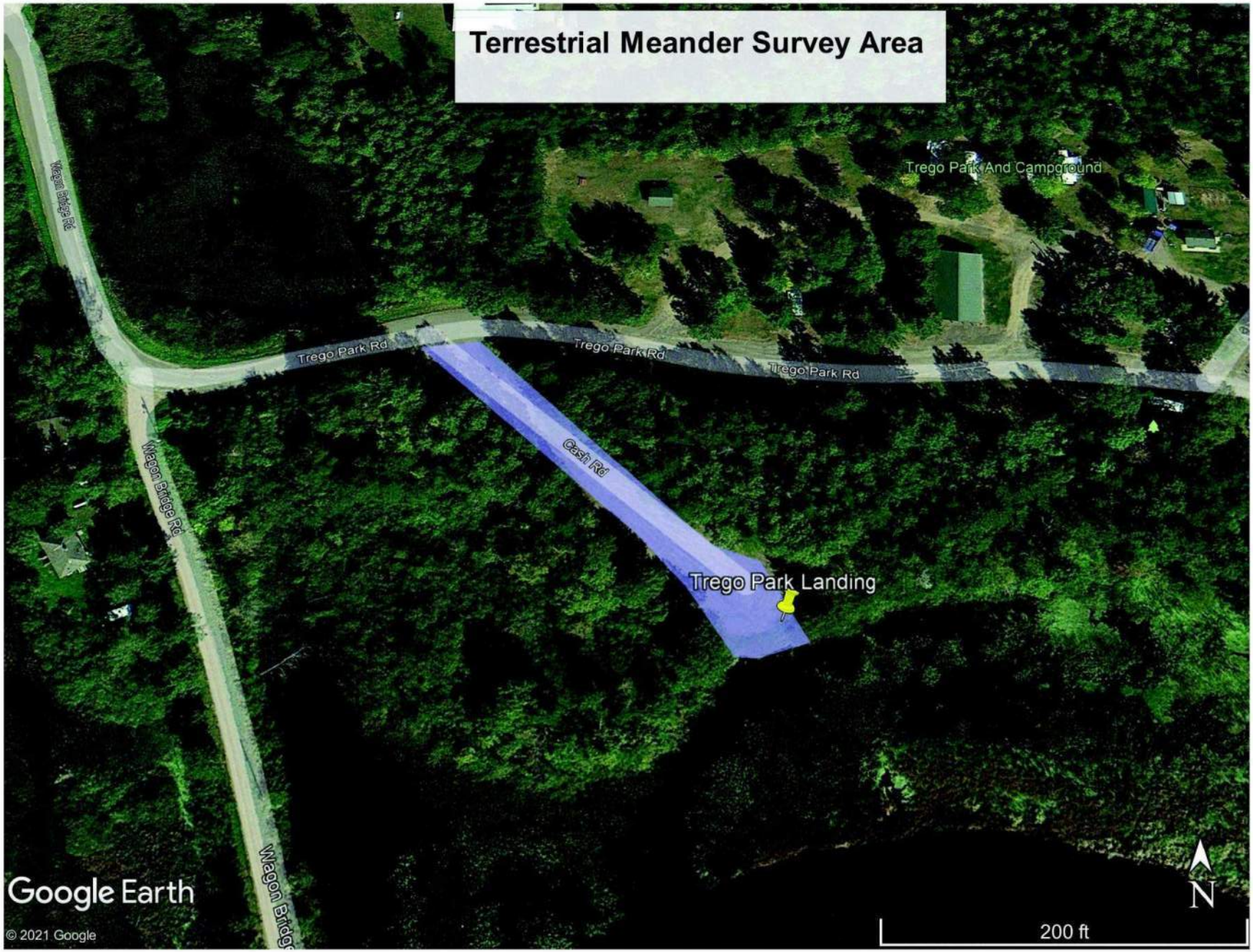
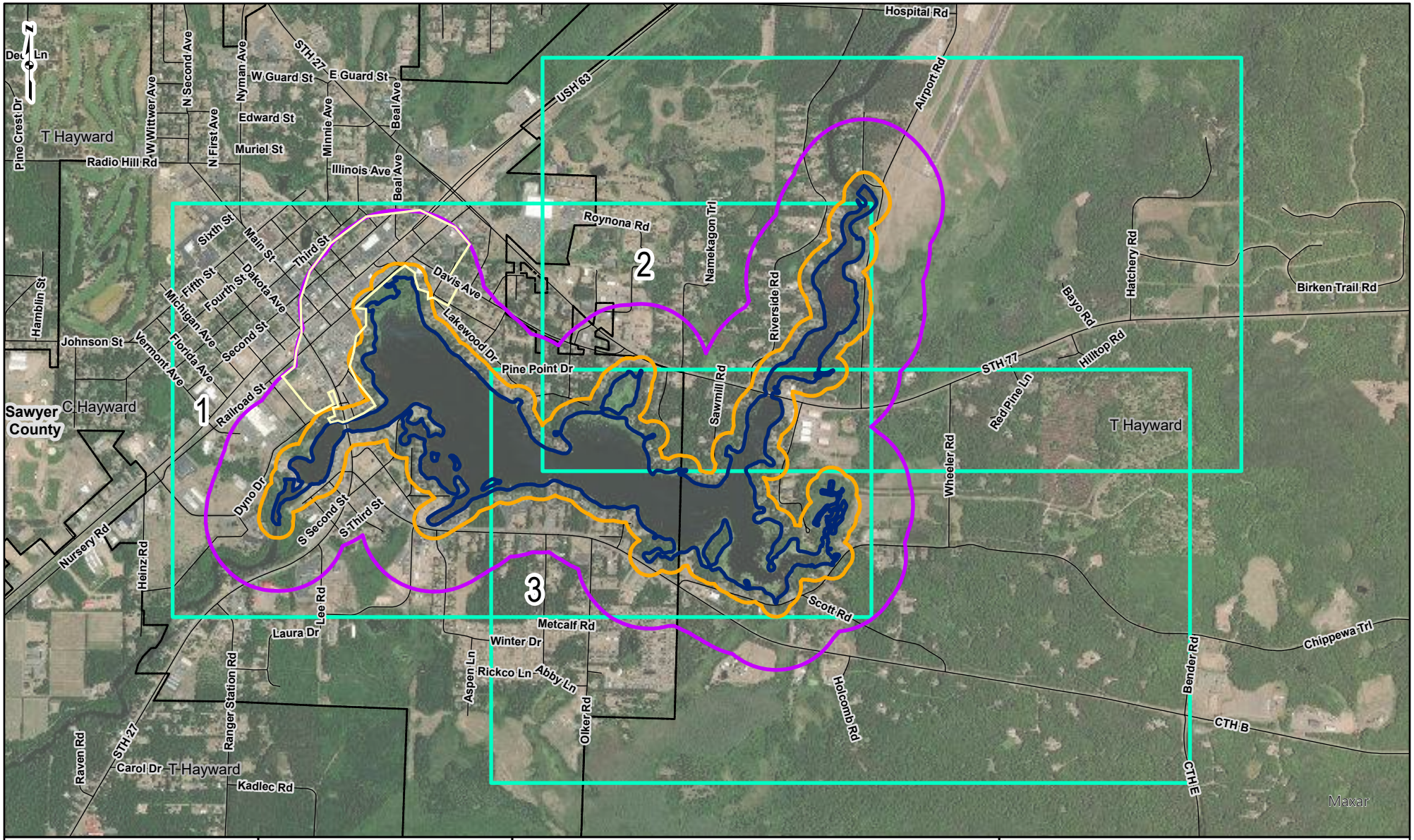
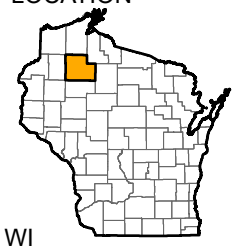


FIGURE 4
Hayward Overview Map



PROJECT LOCATION



SAWYER COUNTY, WI

REFERENCE: ESRI World Imagery, Accessed 8/30/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

LEGEND

- 200' Wood Turtle Buffer
- 984' Blanding's Buffer
- Shoreline within Project
- Sheet Index
- Hayward Urban Area
- Road Centerline
- Community Boundary
- County Boundary

0 1,000 2,000 4,000 Feet

FIGURE 4
HAYWARD OVERVIEW MAP

HAYWARD WOOD AND BLANDING'S TURTLE NESTING HABITAT STUDY

gai consultants

Mead & Hunt

DRAWN BY: EMW DATE: 8/30/2022
CHECKED: TDB APPROVED: LLS

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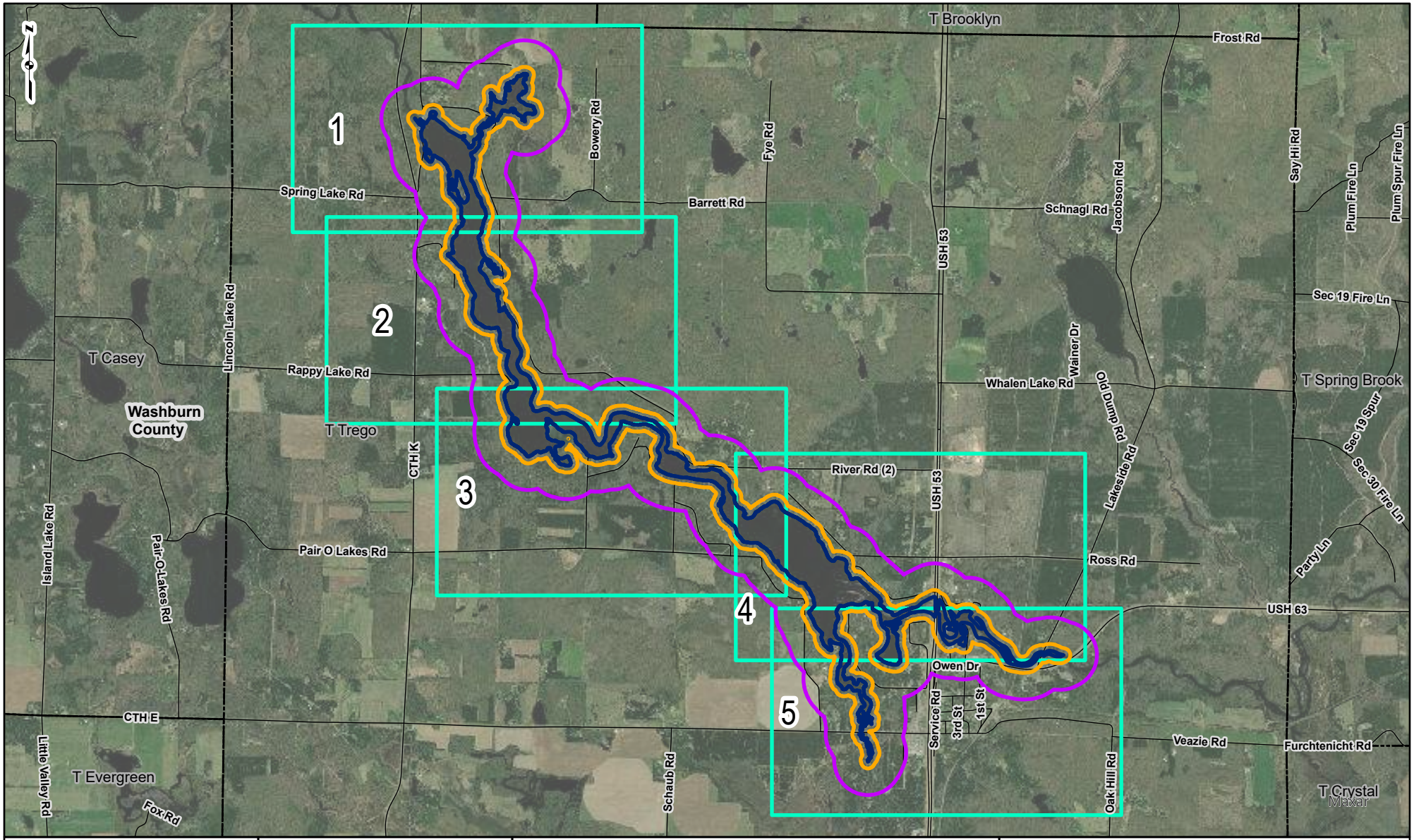
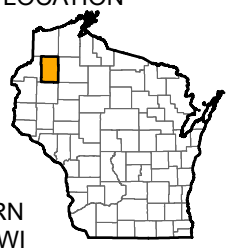
FIGURE 5
Trego Overview Map



PROJECT LOCATION



WASHBURN COUNTY, WI

REFERENCE: ESRI World Imagery, Accessed 8/30/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

LEGEND

- 200' Wood Turtle Buffer
- 984' Blanding's Buffer
- Shoreline within Project
- Sheet Index
- Road Centerline
- Community Boundary
- County Boundary

0 2,000 4,000 8,000 Feet

FIGURE 5
TREGO OVERVIEW MAP

TREGO WOOD AND BLANDING'S TURTLE NESTING HABITAT STUDY

gai consultants

Mead & Hunt

DRAWN BY: EMW DATE: 8/30/2022
CHECKED: TDB APPROVED: LLS

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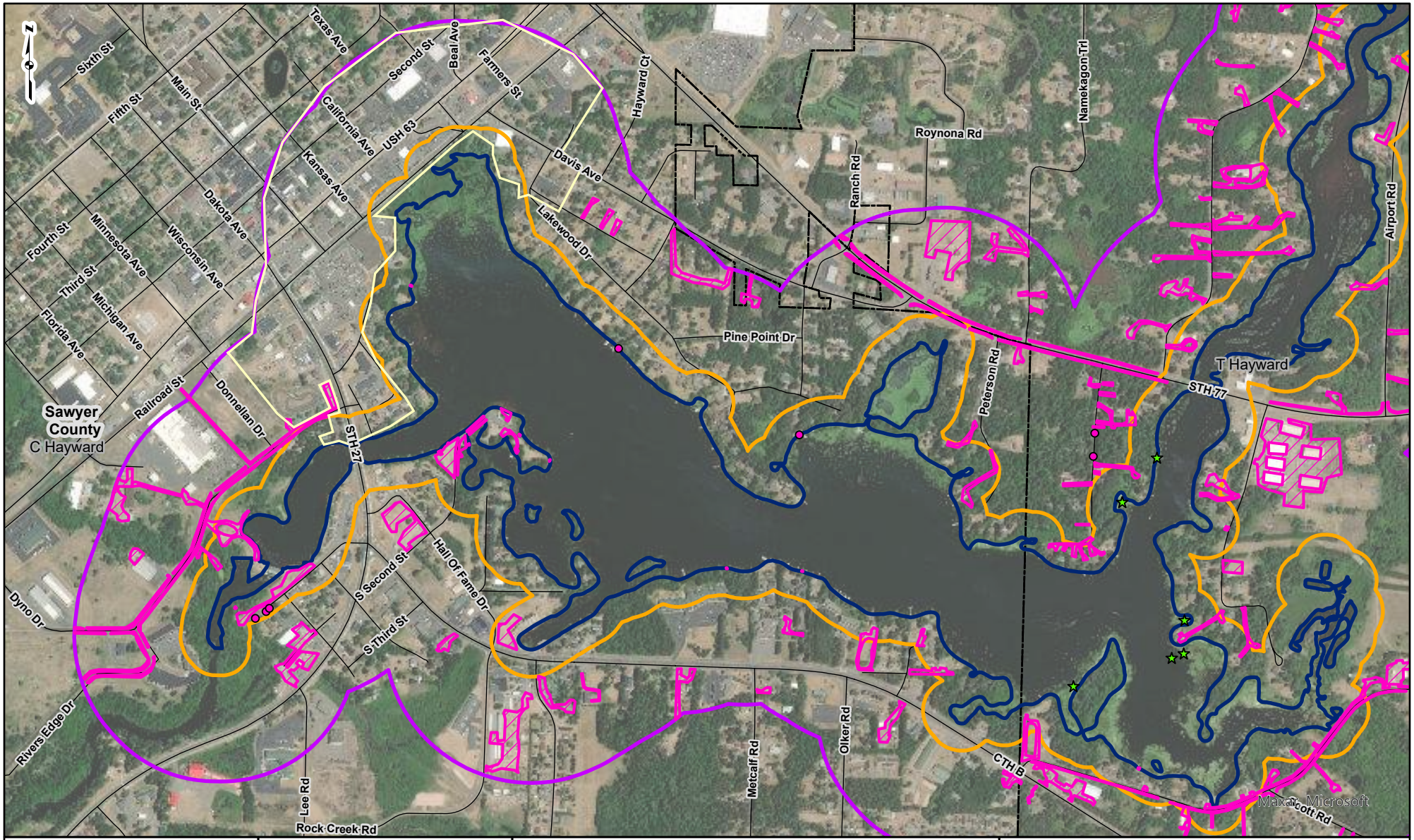
FIGURE 6

Hayward Wood and Blanding's Turtle Nesting Habitat and Basking Areas



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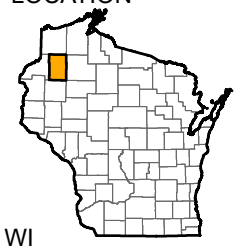

SAWYER COUNTY, WI

REFERENCE: WI DNR Leaf Off Imagery, Accessed 8/30/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

- Turtle Basking Location
- Turtle Nesting Habitat
- Turtle Nesting Habitat
- 200' Wood Turtle Buffer
- 984' Blanding's Buffer
- Shoreline within Project Area
- Hayward Urban Area
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

FIGURE 6
HAYWARD WOOD AND BLANDING'S TURTLE NESTING HABITAT AND BASKING AREAS
SHEET 1 of 3

HAYWARD WOOD AND BLANDING'S TURTLE NESTING HABITAT STUDY

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DRAWN BY: EMW DATE: 8/30/2022
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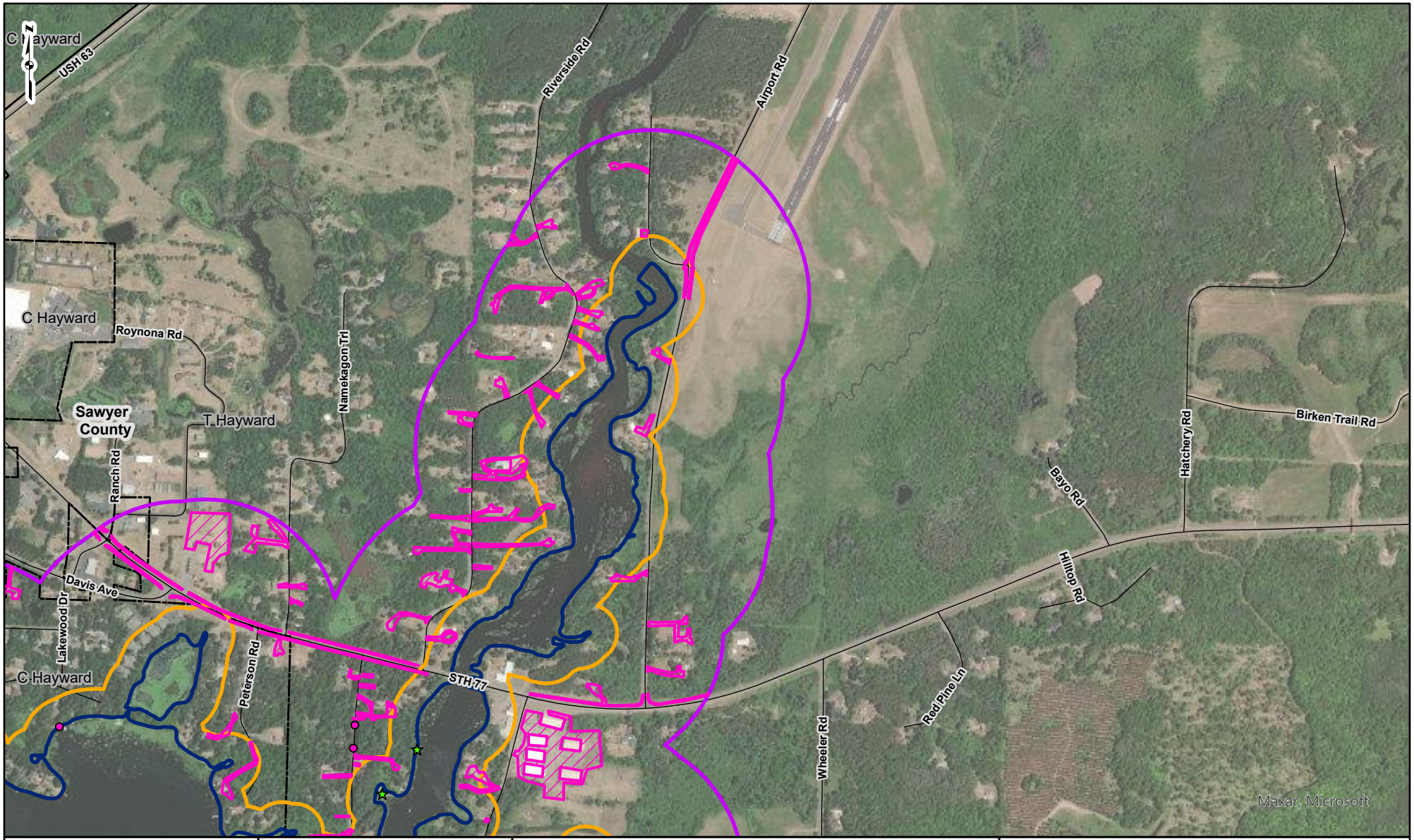

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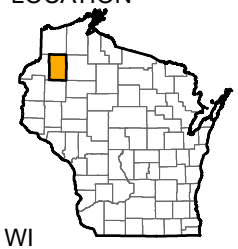

SAWYER COUNTY, WI

REFERENCE: WI DNR Leaf Off Imagery, Accessed 8/30/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

- Turtle Basking Location
- Turtle Nesting Habitat
- Turtle Nesting Habitat
- 200' Wood Turtle Buffer
- 984' Blanding's Buffer
- Shoreline within Project Area
- Hayward Urban Area
- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

FIGURE 6
HAYWARD WOOD AND BLANDING'S TURTLE NESTING HABITAT AND BASKING AREAS
SHEET 2 of 3

HAYWARD WOOD AND BLANDING'S TURTLE NESTING HABITAT STUDY

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DRAWN BY: EMW DATE: 8/30/2022
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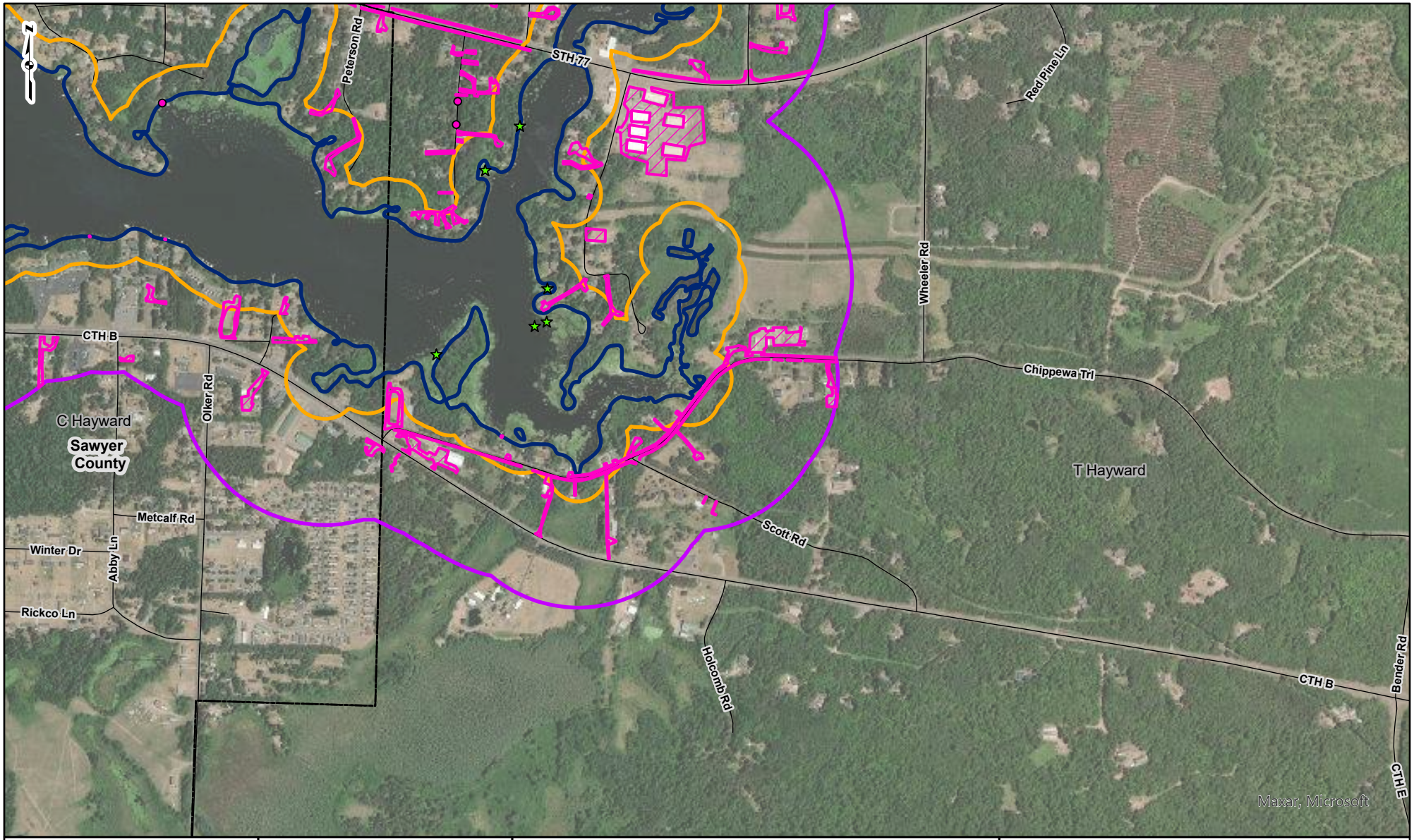

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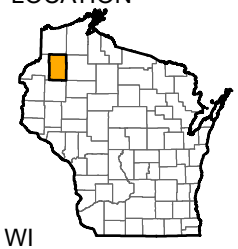

SAWYER COUNTY, WI

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- Turtle Basking Location
- Turtle Nesting Habitat
- Turtle Nesting Habitat
- 200' Wood Turtle Buffer
- 984' Blanding's Buffer
- Shoreline within Project Area
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- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

FIGURE 6
HAYWARD WOOD AND BLANDING'S TURTLE NESTING HABITAT AND BASKING AREAS
SHEET 3 of 3

HAYWARD WOOD AND BLANDING'S TURTLE NESTING HABITAT STUDY

gai consultants

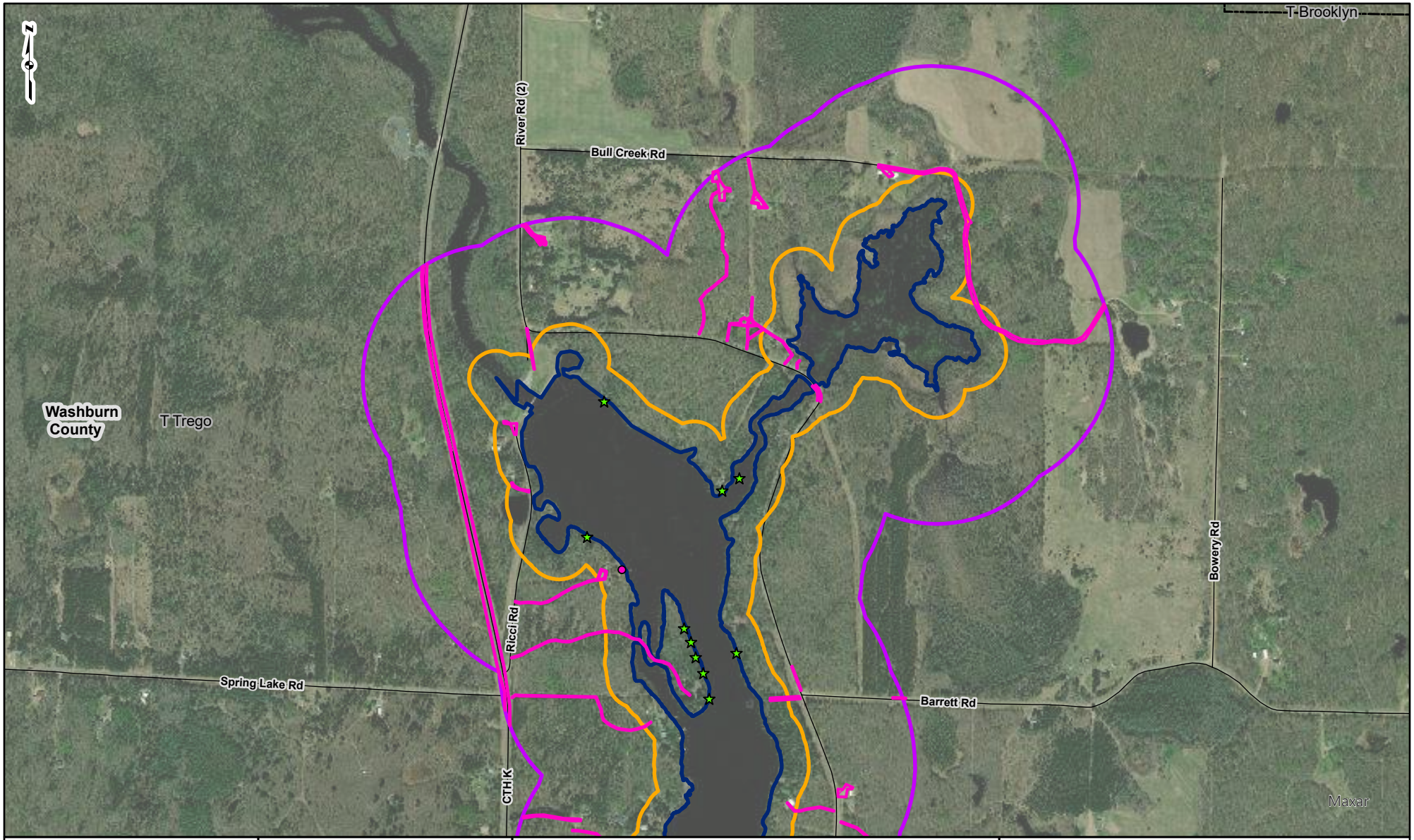
Mead & Hunt

DRAWN BY: EMW DATE: 8/30/2022
CHECKED: TDB APPROVED: LLS

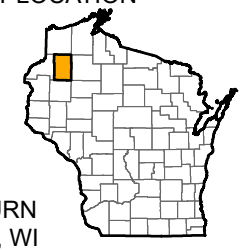
G:_2022\R220323.00 - GIS\AGP\Turtle_Mapping\Hayward_and_Trego\R220323_00_Hayward_and_Trego_Turtle_Mapping\R220323_00_Hawyard_Trego_Turtle_Mapping_2022_08_30.aprx

FIGURE 7

Trego Wood and Blanding's Turtle Nesting Habitat and Basking Areas



PROJECT LOCATION



WASHBURN COUNTY, WI

REFERENCE: ESRI World Imagery, Accessed 8/30/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

- Turtle Basking Location
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- 984' Blanding's Buffer
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- Road Centerline
- Community Boundary
- County Boundary

0 500 1,000 2,000 Feet

FIGURE 7
TREGO WOOD AND BLANDING'S TURTLE NESTING HABITAT AND BASKING AREAS
SHEET 1 of 5

TREGO WOOD AND BLANDING'S TURTLE NESTING HABITAT STUDY

gai consultants

Mead & Hunt

DRAWN BY: EMW DATE: 8/30/2022
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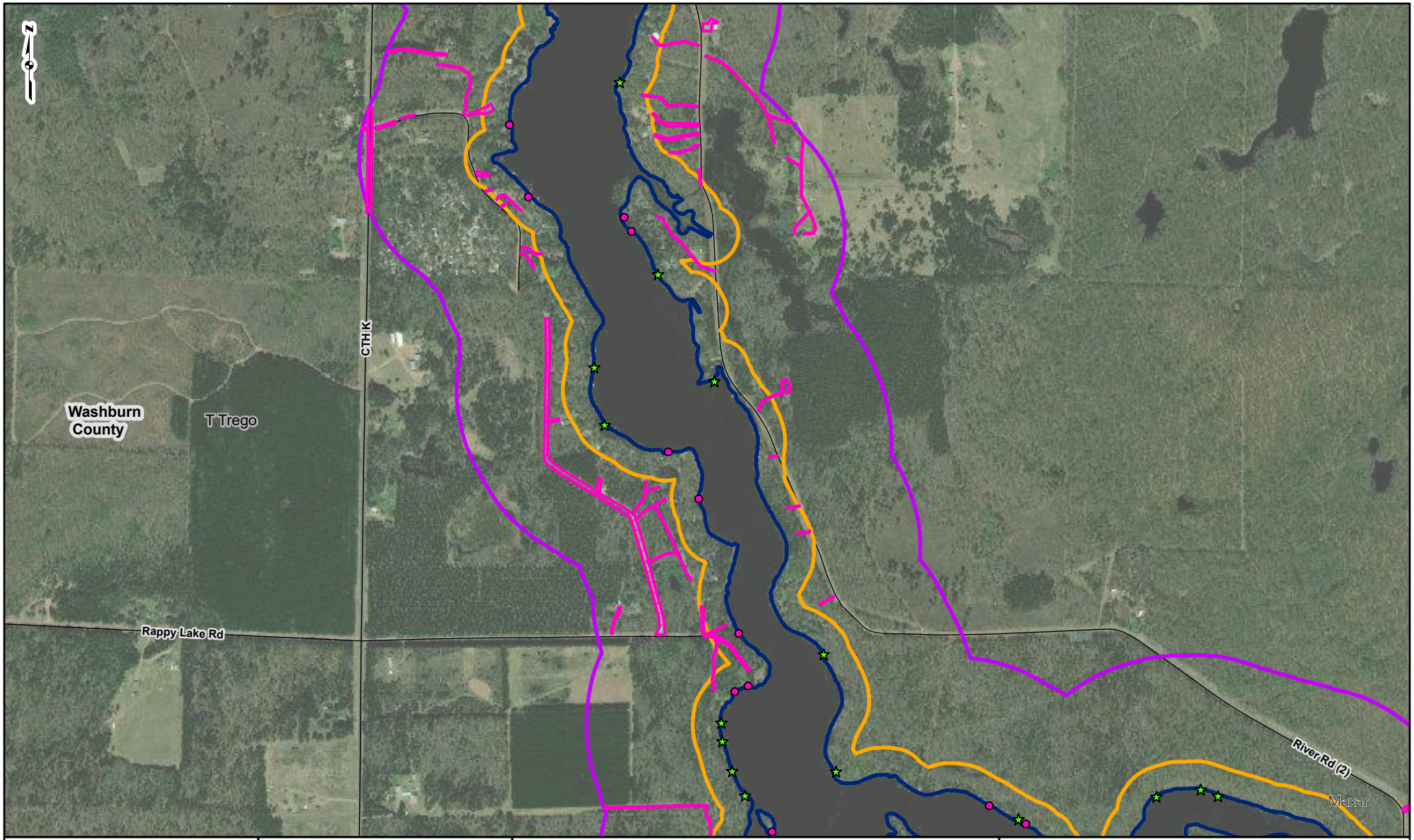

PROJECT LOCATION

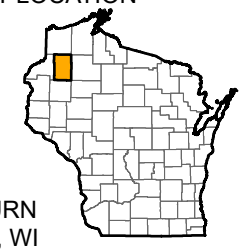

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FIGURE 7
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SHEET 2 of 5

TREGO WOOD AND BLANDING'S TURTLE NESTING HABITAT STUDY

gai consultants

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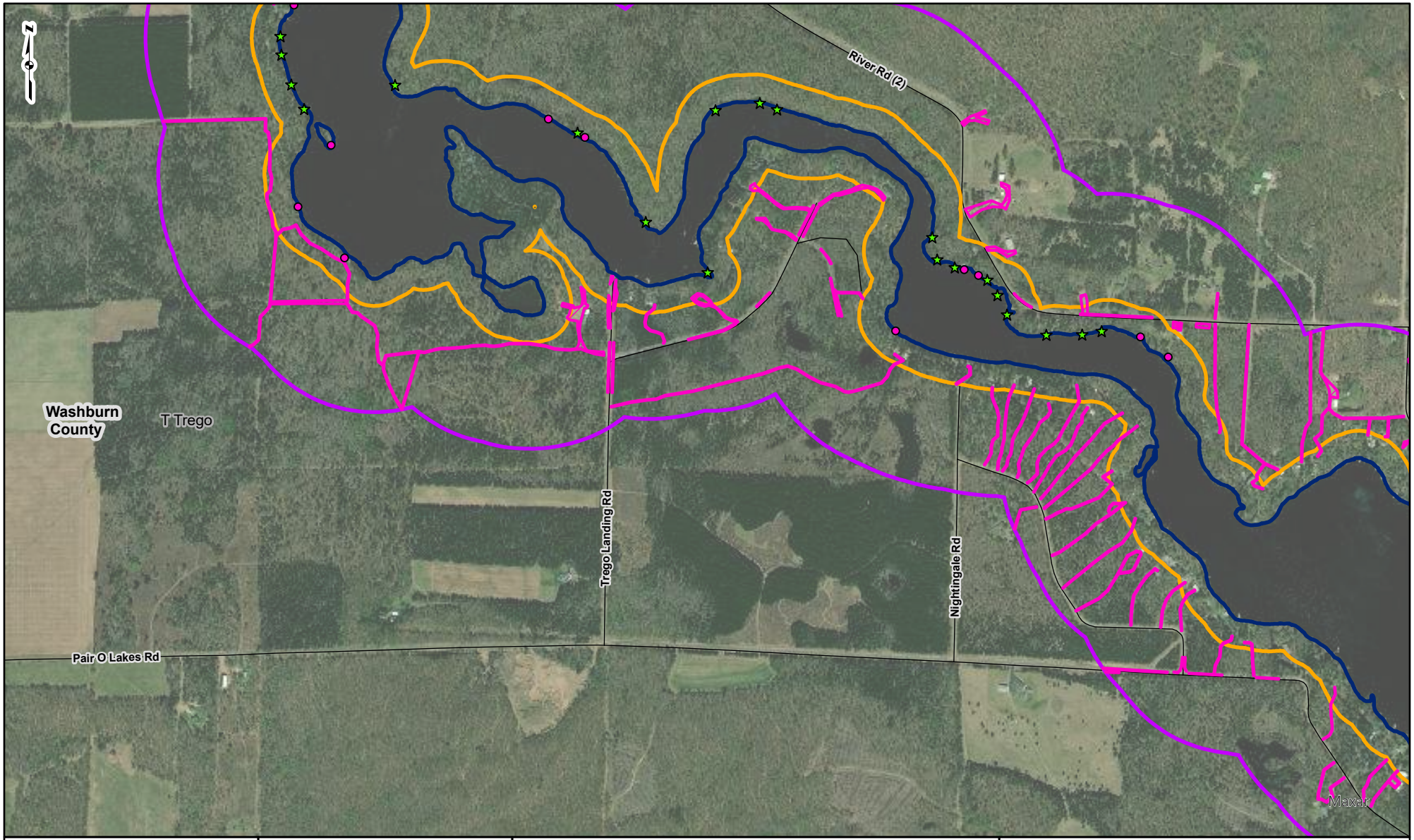

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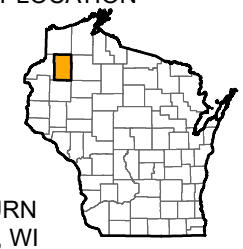

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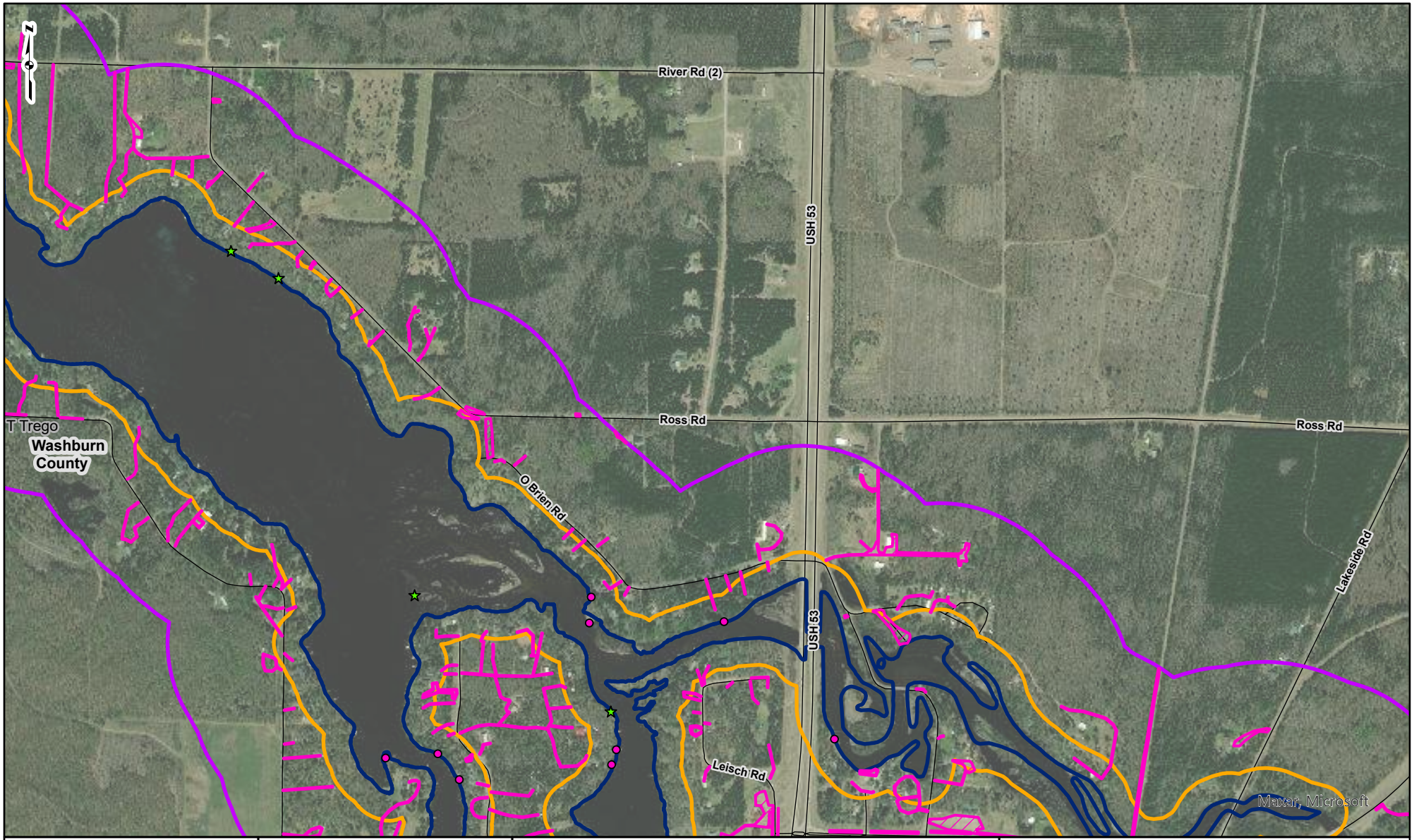

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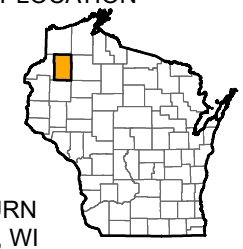

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SHEET 4 of 5

TREGO WOOD AND BLANDING'S TURTLE NESTING HABITAT STUDY

gai consultants

Mead & Hunt

DRAWN BY: EMW DATE: 8/30/2022
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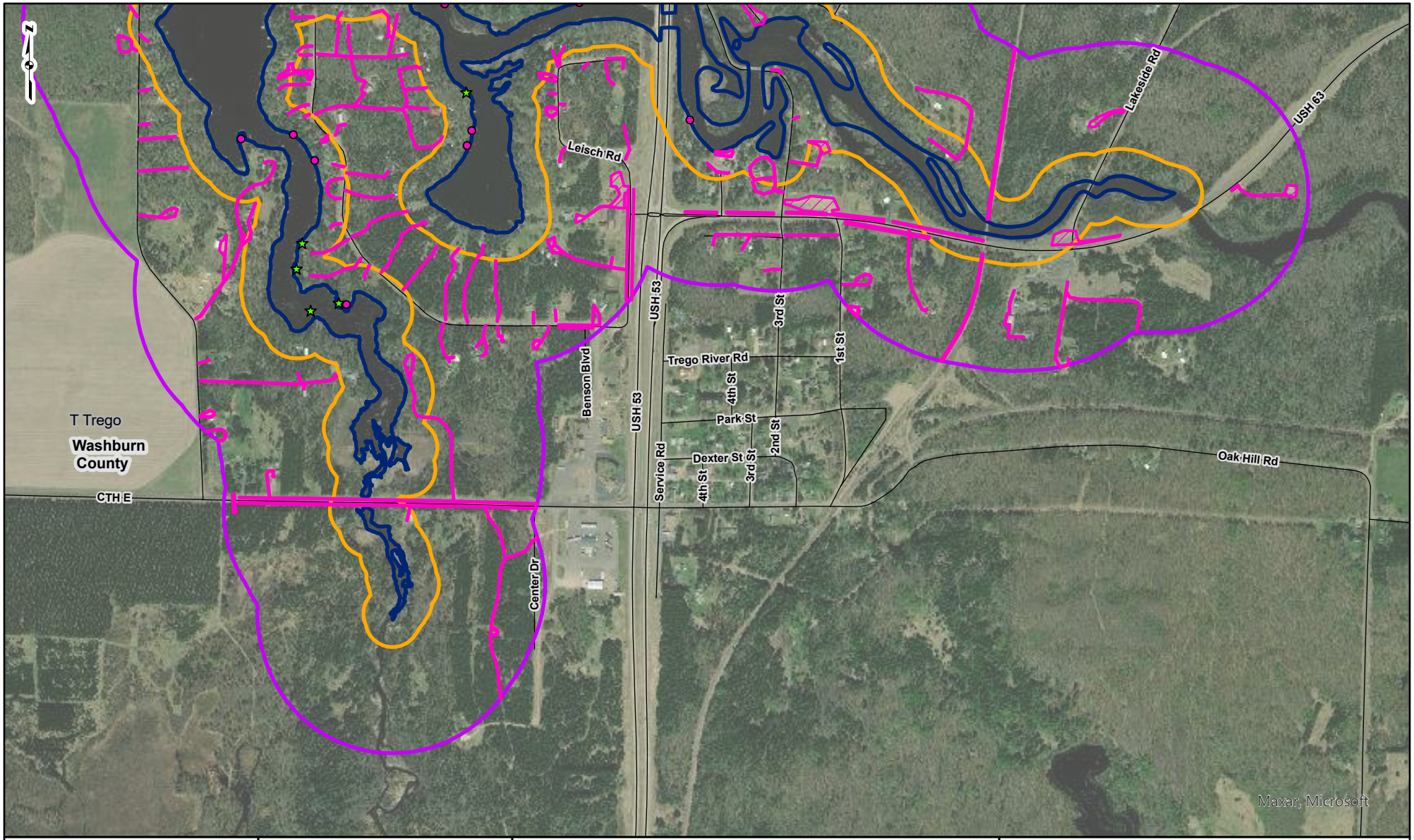

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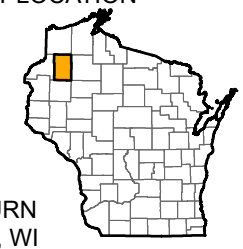

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SHEET 5 of 5

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gai consultants

Mead & Hunt

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ATTACHMENT A
Photo Log

Hayward and Trego Lake
Wood and Blanding's Turtle
Nesting Habitat Study
Report Photo Log

	
Turtle nesting habitat along a riparian property owner's shoreline on Hayward Lake. 46.0123972, -91.479827 June 7, 2022	Turtle nesting habitat by the Hayward Lake public boat launch parking lot. 46.00913357, -91.47874544 June 7, 2022
	
Sandy open area along Pair-O-Lakes Road; potential turtle nesting habitat by Trego Lake. 45.91378814, -91.85412314 June 8, 2022	Area of potential suitable turtle nesting habitat at the south end of Trego Lake by the Cash Rd. boat launch. 45.90998076, -91.82530134 August 4, 2022

	
Area of potential turtle nesting habitat near the Hayward dam. 46.0059694167, -91.4842388889 June 7, 2022	Foraging habitat at the north end of Trego Lake. 45.94828775, -91.88574416 August 4, 2022
	
Trego wetland area that appears to be prime habitat for Blanding's turtles. 45.948597, -91.880114 August 15, 2022	Hayward wetland area that appears to be prime habitat for Blanding's turtles. 46.011373, -91.465597 August 5, 2022

NPS Comments on Study Reports

Please Note: These comments have been responded to in Section 1.4.2.2 of the Exhbit E.

United States Department of the Interior

NATIONAL PARK SERVICE
St. Croix National Scenic Riverway
401 North Hamilton Street
Saint Croix Falls, WI 54024

April 21, 2023

Matthew Miller
Environmental Analyst
Xcel Energy
1414 West Hamilton Avenue
Eau Claire, WI 54702
matthew.j.miller@xcelenergy.com

Shawn Puzen
FERC Licensing & Compliance
Mead & Hunt
1702 Lawrence Drive
De Pere, WI 54115
shawn.puzen@meadhunt.com

Re: Study Reports for Invasive Species, Mussels, Recreation, Turtle Nesting Habitat, and Water Quality for Hayward and Trego Hydroelectric Projects (FERC Nos. P-2417 and P-2711), Namekagon River

Dear Mr. Miller and Mr. Puzen:

The St. Croix National Scenic Riverway (Riverway), National Park Service (NPS) appreciates the opportunity to review and provide comments on the study reports for Invasive Species, Mussels, Recreation, Turtle Nesting Habitat, and Water Quality as part of the relicensing efforts for the Hayward and Trego Hydroelectric Projects (FERC Nos. P-2417 and P-2711) on the Namekagon River.

Comments on Study Reports

1. **Hayward and Trego Aquatic and Terrestrial Invasive Species Study Report**
   - Page 1, 2.0 Introduction, paragraph 2: The report should be corrected to state that the entirety of Hayward Lake and Trego Lake are within the boundary of the St. Croix National Scenic Riverway, a unit of the National Park System.
   - Page 2, 3.0 Methodology, 3.1.1, paragraph 1: Given that the study extended sampling further upstream than the WDNR grid, is there a difference in how the vegetation, substrate, and depth are characterized in this added area compared with the area immediately downstream?
   - Page 2, 3.0 Methodology, 3.1.1, paragraph 2 and Figure 19: Does the coarse woody habitat (CWH) greater than 4 inches in diameter and 5 feet in length have cultural resource significance or are they naturally occurring (i.e. from downed trees)? (Page 8, 4.1.4, paragraph 6: "29 pieces of CWH were mapped primarily in near-shore and island areas around the lake. In addition, wood pilings which were part of the historic railroad bridge are also present extending into the lake.")
   - Page 15, 4.3.4 Trego Lake Overall Aquatic Plant Survey Analysis and Observations, paragraph 3: "…all occurrences of wild rice were mapped in the field and accounted for in Fig. 8." What mapping techniques were used to create Figure 8? Given difficulties mapping later season wild rice, can the licensee consider other methods (e.g. aerial surveys) to supplement the documentation of where wild rice occurs, especially since it is dynamic and can change from year to year?

- Page 15, 4.3.4 Trego Lake Overall Aquatic Plant Survey Analysis and Observations, paragraph 4: "…The upstream portion of the Project reservoir was riverine with steady flow and a sandy bottom. Vegetation in this area…" How is vegetation characterized in the vicinity of areas of concern about recreation access and navigability (i.e. Trego Lake District, Trego Park)? How will the information from this study be integrated with Recreation Report issues?
- Page 19, 5.0 Conclusion, paragraph 2: This section describes that Trego Lake has a "protected status" that Lake Hayward does not. This should be corrected to reflect that both Lake Hayward and Trego Lake are within the boundary of the St. Croix National Scenic Riverway.
- Figures 17 and 24: Using the existing data collected, can more detailed maps be created displaying lower depths than the 0–5-foot range that is currently shown? At a minimum, showing depths of 0-1 feet and 0-2 feet may be helpful in understanding potential wild rice areas and areas important for recreation access/navigation.

2. Freshwater Mussel Study for the Hayward Hydroelectric Project (FERC No. 2417) and Freshwater Mussel Study for the Trego Hydroelectric Project (FERC No. 2711)

- The NPS found the results of the mussel studies to be noteworthy in multiple respects and looks forward to working with the licensee and other stakeholders on additional analysis and ensuring these resources are thoughtfully considered in future steps of the licensing process.
- It appears the Chinese Mystery Snail may be a new finding within this reach. Has this finding been reported to WDNR's Aquatic Invasive Species Program?
- Per the WDNR permit correspondence, the researchers were asked to make note of any "obvious 'drawdown zone' in any of the river reaches as a result of either consistent drawdown or seasonal drawdowns where no mussels are present due to being dewatered". There were no such zones noted in the reports. It should be clarified if no such zones were observed, if these zones were not looked for, or if it was simply omitted from the report.

3. Recreation Report for the Hayward Hydroelectric Project (FERC No. 2417) and Trego Hydroelectric Project (FERC No. 2711)

- 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.
- Page 5-15, 5.3.2 Trego Lake District: The summary of Trego Lake District response does not adequately reflect material shown in Appendix 7, including Xcel partnership regarding vegetation management under the current license and concerns about access, AIS, vegetation management, and sedimentation.
- Page 6-1, Conclusions, paragraph 2: 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.
- Appendix 3, Recreation Inventory Photolog, PDF page 27: An index should be added to this section identifying photo number, topic, and location.

4. Lake Hayward and Trego Lake Wood and Blanding's Turtle Nesting Habitat Study Report

- Our agency appreciates the completion of this study and does not have any questions or comments regarding the study report at this time.

5. Water Quality Monitoring Study

- Can the licensee clarify why the water quality monitoring study excluded the parameters of cyanobacteria, methyl mercury, and sediment accumulation that were requested for inclusion by WDNR?

Outstanding Study Requests

Our agency requests that the Licensee reconsider the additional study requests outlined in our April 27, 2021 and subsequent letters, especially the Hydraulics, Sedimentation, and Channel Change study. As previously described, the proposed license will require a Section 7(a) evaluation by the NPS under the Wild and Scenic Rivers Act. These studies are necessary to the timely completion of our agency's review. They are also needed to satisfy Section 4(e) of the Federal Power Act, which directs FERC to "give equal consideration to the purposes of energy conservation, the protection, mitigation of damage to, and enhancement of, fish and wildlife (including related spawning grounds and habitat), the protection of recreational opportunities, and the preservation of other aspects of environmental quality." Equal consideration is not possible without adequate information on these important and relevant topics.

Thank you for your consideration of our agency's comments on the study reports. The NPS looks forward to continuing to consult with Xcel Energy and other stakeholders as the licensing process moves forward.

If you have any questions about our comments, please contact Lisa Yager at lisa_yager@nps.gov or 715-483-2290.

Sincerely,

CRAIG HANSEN

Digitally signed by CRAIG HANSEN
Date: 2023.04.21 13:53:42 -05'00'

Craig Hansen
Superintendent

TLD did not provide any comments on the ATIS Study Report

WDNR did not provide comments on any study reports

WDNR 2022 Fish Data

Darrin Johnson

From: Darrin Johnson
Sent: Wednesday, March 29, 2023 9:19 AM
To: Laatsch, Cheryl - DNR
Cc: Miller, Matthew J; Shawn Puzen; Darrin Johnson
Subject: Hayward 2022 Fish Data

Hi Cheryl,

We received a copy of the draft Lake Hayward Aquatic Plant Management Plan from the Lake Hayward Association. In the report it indicated that spring fyke netting surveys and June electrofishing surveys were conducted in 2022 within the lake. Can we get data from the 2022 fisheries surveys for inclusion in the Draft License Application?

We would like to request any recent fisheries data for surveys completed at the Trego Project as well. We have fisheries survey information for Trego up through 2019, so are just requesting any new survey data from 2020 to present if there is any.

Thank you.

Darrin Johnson
FERC Compliance and Licensing | Water
Direct: 608-443-0313 | Cell: 715-697-3130 | Transfer Files
Mead&Hunt
LinkedIn | Twitter | Facebook | Instagram

Darrin Johnson

From: Wolter, Max H - DNR <Max.Wolter@wisconsin.gov>
Sent: Wednesday, March 29, 2023 12:26 PM
To: Laatsch, Cheryl - DNR; Roberts, Craig M - DNR
Cc: Darrin Johnson
Subject: RE: Hayward 2022 Fish Data

Hot off the press:
https://dnr.wisconsin.gov/sites/default/files/topic/Fishing/SawyerLakeHayward2022SpringSummary.pdf

Max H. Wolter
Fisheries Biologist
Hayward Service Center
Bureau of Fisheries Management
Wisconsin Department of Natural Resources
(☎) phone: (715) 634-7429
(☎) fax: (715) 634-9232
(✉) e-mail: Max.wolter@wisconsin.gov

We are committed to service excellence.
Visit our survey at http://dnr.wi.gov/customersurvey to evaluate how I did.

From: Laatsch, Cheryl - DNR <Cheryl.Laatsch@wisconsin.gov>
Sent: Wednesday, March 29, 2023 12:16 PM
To: Wolter, Max H - DNR <Max.Wolter@wisconsin.gov>; Roberts, Craig M - DNR <Craig.Roberts@wisconsin.gov>
Cc: Darrin Johnson <Darrin.Johnson@meadhunt.com>
Subject: FW: Hayward 2022 Fish Data

Hi Max and Craig – See the info below. Please provide Darrin with any updated fishery information for these 2 projects. Thanks 😊

Cheryl Laatsch
Statewide FERC Coordinator
Bureau of Environmental Analysis and Sustainability
Wisconsin Dept of Natural Resources
N7725 Hwy 28
Horicon WI 53032
NEW (Work Cell) 920-382-9975
Cheryl.laatsch@wisconsin.gov

dnr.wi.gov

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To: Laatsch, Cheryl - DNR <Cheryl.Laatsch@wisconsin.gov>
Cc: Miller, Matthew J <matthew.j.miller@xcelenergy.com>; Shawn Puzen <Shawn.Puzen@meadhunt.com>; Darrin Johnson <Darrin.Johnson@meadhunt.com>
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From: Roberts, Craig M - DNR <Craig.Roberts@wisconsin.gov>
Sent: Wednesday, March 29, 2023 12:42 PM
To: Darrin Johnson; Wolter, Max H - DNR; Laatsch, Cheryl - DNR
Subject: RE: Hayward 2022 Fish Data

We haven't been back to survey Trego Lake since 2019. So there isnt any new data for the flowage itself.

We are committed to service excellence.
Visit our survey at http://dnr.wi.gov/customersurvey to evaluate how I did.

Craig M. Roberts
Phone: (715) 416-0351
Craig.Roberts@Wisconsin.gov

From: Darrin Johnson <Darrin.Johnson@meadhunt.com>
Sent: Wednesday, March 29, 2023 12:40 PM
To: Wolter, Max H - DNR <Max.Wolter@wisconsin.gov>; Laatsch, Cheryl - DNR <Cheryl.Laatsch@wisconsin.gov>; Roberts, Craig M - DNR <Craig.Roberts@wisconsin.gov>
Subject: RE: Hayward 2022 Fish Data

Thanks Max.

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meadhunt.com | Experience Exceptional

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To: Laatsch, Cheryl - DNR <Cheryl.Laatsch@wisconsin.gov>
Cc: Miller, Matthew J <matthew.j.miller@xcelenergy.com>; Shawn Puzen <Shawn.Puzen@meadhunt.com>; Darrin Johnson <Darrin.Johnson@meadhunt.com>
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Section 106 Consultation

Darrin Johnson

From: WHPD <compliance@wisconsinhistory.org>
Sent: Tuesday, January 24, 2023 3:44 PM
To: shawn.puzen@meadhunt.com; tyler.howe@wisconsinhistory.org
Subject: Compliance Submittal Accepted

Hayward Hydroelectric Project Relicensing Shoreline Survey Report FERC Project No. 2417 (MH 1853) has been accepted by the State Historic Preservation Office as project 23-0139.

Darrin Johnson

From: WHPD <compliance@wisconsinhistory.org>
Sent: Wednesday, February 1, 2023 3:38 PM
To: shawn.puzen@meadhunt.com; tyler.howe@wisconsinhistory.org
Subject: Compliance Submittal Accepted

Categories: Filed by Newforma

Trego Hydroelectric Project Relicensing Shoreline Survey Report FERC Project No. 2711 (MH 1853) has been accepted by the State Historic Preservation Office as project 23-0196.

Darrin Johnson

From: Shawn Puzen
Sent: Tuesday, March 28, 2023 9:42 AM
To: TYLER B HOWE
Cc: Darrin Johnson
Subject: Status of Section 106 Reviews in my Account

Good Morning Tyler,
I want to make sure that three filing I made for Section 106 in my account have not fallen through the cracks.

I have not received any word from you on the following reviews in my account:

1) Hayward 2417-submitted January 24, 2023.
2) Trego 2711-submitted February 1, 2023.

I cannot locate a response for either of these review requests. Can you please let me know if they have been completed?

Thanks,

Shawn Puzen
FERC Hydropower Licensing and Compliance | Water
Direct: 920-593-6865 | Cell: 920-639-2480 | Transfer Files
Mead&Hunt
LinkedIn | Twitter | Facebook | Instagram | My LinkedIn

Darrin Johnson

From: tyler.howe@wisconsinhistory.org
Sent: Tuesday, March 28, 2023 11:56 AM
To: matthew.j.miller@xcelenergy.com
Cc: shawn.puzen@meadhunt.com
Subject: 23-0139/SY - MH 1853 - Hayward Hydroelectric Project Relicensing Shoreline Survey Report FERC Project No. 2417

Categories: Filed by Newforma

Good morning, Matt and Shawn:

We are in receipt of the 2023 shoreline survey of the Haywood hydro project (FERC No. 2417). We accept this report in fulfillment of the requirements of the HRMP and the PA. We concur with the following observations:

1). 47SY29: We recognize that the " shoreline was inspected on foot. Surface collection along the river bank yielded no artifacts." We also understand that the site does not appear to be currently impacted by facility operations.

2). 47SY54: Again, we recognize that the "shoreline was inspected on foot. Surface collection along the river bank yielded no artifacts." We also understand that the site does not appear to be currently impacted by facility operations.

3). 47SY121: We recognize that the "shoreline where the pilings had intersected previously, was inspected on foot. Surface collection along the river bank did not yield artifacts." Like other shoreline sites, this site appears to be not currently impacted by facility operations.

4). 47SY158 / BSY-0044: The SHPO understands the "shoreline at the location where the mound was reported was inspected on foot. Surface collection along the river bank did not yield artifacts." We further understand this site does not appear to be currently impacted by facility operations.

As such, the WI SHPO accepts the 2023 shoreline survey of the Hayward hydro project (FERC No. 2417) in fulfillment of the requirements of the HRMP and the PA. We look forward to our continued consultation partnership.

All the best,

Tyler

Tyler B. Howe, PhD
Compliance Section Manager
State Historic Preservation Office

Wisconsin Historical Society
816 State Street, Madison, WI 53706

tyler.howe@wisconsinhistory.org

Wisconsin Historical Society
Collecting, Preserving, and Sharing Stories Since 1846

Darrin Johnson

From: TYLER B HOWE <tyler.howe@wisconsinhistory.org>
Sent: Tuesday, March 28, 2023 11:57 AM
To: matthew.j.miller@xcelenergy.com
Cc: shawn.puzen@meadhunt.com
Subject: Re: 23-0139/SY - MH 1853 - Hayward Hydroelectric Project Relicensing Shoreline Survey Report FERC Project No. 2417

Categories: Filed by Newforma

Sorry, but I meant Hayward hydro, not Haywood hydro. I must have NC on the mind.

Cheers,

Tyler

Tyler B. Howe, PhD
Compliance Section Manager
State Historic Preservation Office

Wisconsin Historical Society
816 State Street, Madison, WI 53706

tyler.howe@wisconsinhistory.org

Wisconsin Historical Society
Collecting, Preserving, and Sharing Stories Since 1846

From: tyler.howe@wisconsinhistory.org <tyler.howe@wisconsinhistory.org>
Sent: Tuesday, March 28, 2023 11:55 AM
To: matthew.j.miller@xcelenergy.com <matthew.j.miller@xcelenergy.com>
Cc: shawn.puzen@meadhunt.com <shawn.puzen@meadhunt.com>
Subject: 23-0139/SY - MH 1853 - Hayward Hydroelectric Project Relicensing Shoreline Survey Report FERC Project No. 2417

Good morning, Matt and Shawn:

We are in receipt of the 2023 shoreline survey of the Haywood hydro project (FERC No. 2417). We accept this report in fulfillment of the requirements of the HRMP and the PA. We concur with the following observations:

1). 47SY29: We recognize that the " shoreline was inspected on foot. Surface collection along the river bank yielded no artifacts." We also understand that the site does not appear to be currently impacted by facility operations.

2). 47SY54: Again, we recognize that the "shoreline was inspected on foot. Surface collection along the river bank yielded no artifacts." We also understand that the site does not appear to be currently impacted by facility operations.

3). 47SY121: We recognize that the "shoreline where the pilings had intersected previously, was inspected on foot.

Surface collection along the river bank did not yield artifacts." Like other shoreline sites, this site appears to be not currently impacted by facility operations.

4). 47SY158 / BSY-0044: The SHPO understands the "shoreline at the location where the mound was reported was inspected on foot. Surface collection along the river bank did not yield artifacts." We further understand this site does not appear to be currently impacted by facility operations.

As such, the WI SHPO accepts the 2023 shoreline survey of the Hayward hydro project (FERC No. 2417) in fulfillment of the requirements of the HRMP and the PA. We look forward to our continued consultation partnership.

All the best,

Tyler

Tyler B. Howe, PhD
Compliance Section Manager
State Historic Preservation Office

Wisconsin Historical Society
816 State Street, Madison, WI 53706

tyler.howe@wisconsinhistory.org

Wisconsin Historical Society
Collecting, Preserving, and Sharing Stories Since 1846

Darrin Johnson

From: tyler.howe@wisconsinhistory.org
Sent: Tuesday, March 28, 2023 1:51 PM
To: matthew.j.miller@xcelenergy.com
Cc: shawn.puzen@meadhunt.com
Subject: 23-0196/WB - MH 1853 - Trego Hydroelectric Project Relicensing Shoreline Survey Report FERC Project No. 2711

Categories: Filed by Newforma

Good afternoon, Matt and Shawn:

We are in receipt of the 2022 shoreline survey report for the Trego hydro project (FERC No. 2711). We accept this report in fulfillment of the requirements of the HRMP and the PA. We offer the following comments:

1). 47WB39: The WI SHPO recognizes this site was surveyed on foot, and no artifacts were encountered during the survey. We also understand this site does not appear to be impacted by facility operations.

2). 47WB105: The WI SHPO recognizes that the " shoreline was inspected on foot with access to the site provided by boat. Surface collection along the riverbank yielded no artifacts." We also understand the site does not appear to be impacted by facility operations.

3). 47WB106: The WI SHPO recognizes this site was mapped, and accessed by boat, and that no artifacts were recovered during shoreline inspection. We also understand the site does not appear to be impacted by facility operations.

4). 47WB107: We understand the shoreline was physically inspected, and no artifacts were discovered during the survey. We also understand the site does not appear to be impacted by facility operations.

5). 47WB108: We understand access to this site was blocked, and the site boundaries may not extend to the water line. As such, I suggest we discuss the usefulness of including this site in future shoreline surveys.

6). 47WB109: We understand this site was physically surveyed, and no artifacts were encountered during the survey. We also understand this site does not appear to be impacted by facility operations.

7). 47WB110: The WI SHPO recognizes this site was inspected on foot, and no artifacts were encountered during the survey. We also understand this site does not appear to be impacted by facility operations.

The WI SHPO concurs with the professional archaeologist's determination that "there is no mention in the report of erosion at any of the sites; thus, no mention of artifacts being found at the bank." As such, the WI SHPO accepts the 2022 shoreline survey of the Trego hydro project (FERC No. 2711) in fulfillment of the HRMP and the PA. We look forward to our continued consultations.

Take care,

Tyler

Tyler B. Howe, PhD
Compliance Section Manager
State Historic Preservation Office

Wisconsin Historical Society
816 State Street, Madison, WI 53706

tyler.howe@wisconsinhistory.org

Wisconsin Historical Society
Collecting, Preserving, and Sharing Stories Since 1846

CZMA Correspondence

Darrin Johnson

From: Miller, Matthew J <Matthew.J.Miller@xcelenergy.com>
Sent: Wednesday, May 24, 2023 3:20 PM
To: kathleen.angel@wisconsin.gov
Cc: Shawn Puzen; Darrin Johnson
Subject: Request for Determination - Hayward and Trego Hydroelectric Projects
Attachments: Hayward CZMA Letter signed.pdf; Trego CZMA Letter signed.pdf

Hello Ms. Angel,

Attached you will find two letters from Xcel Energy each requesting a written determination of consistency with Wisconsin's Coastal Management Program regarding the federal relicensing of the Hayward and Trego hydroelectric projects located in Sawyer County and Washburn County, respectively. Should you have any questions, you may reach me directly at 715-737-1353.

Kind Regards,

Matthew Miller
Xcel Energy
Environmental Analyst
1414 W. Hamilton Ave., P.O. Box 8, Eau Claire, WI 54702
P: 715.737-1353 **F**: 715.737.1077
E: matthew.j.miller@xcelenergy.com

XCELENERGY.COM

1414 West Hamilton Avenue
PO Box 8
Eau Claire, WI 54702-0008

May 24, 2023

VIA Electronic Mail

Ms. Kathleen Angel
Wisconsin Coastal Management Program Department of Administration
101 E. Wilson Street, 9th Floor
P.O. Box 894
Madison, WI 53708-8944

Re: **Request for Determination of Compliance**
Hayward (P-2417) Hydroelectric Project

Dear Ms. Angel:

Northern States Power Company – Wisconsin (NSPW) is the licensee for the Hayward Hydroelectric Project (Project). The Project is licensed by the Federal Energy Regulatory Commission (FERC) as Project No. 2417. The current FERC license for the Project expires on November 30, 2025.

A Preliminary Application Document providing a description of the Project and its proposed operation was submitted to your office in November 2020 and is available for review at hydrorelicensing.com/hayward/. It is anticipated that the Draft Application for New License and the Final Application for New License will be submitted in June 2023 and November 2023, respectively.

As part of the federal relicensing process for the Project, NSPW must provide the FERC documentation that a determination has been made that the proposed relicensing complies with the policies of Wisconsin's approved Coastal Management Plan, and that any activities associated with the licensing will be conducted in a manner that is consistent with such policies. This letter constitutes a formal request on behalf of NSPW for a written determination of consistency with Wisconsin's Coastal Management Program.

If you are unable to submit a letter, please provide your determination to me via e-mail so that I may incorporate your comments into FERC's licensing record. My email address is matthew.j.miller@xcelenergy.com. Should you have any questions, you may contact me at 715-737-1353.

Sincerely,

Matthew J. Miller

Digitally signed by Matthew J. Miller
Date: 2023.05.24 15:08:52 -05'00'

Matthew J. Miller
Environmental Analyst

CC: Shawn Puzen, Darrin Johnson – Mead & Hunt (via e-mail)
Scott Crotty – Xcel Energy (via e-mail)

Xcel Energy®
RESPONSIBLE BY NATURE®

1414 West Hamilton Avenue
PO Box 8
Eau Claire, WI 54702-0008

May 24, 2023

VIA Electronic Mail

Ms. Kathleen Angel
Wisconsin Coastal Management Program Department of Administration
101 E. Wilson Street, 9th Floor
P.O. Box 8944
Madison, WI 53708-8944

Re: **Request for Determination of Compliance**
Trego (P-2711) Hydroelectric Project

Dear Ms. Angel:

Northern States Power Company - Wisconsin (NSPW) is the licensee for the Trego Hydroelectric Project (Project). The Project is licensed by the Federal Energy Regulatory Commission (FERC) as Project No. 2711. The current FERC license for the Project expires on November 30, 2025.

A Preliminary Application Document providing a description of the Project and its proposed operation was submitted to your office in November 2020 and is available for review at hydrorelicensing.com/trego/. It is anticipated that the Draft Application for New License and the Final Application for New License will be submitted in June 2023 and November 2023, respectively.

As part of the federal relicensing process for the Project, NSPW must provide the FERC documentation that a determination has been made that the proposed relicensing complies with the policies of Wisconsin's approved Coastal Management Plan, and that any activities associated with the licensing will be conducted in a manner that is consistent with such policies. This letter constitutes a formal request on behalf of NSPW for a written determination of consistency with Wisconsin's Coastal Management Program.

If you are unable to submit a letter, please provide your determination to me via e-mail so that I may incorporate your comments into FERC's licensing record. My email address is matthew.j.miller@xcelenergy.com. Should you have any questions, you may contact me at 715-737-1353.

Sincerely,

Matthew J. Miller

Digitally signed by Matthew J. Miller
Date: 2023.05.24 15:10:15 -05'00'

Matthew J. Miller
Environmental Analyst

CC: Shawn Puzen, Darrin Johnson – Mead & Hunt (via e-mail)
Scott Crotty – Xcel Energy (via e-mail)

Draft License Application Cover Letter

1414 West Hamilton Avenue
PO Box 8
Eau Claire, WI 54702-0008

June 29, 2023

VIA Electronic Filing

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Subject: **Draft License Application for Subsequent Licenses**
Hayward Hydroelectric Project (FERC No. 2417-065) and Trego Hydroelectric Project (FERC No. P-2711-032)

Dear Secretary Bose:

Northern States Power Company, a Wisconsin corporation (NSPW, Licensee, or Applicant) is the owner and operator of the Hayward Hydroelectric Project (Hayward Project) (FERC No. 2714) and the Trego Hydroelectric Project (Trego Project) (FERC No. 2711).[1] The Hayward Project is located on the Namekagon River in the City of Hayward and Town of Hayward in Sawyer County, Wisconsin. The Trego Project is located on the Namekagon River in the Town of Trego in Washburn County, Wisconsin. The licenses for both Projects expire on November 30, 2025.

In accordance with 18 CFR 4.32 (h), NSPW hereby submits the Draft License Application (DLA) for the relicensing of the Hayward and Trego Hydroelectric Projects.[2] The Licensee has prepared the DLA to conform to the requirements of the Commission's regulations at 18 CFR §§ 4.38 and 4.61, as required under the Traditional Licensing Process (TLP). Licensee's request to use the TLP for both Projects was approved by the Commission via letter dated January 21, 2021.

Pursuant to 18 CFR § 4.38, and by copy of this letter (via email and/or US mail), the Licensee is providing a link to the Projects' relicensing website at http://hydrorelicensing.com/. From this website, an electronic copy of the public portions of the DLA may be downloaded for review by relevant resource agencies, tribes, non-governmental organizations, and other interested parties included in the enclosed distribution list. Written comments are due to the Commission within 90 days of the date of this filing. Should stakeholders experience difficulty downloading the document, or prefer to receive an electronic version on a USB drive via US mail, they may contact Matthew Miller at 715-737-1353 or matthew.j.miller@xcelenergy.com.

It should be noted that there are several documents hereby filed with the Commission that are unavailable to the public for security or confidentiality reasons. Those documents are as follows:

[1] Throughout the documents included with this transmittal, the Hayward Project and Trego Project are individually referred to as Project or collectively as Projects.

[2] Since both Projects are located on the Namekagon River in Wisconsin, with the Hayward Project located approximately 30 miles upstream of the Trego Project, one Application for both Projects is being submitted.

- Exhibit F drawings. These drawings for both Projects contain Critical Energy Infrastructure Information (CEII). Therefore, NSPW has filed the documents as CEII with the Commission and designated them as such.

- Appendices E-22 and E-44. These appendices contain privileged locational information for threatened and endangered species. Therefore, NSPW has filed these documents with the Commission as privileged information.

Should you have any questions, please contact Matthew Miller at 715-737-1353 or matthew.j.miller@xcelenergy.com.

Sincerely,

Don Hartinger

Digitally signed by Don Hartinger
Date: 2023.06.28 13:55:30 -05'00'

Donald Hartinger
Plant Director, Renewable Operations-Hydro

Enclosure

cc: Distribution List

Certificate of Service

I hereby certify that I, on behalf of Northern States Power Company, a Wisconsin corporation, have served by U.S. mail or via email (if a mailing address was not available), a letter with a link to the foregoing documents in electronic format upon each person designated on the attached distribution list.

Dated this 29thth day of June, 2023

Darrin Johnson
Mead & Hunt, Inc.

1414 West Hamilton Avenue
PO Box 8
Eau Claire, WI 54702-0008

Hayward and Trego Hydroelectric Project Licensing Stakeholder List
FERC Project Nos. 2417 and 2711

Indian Tribes

Edith Leoso, THPO
Bad River Band of the Lake Superior
Tribe of the Chippewa
P.O. Box 39
Odanah, WI 54861-0039

Michael Wiggins, Chairman
Bad River Band of the Lake Superior Tribe of
the Chippewa
P.O. Box 39
Odanah, WI 54861

Whitney Gravelle, President
Bay Mills Indian Community of Michigan
12140 W. Lakeshore Dr.
Brimley, MI 49715-9319

Kevin R. Dupuis, Sr., Chairman
Fond Du Lac Band of Lake Superior Chippewa
1720 Big Lake Rd.
Cloquet, MN 55720

Jill Hoppe, THPO
Fond Du Lac Band of Lake Superior Chippewa
1720 Big Lake Rd.
Cloquet, MN 55720

Ned Daniels Jr., Chairman
Forest County Potawatomi Community of WI
3051 Sand Lake Rd.
Crandon, WI 54520-9801

Benjamin Rhodd, THPO
Forest County Potawatomi Community of WI
5320 Wensaut Lane, P.O. Box 340
Crandon, WI 54520

Jeffrey Stiffarm, President
Fort Belknap Indian Community
RR 1, Box 66
Harlem, MT 59526

Michael J Blackwolf, THPO
Fort Belknap Indian Community
656 Agency Main St
Harlem, MT 59526

Robert Deschampe, Chair
Grand Portage Band of Chippewa Indians
P.O. Box 428
Grand Portage, MN 55605

Mary Ann Gagnon, THPO
Grand Portage Band of Chippewa Indians
P.O Box 428
Grand Portage, MN 55605

Marlin WhiteEagle, President
Ho Chunk Nation of WI
PO Box 667
Black River Falls, WI 54615-0667

William Quackenbush, THPO
Ho Chunk Nation of WI
P.O. Box 667
Black River Falls, WI 54615-0667

Gary Loonsfoot, THPO
Keweenaw Bay Indian Community of Michigan
16429 Bear Town Rd
Baraga, MI 49908

Indian Tribes (continued)

Warren C Swartz, Sr., President
Keweenaw Bay Indian Community of Michigan
107 Bear Town Rd.
Baraga, MI 49908

Louis Taylor, Sr., Chairman
Lac Courte Oreilles Band of Chippewa Indians
13394 W Trepania Rd., Bldg. NO1
Hayward, WI 53843-2186

Brian Bisonette, THPO
Lac Courte Oreilles Band of Chippewa Indians
13394 W Trepania Rd., Bldg. NO1
Hayward, WI 54843

John Johnson
Lac Du Flambeau Band of Lake Superior
Chippewa Indians
P.O. Box 67
Lac Du Flambeau, WI 54538-0067

Melinda Young, THPO
Lac Du Flambeau Band of Lake Superior
Chippewa Indians
P.O. Box 67
Lac Du Flambeau, WI 54538

Alina Shively, THPO
Lac Vieux Desert Band of Lake Superior
Chippewa Indians
alina.shively@lvd-nsn.gov
(*sent via email per request)*

James Williams, Jr., Chairman
Lac Vieux Desert Band of Lake Superior
Chippewa Indians
P.O. Box 249
Watersmeet, MI 49969

Amy Burnette, THPO
Leech Lake Band of Ojibwe
190 Sailstar Dr NE
Cass Lake, MN 56633

Faron Jackson, Sr., Chairman
Leech Lake Band of Ojibwe
190 Sailstar Dr NE
Cass Lake, MN 56633

Ron Corn, Sr. Chairman
Menominee Indian Tribe of Wisconsin
P. O. Box 910
Keshena, WI 54135

David Grignon, THPO
Menominee Indian Tribe of Wisconsin
W3426 Cty. VV W., P.O. Box 910
Keshena, WI 54135-0910

Diane Hunter, THPO
Miami Tribe of Oklahoma
P.O. Box 1326
Miami, OK 74355

Douglas G. Lankford, Chief
Miami Tribe of Oklahoma
P.O. Box 1326
Miami, OK 74355

Melanie Benjamin, Chief Executive
Mille Lacs Band of Ojibwe
43408 Oodena Dr.
Onamia, MN 56359

Natalie Weyaus, THPO
Mille Lacs Band of Ojibwe
43408 Oodena Dr.
Onamia, MN 56359

Gary Frazer, Executive Director
Minnesota Chippewa Tribe
P.O. Box 217
Cass Lake, MN 56633

Nicolas Metoxen, THPO
Oneida Tribe of Wisconsin
PO Box 365
Oneida, WI 54155-0365

Indian Tribes (continued)

Tehassi Hill, Chairperson
Oneida Tribe of Wisconsin
PO Box 365
Oneida, WI 54155-0365

Chad Able, Treaty Natural Resource
Red Cliff Band of Lake Superior
Chippewa Indians
88385 Pike Rd., Hwy. 13
Bayfield, WI 54814

Marvin Defoe, THPO
Red Cliff Band of Lake Superior
Chippewa Indians
88385 Pike Rd., Hwy. 13
Bayfield, WI 54814

Christopher Boyd, Chairman
Red Cliff Band of Lake Superior Chippewa
Indians
88385 Pike Rd., Hwy. 13
Bayfield, WI 54814

Robert Van Zile, Jr., Chairman
Sokaogon Chippewa Community
Mole Lake Band
3051 Sand Lake Rd.
Crandon, WI 54520-9801

Michael LaRonge, THPO
Sokaogon Chippewa Community
Mole Lake Band
3051 Sand Lake Rd.
Crandon, WI 54520-9801

Lewis Taylor, President
St. Croix Band of Lake Superior Chippewa
24663 Angeline Ave
Webster, WI 54893-9246

Wanda McFaggen, THPO
St. Croix Band of Lake Superior Chippewa
24663 Angeline Ave
Webster, WI 54893

Shannon Holsey, President
Stockbridge Munsee Tribe of Mohican Indians
N8476 Mo He Con Nuck Rd
Bowler, WI 54416

Sherry White, THPO
Stockbridge Munsee Tribe of Mohican Indians
PO Box 70
Bowler, WI 54416-0070

Jeffrey Bendremer, THPO
Stockbridge Munsee Community
thpo@mohican-nsn.gov
(*sent via email per request*)

Jamie Arsenault, THPO
White Earth Band of the Minnesota Chippewa
Tribe
P.O. Box 418
White Earth, MN 56591

Michael Fairbanks, Chairman
White Earth Band of the Minnesota Chippewa
Tribe
P.O. Box 418
White Earth, MN 56591

Federal

Kimberly Bose, Secretary
FERC Office of General Counsel
888 First St. NE
Washington, DC 20426

Kimberly Bose, Secretary
FERC Office of Energy Projects
888 First St. NE
Washington, DC 20426

Ann McCammon Soltis
Great Lakes Indian Fish and Wildlife Commission
72682 Maple St., PO Box 9
Odanah, WI 54861
amsoltis@glifwc.org

Tammie Poitra, Regional Director
U.S. Bureau of Indian Affairs
Midwest Regional Office
5600 West American Blvd., Suite 500
Bloomington, MN 55437

Nannette Bischoff, FERC Coordinator
St. Paul District
U.S. Department of the Army
Corps of Engineers
180 5th St. E., Suite 700
St. Paul, MN 55101-1638

Mary Manydeeds, Environmental Specialist
U.S. Department of the Interior
Bureau of Indian Affairs
Norman Pointe II Building
5600 American Boulevard W, Suite 500
Bloomington, MN 55437-1458

Michael C. Connor
U.S. Department of the Interior
Comm. U.S. Bureau Reclamation
1849 C Street NW
Washington, DC 20240-0001

Glen Grothman, U.S. Representative
U.S. Representative from Wisconsin District 6
1511 Longworth H.O.B
Washington, DC 20515

Darrin Simpkins, Coastal Program
U.S. Department of the Interior
Fish & Wildlife Service
2661 Scott Tower Drive
New Franken, WI 54229

Field Supervisor
U.S. Department of the Interior
Fish & Wildlife Service
Green Bay Field Office
2661 Scott Tower Dr.
New Franken, WI 54229-9565

Christine Gabriel, Regional Environmental Coordinator
U.S. Department of the Interior
National Park Service
601 Riverfront Dr.
Omaha, NE 68102-4226

Craig Hansen, St. Croix National Scenic Riverway
U.S. Department of the Interior
National Park Service
401 N. Hamilton St.
St. Croix Falls, WI 54024
Craig_Hansen@nps.gov

Lillian Jonas, NPS Hydropower Consultant
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National Park Service
Lillian_jonas@contractor.nps.gov

Susan Rosebrough, HAP Team Lead
U.S. Department of the Interior
National Park Service
Susan_rosebrough@nps.gov

Federal (continued)

David Thomson, Program Manager
U.S. Department of the Interior
National Park Service
601 Riverfront Dr.
Omaha, NE 68102
dave_thomas@nps.gov

Terri Hogan, St Croix National Scenic Riverway
U.S. Department of the Interior
National Park Service
401 N. Hamilton St.
St. Croix Falls, WI 54024

Lisa Yager, St. Croix National Scenic Riverway
U.S. Department of the Interior
National Park Service
401 N. Hamilton St.
St. Croix Falls, WI 54024
Lisa_Yager@nps.gov

Johnathon Moore, St. Croix National Scenic Riverway-Cultural Resources
U.S. Department of the Interior
National Park Service
401 N Hamilton St.
St. Croix Falls, WI 54024

Jen Tyler
Mail Code: E-19J
U.S. Environmental Protection Agency
NEPA Implementation Section, Region V
77 W. Jackson Boulevard, AR-18J
Chicago, IL 60604-3507

Tom Tiffany, U.S. Representative
U.S. Representative from Wisconsin District 7
1714 Longworth House Office Building
Washington, DC 20515

Alyssa Walker
National Park Service
Alyssa_l_walker@nps.gov

State

Public Service Commission of Wisconsin
P.O. Box 7894
Madison, WI 53707-7854

Wisconsin Cooperative Fishery Research Unit
College of Natural Resources
U.W. Stevens Point
Stevens Point, WI 54481

Kathleen Angel, Wisconsin Coastal Management Program
Wisconsin Department of Administration
101 E. Wilson St., 10th Floor
Madison, WI 53703

Connie Antonuk, WDNR
107 Sutcliff Ave.
Rhinelander, WI 54501

Cheryl Laatsch, FERC Coordinator
Wisconsin Department of Natural Resources
502 E Mill St.
Beaver Dam, WI 53916

Jeffrey Scheirer, Watershed Management
Wisconsin Department of Natural Resources
875 S. Fourth Ave
Park Falls, WI 54552

Wisconsin Office of the Governor
P.O. Box 7863
Madison, WI 53702-0001

Tyler Howe, Preservation Office
Wisconsin State Historical Society
816 State St.
Madison, WI 53706

Local

Dale Peters, City of Eau Claire
203 S Farwell St., PO Box 5148
Eau Claire, WI 54702-5148

Lisa Poppe Clerk/Treasurer
City of Hayward
P.O. Box 969
Hayward, WI 54843

John McCue
Public Works Director
PO Box 969
Hayward, WI 54843

Marathon County
500 Forest Street
Wausau, WI 54403-5554

Ronald Pete, Town Chairman
Town of Superior
4917 South State Road 35
Superior, WI 54880

Thomas Hoff, County Administrator
Sawyer County
10610 Main Street, Suite 23
Hayward, WI 54843

Stephanie Laakson, Town Chairman
Town of Hayward
15460W State Rd 77E
Hayward, WI 54843

Wes Huffer, Town Chairman
Town of Trego
N8521 Hwy 53
Trego, WI 54888

William Allard, Town Supervisor
Town of Trego
W5690 Trego River Street
Trego, WI 54888

Brian Vosberg, Town Supervisor
Town of Trego
N7523 Lakeside Rd
Trego, WI 54888

Patti Butterfield, Town Clerk
Town of Trego
W6097 River Rd
Trego, WI 54888

Alicia Swearingen, County Clerk
Washburn County
10 4th Ave., P.O. Box 639
Shell Lake, WI 54871

Utility

Scott Crotty, Xcel Energy
Sr. Operations Manager
1414 W. Hamilton, P.O. Box 8
Eau Claire, WI 54702-0008

Donald Hartinger, Xcel Energy
Plant Director, Renewable Operations-Hydro
414 Nicollet 2
Minneapolis, MN 55401

Matt Miller, Xcel Energy
Hydro License Compliance Consultant
Xcel Energy
1414 W. Hamilton, P.O. Box 8
Eau Claire, WI 54702-0008

Other

Mike Arrowood, Chairman
Walleye for Tomorrow
2240 Auburn St.
Fond du Lac, WI 54935

Hugh Duffy, President
Lake Hayward Property Owners Association
PO Box 972
Hayward, WI 54843

James Fossum
River Alliance of Wisconsin
199 Janet Marie Ln.
Winona, MN 55987

Thomas Frost, Board Member
Trego Lake District
N7558 Wood Drive
Trego, WI 54888

Joan Harn
3223 6000 Aniston Rd.
Bethesda, MD 20817

Charlie Petersen, Chairman
Trego Lake District
5504 12th Ave. S.
Minneapolis, MN 55417

Northwest Regional Planning Commission
1400 S. River St.
Spooner, WI 54801-8692

Angie Tornes
Temporary NPS Consultant
3223 S. Indiana Ave.
Milwaukee, WI 53207

Hayward Adjacent Owners

Maris & Joanne Freiman
10328 Red Stone Lane
Hayward, WI 54843

Wehrman Trust No. 2014
10330 Pine Tree Drive
Hayward, WI 54843-2611

Heather L. Sheehan
10330 Rd Stone Lane
Hayward, WI 54843

Steven & Mary Menk
10332 Red Stone Lane
Hayward, WI 54843

Aaron & Sarah Halberg
10335N Duffy Road
Hayward, WI 54843

Alano Society of Sawyer County
10339S Florida Ave.
Hayward, WI 54843-0211

Harold & Janet Treland Trust
10345N Duffy Road
Hayward, WI 54843

Lee Hennig
10351 Historyland Lane
Hayward, WI 54843

Thomas & Mary Diane Everson Rev Trust
10354N Duffy Road
Hayward, WI 54843

McIntosh Trust
10358 Pine Tree Drive
Hayward, WI 54843

James & Elaine Hamblin
10361N Duffy Road
Hayward, WI 54843

Hayward Adjacent Owners (continued)

Joseph & Joelle Shotshell
10362N Sawmill Road
Hayward, WI 54843

Patricia Newman
10364 Pine Tree Drive
Hayward, WI 54843

Roy & Virginia Ryttie
10366N Sawmill Road
Hayward, WI 54843

Ronald & Andrea Wittwer
10370N Sawmill Road
Hayward, WI 54843

Dawn Henk
10383N Duffy Road
Hayward, WI 54843

Leonard & Hiromi Hodgeman
10404N Sawmill Road
Hayward, WI 54843

Judith Timmerman
10411 Sorenson Drive
Hayward, WI, 54843

Jason & Jodi Jorczak
10419 Sorenson Drive
Hayward, WI 54843

Linda Rumen
10421N Duffy Road
Hayward, WI 54843

Szymon & Luz Krolak
10429 State Hwy. 27
Hayward, WI 54843

Larry Jennings
10431 Peterson Rd
Hayward, WI 54843

Rodney & Gayle Little
10431 Sorenson Drive
Hayward, WI 54843

Scott & Lori Soli
10436 Bay Ave.
Hayward, WI 54843

William & April Rasmussen, Jr.
10440 Florida Ave.
Hayward, WI 54843

Harry & Loretta Hodgkinson
10443 Peterson Road
Hayward, WI 54843

Kerry & Angela Walters
10443 Sorenson Drive
Hayward, WI 54843

Linda Yoo Trust & Donald Haig
10458 Bay Ave.
Hayward, WI 54843

Lily Hennig
10459 Peterson Road
Hayward, WI 54843-6496

Charles & Deanna May
10462 Hayward Shores Drive
Hayward, WI 54843

Walter & Roberta Kass
10464 Bay Ave.
Hayward, WI 54843

Dale & Carole Kemp Rev Trust
10464 Hayward Shores Dr
Hayward, WI 54843

Linnea & Calyn Forsell
10468 Hayward Shores Drive
Hayward, WI 54843

Hayward Adjacent Owners (continued)

Bradley Madison
10470 Bay Ave
Hayward, WI 54843

Gary & Delores Lindner
10482 Hayward Shores Dr
Hayward, WI 54843

Frederick Ash & Donna Stuart
10482 Wheeler Street
Hayward, WI 54843

Matthew & Holly Leudke
10484 N Riverside Road
Hayward, WI 54843

John & Joanne Boya
10488 Hayward Shores Drive
Hayward, WI 54843

Ronald & Terri Craig
10490 Hayward Shores Drive
Hayward, WI 54843

Dale & Karen Carlson
10498 Wheeler Street.
Hayward, WI 54843-2510

Eugene & Joyce Neuendorf Rev Trust
10502 Hayward Shores Drive
Hayward, WI 54843

Caleb & Ashley Yoder Trust
10524N Riverside Road
Hayward, WI 54843

Jean Friske
10527N Airport Road
Hayward, WI 54843

Nina Gilberg
10536N Airport Road
Hayward, WI 54843

Thomas and Karen Duffy
10544 Michigan Ave.
Hayward, WI 54843

Graham & Susan Van Dixhorn
10548N Riverside Rd
Hayward, WI 54843

Howard & Susan Gold
10561 Gresylon Drive
Hayward, WI 54843

Lynn & Dustin Burnette
10564N Riverside Road
Hayward, WI 54843

Bruce & Kathleen Aubart
10584N Riverside Road
Hayward, WI 54843

James Miller
10591 N Airport Road
Hayward, WI 54843

Airport Sawyer County
10610 Main Street, Suite 10
Hayward, WI 54843

Diane Fischer
10604N Riverside Road
Hayward, WI 54843

William Lontz
10643N Airport Road
Hayward, WI 54843

Dan & Jo Anne Cobb
10646N Riverside Road
Hayward, WI 54843

John & Gloria Skylondz, Jr.
10678N Riverside Road
Hayward, WI 54843

Hayward Adjacent Owners (continued)

Bradley & Kathleen Heinkel
1109 Blue Ridge Drive
Green Bay WI 53404

Loren & Katie Nelson
11355N Sunset Circle
Hayward, WI 54843

RCP Properties, LLC
11674W State Hwy 77
Hayward, WI 54843

Thomas & Vera Marquardt
118 Knoll Circle E.
Burnsville, MN 55337

Paul & Renee Adler
122 Hudson Street
Eau Claire, WI 54703

Charles Johansen & William Johnson
12905W County Road OO
Hayward, WI 54843

Thomas Sapp & Mary Smith-Sapp
13343 Glenhaven Court
Apple Valley, MN 55124

Daniel & Brenda Grubbs
136 Bates Tower Road
Iron River, MI 49935

Owen & Anne Marie Larson
13645W Lenroot Lane
Hayward, WI 54843

Donald & Karibeth Aderman
15167W Spring Creek Road
Hayward, WI 54843

Elvie & Elizabeth Martin
15222W State Hwy. 77
Hayward, WI 54843

Jacob & Hannah Johnson
15244W Chippewa Trail
Hayward, WI 54843

Michael Nichols
15254W Chippewa Trail
Hayward, WI 54843

Gregory & Jacqueline Gerard
1529 South Point Drive
Hudson, WI 54016

Lionel & Roberta Johnson
15312W Chippewa Trail
Hayward, WI 54843

Paul & Juanita Bartz
15324W Chippewa Trail
Hayward, WI 54843

David & Rhonda Tworek
15333W State Hwy. 77
Hayward, WI 54843

David & Joyce Kolstad
15342W Chippewa Trail
Hayward, WI 54843

Barbara Kirley
15358W Chippewa Trail
Hayward, WI 54843

Seymour Trust No. 2006
15383W County Hwy. B
Hayward, WI 54843

Dale & Ruth Jorgensen
15458 Lindholm Drive
Hayward, WI 54843

Town of Hayward
15460W State Hwy. 77
Hayward, WI 54843

Hayward Adjacent Owners (continued)

Douglas Ruckdaschel & Lina Joubert Castro
15464 Lindholm Drive
Hayward, WI 54843

Salty Walrus Family Trust
15535 Lakewood Drive
Hayward, WI 54843

Leonard & Carol Anderson
15536 County Hwy. B, Unit A3
Hayward, WI 54843

Alexander Kaluza
15536 County Hwy. B, Unit A4
Hayward, WI 54843

Cheryl Beaver
15536 County Hwy. B, Unit B2
Hayward, WI 54843

Grace Fanning
15536 County Hwy B, Unit B3
Hayward, WI 54843

Ronald & Bonnie Kubarek
15551 Davis Ave.
Hayward, WI 54843

Myrna Huber & Carl Henriksen
15583 Lakewood Drive
Hayward, WI 54843

Northwoods Lodging, LLC
15586 County Hwy. B
Hayward, WI 54843

Roger Hartnett Trust
15591 Lakewood Drive
Hayward, WI 54843

Robert & June Kinney
15607 Lakewood Drive
Hayward, WI 54843

James Miller
15611 Lakewood Drive
Hayward, WI 54843

Douglas Pluim & Lisa Voeltz
15617 Lakewood Drive
Hayward, WI 54843

Michael & Traci Christopherson
15623 Lakewood Drive
Hayward, WI 54843

Kathleen Lamphere
15627 Lakewood Drive
Hayward, WI 54843

Warren & Denise Jensen
15631 Lakewood Drive
Hayward, WI 54843

Paul & Carolyn Van Natta
15639 Lakewood Drive
Hayward, WI 54843

Derry & Trudy Flynn
15643 Lakewood Drive
Hayward, WI 54843

William & Dana Carothers
15653 Lakewood Drive
Hayward, WI 54843

Raymond & Martha Moeller Rev Ttrust
15659 Lakewood Drive
Hayward, WI 54843

Timothy Manych & Susan Kettler
15665 Lakewood Drive
Hayward, WI 54843

Joel & Lois Slabe
15670 Lake Drive
Hayward, WI 54843

Hayward Adjacent Owners (continued)

Alfred & Marlys Voight
15673 Lakewood Drive
Hayward, WI 54843

Bonnies Florist & Greenhouse Inc.
15691 Davis Ave.
Hayward, WI 54843

Emmaj Young
15793 Third Street
Hayward, WI 54843

Arclin Surfaces Inc.
15859 Dyno Drive
Hayward, WI 54843

Steven & Janean Winter
15951 607th Ave.
Mapleton, MN 56065

Denise Marquardt
15995 Fourth Street
Hayward, WI 54843

Bennett & Maureen Pastika Rev Trust
1624 32nd Ave.
Kenosha, WI 53144

Miller Family Trust
16566 N 104th Way
Scottsdale, AZ 85255

WI Dept. of Transportation Dist. 8
1701 N 4th Street
Superior, WI 54880-1068

Jeffrey & Delores Folmer
177 Rosewood Drive N
Lake Placid, FL 33852

Imwinkelried Family Trust U/A May 3 1996
1837 White Sands Lane
Davis, CA 95616

Stephen & Michael Keenan
187 W Canyon Drive
Hudson, WI 54016

Coborn's Inc.
1921 Coborn Blvd.
St. Cloud, MN 56301

Patricia Gillette
206 Glen Hollow Road
Madison, WI 53705

Thomas & Dawn Czajkowski
206 Roller Ave.
Beaver Dam, WI 53916

Susan Aaker & C. Scott Gordon
2073 149th Ave, NW
Andover, MN 55304

Donald & Mary Jo Mleziva Rev Trust
2120 Wisconsin Ave. North
Golden Valley, MN 55427-3365

James & Cheryl Kammerer
2191 Rugged Mesa Drive
Laughlin, NV 89029

Jeremy Pomeroy
226341 Kingbird Ave.
Wausau, WI 54401

La Ronge Fam Irrev Trust
27665 Bryn mawr Place
Shorewood, MN 55331

Cheq Village LLC
2810 W Skyline Pkwy.
Duluth, MN 55806

Lloyd & Shelley Brandon
2905 8th Ave. SW
Austin, MN 55912

Hayward Adjacent Owners (continued)

Monica Mueller
310 E Church Street No.204
Libertyville, IL 60048

Terrance Nutt & Deborah De Grio
35 Beech Street Apt. 24
Homosassa, FL 34446-7900

Cynthia Garretson
3966 Glenview Ave.
Arden Hills, MN 55112

Mary Kathleen Skinner
41 Contessa Drive
Springfield, MA 01119-1610

Delfa Dunalp Trust
4113 Hillcrest Drive
Madison, WI 53705

Michael Stiegler & Sonja Savre
4115 Forestview Lane N.
Plymouth, MN 55441

Pamela Clark
4200 N Stanwyck Terrace
Beverly Hills, FL 34465-4776

William & Julie Zawistowski
4217N Sissabagama Road
Stone Lake, WI 54876

Larry & Ellen Nelson
47455 Old Grade Road
Cable, WI 54821

Kenneth Pfankuch
4786 South 22 Road
South Range, WI 54874

Vlack LLC
4901 Island Beach Lane
Duluth, MN 55803

Thomas & Robin Tedlund
5016 Lester River Road
Duluth, MN 55804

Kelly & John Karesh
508 Blackhawk Drive
Westmont, IL 60559-1523

Daniel Tucker
546 Augusta Drive
Canton, GA 30115

Nicholas & Christina Berens
5468 Lindholm Drive
Hayward, WI 54843

Robert Reeve, Jr.
5517 Triple Crown Drive
Frederick, CO 80504

Daniel & Lenore Theobald
5646 Lakeview Drive
Clear Lake, IA 50428

Brian & Janet Werst
5715 Old Legacy Drive
Fort Collins, CO 80528

Jennifer Kiesl & Stephani Binder
5731 East Muriel Drive
Scottsdale, AZ 85254

Namekagon Cottages, LLC
6719 44th Ave. N
Crystal, MN 55428

Trunorth Trust
721 1st Street, Suite 404
Hudson, WI 54016-4420

Dahmen Living Trust
7421 Kickaboo Road
Waunakee, WI 53597

Hayward Adjacent Owners (continued)

Lakes Community Health Center Inc.
7665 US Hwy 2
Iron River, WI 54847

Rice Lake Building Group LLC
827 Hammond Ave.
Rice Lake, WI 54868

Steven & Kim Olson
84 Springhill Bay
Hudson, WI 54016-7742

Darren & Alison Hendrickson
8756 E. Baldwin Ave.
Solon Springs, WI 54873-8156

Patrick David & Molly Kaye Bushman
935 Bluff View Circler
Chippewa Falls, WI 54729

Hayward Outfitters Land Co, LLC
15752 S. First Street
Hayward, WI 54843

Sidney & Eileen Faith Lysaker Family Trust
11901W Blue Island Road
Hayward, WI 54843

Aaron & Rebecca Niemuth
N2396 County Road K
Waupaca, WI 54981

Hayward Cabins LLC
N7070 Hayes Road
Durand, WI 54981

Dennis & Avid Pecha
N8273 County Hwy. E
Hayward, WI 54843

Charles & Lisa Tart
PO Box 13187
Hayward, WI 54843

Jean & Gerald Zowin
PO Box 13309
Hayward, WI 54843

Derek & Linda Hand
PO Box 135
Hayward, WI 54843

Lee & Mary Jo Neuschwander
PO Box 1374
Hayward, WI 54843

Fred Scheer III
PO Box 221
Hayward, WI 54843

MP Bay Ave, LLC
PO Box 274
Hayward, WI 54843

Kelly & Lynne Lindquist
PO Box 323
Hayward, WI 54843

Salvadore & Susan Borsellino Jr &
Le Roy Borsellino
PO Box 34
Cable WI 54821-0034

Joseph & Clarice Kreyer
PO Box 365
Hayward, WI 54843

Carlton & Paula De Witt
PO Box 38
Glenwood City, WI 54013-0038

Darwin & Elizabeth Karl
PO Box 481
Frederick WI 54837

Susan Vlasak
PO Box 508
Hayward, WI 54843

Hayward Adjacent Owners (continued)

Craig Malkow
PO Box 535336
Grand Prairie, TX 75053

Lumberjack World Championship Foundation
PO Box 666
Hayward, WI 54843

National Fresh Water Fishing Hall of Fame
PO Box 690
Hayward, WI 54843

Linda Emery Derber Trust
PO Box 699
Hayward, WI 54843

Miley Building LLC
PO Box 700
Hayward, WI 54843

Michael Kelsey
PO Box 718
Hayward, WI 54843

Robert Novak
PO Box 749
Hayward, WI 54843

Theodore & Charlotte Schwenker Trust
PO Box 797
Hayward, WI 54843

Darrell Thompson Sr.
PO Box 806
Hayward, WI 54843

Jeffery & Jaime Romsos
PO Box 89
Hayward, WI 54843

Robert & Janet Olson
PO Box 897
Hayward, WI 54843

American Birkebeiner Ski Foundation
PO Box 911
Hayward, WI 54843

Thomas & Carol Duffy
PO Box 965
Hayward, WI 54843

Christopher & Lu Ann Bauer
S394 Steinke Road
Hayward, WI 54843

Ronan LLC
W7237 Rappy Lake Road
Trego, WI 54888

Bradley & Carrie Reuter
W838 County Road E
Arcadia, WI 54612

Trego Adjacent Owners

Alan Russel & Karen Jean Nelson
N7467 Liesch Road
Trego, WI 54888

Allan & Sally Letheby
W6253 River Road
Trego, WI 54888

Amy & Corey Busker
7132 McCann Court
Savage, MN 55378

Arthur Higinbotham
2213 Hidden Valley Road
Northfield, MN 55057

Barbara Emerson
N7742 Bushey Road
Trego, WI 54888

Barbara Booth Trust
801 S Harvard Ave.
Villa Park, IL 60181

Barry Rye
N7547 Liesch Rd
Trego, WI 54888

Benjamin & Allison Westerberg
301 Oak Grove Street
Minneapolis, MN 55403

Beverly Stencel
N7792 Bushey Road
Trego, WI 54888

Black Canyon Trust
W6004 Pair O Lakes Road
Trego, WI 54888

Brent Wisner
PO Box 21
Wilton, WI 54670

Brian & Margaret Gongoll
W5877 O Brien Road
Trego, WI 54888

Brian Casey
490 Myrtle Ave, Apt. 7K
Brooklyn, NY 11205

Brian & Ginger Pahos
N8226 Baker Lane
Trego, WI 54888

Brian & Amy Kizer
9459 Woodridge Court
Savage, MN 55378

Brian & Angela Koehler
4132 114th Lane NE
Blaine, MN 55449

Bruce & Kathleen Meier
890 Ridge Road
Owatonna, MN 55060

Caleb & Susan Trusler Scharf
4352 Meadow Lane
Eau Claire, WI 54701

Carol Avery
W6066 Pair O Lakes Road
Trego, WI 54888

Carol Geiger
W5773 O Brien Road
Trego, WI 54888

Carrie & Katherine Poser
3035 Eddy Lane
Eau Claire, WI 54703

Catherine Korthals
N8524 Ricci Road
Trego, WI 54888

Trego Adjacent Owners (continued)

Charles E. & Charles O. Lawrence
7797 N State Road 23
Walkerton, IN 46574

Charles Petersen & Anna Korinko
5504 12th Ave. S
Minneapolis, MN 55417

Charles & Deanne Schmidt Trust
20169 Apple Tree Lane
Estero, FL 33928

Cheryl Lea Mann
N7513 Wood Drive
Trego, WI 54888

Constance Pearson
140 Stratford Way
Hudson, WI 54016

Craig & Donna Roesler
N7776 Bushey Road
Trego, WI 54888

Cynthia Otten & Nick Youker
578 Country Oaks Lane
River Falls, WI 54022

Cynthia Stoltz
711 Elm Street W
Stillwater, MN 55082

D2JQ LLC
4030 York Ave. S
Minneapolis, MN 55410

Dale & Chloe Hendrickson
2049 County Road J
Baldwin, WI 54002

Daniel & Jill Durose
2515 Silver Lake Road NW
New Brighton, MN 55112

Daniel Mundt Sr. Trust
306 Rainbow Street
Duluth, MN 55811

Daniel & Debra l Sullivan
N8393 River Road
Trego, WI 54888

Daniel Grubish & Stacy Mitchell
10830 Thone Circle
Woodbury, MN 55129

Daniel Liver
5807 S Kings Valley Court
Byers, Colorado 80103

Danny & Mary Berhow
N7521 Wood Drive
Trego, WI 54888

David & Sally Hopkinson
2266 Princeton Ave.
Saint Paul, MN 55105

David & Donna Heyer
N7539 Liesch Road
Trego, WI 54888

David Parker
N7473 Liesch Road
Trego, WI 54888

David Daniel & Jenny Lynn Busch
105 N Meadow Lane
Roberts, WI 54023

David & Sarah Clark
6956 Bridgemarker Drive
Grand Prairie, TX 75054

David & Sharon Makela
N7555 Liesch Road
Trego, WI 54888

Trego Adjacent Owners (continued)

David & Theresa Scheder
1590 95th Street
New Richmond, WI 54017

David & Kathleen Fletcher
W5942 Pair O Lakes Road
Trego, WI 54888

David & Victoria Shaffer
N6828 Mackey Road
Springbrook, WI 54875

David Vincent Jr. & Cynthia Vincent
9634 106th Ave. N.
Maple Grove, MN 55369

David & Julie Hogeboom
704 E 5th Street
Coal Valley, IL 61240

David & Elaine Arnold
6108 Creek Line Drive
Minnetonka, MN 55345

David & Dawn Dodge
N8184 Baker Lane
Trego, WI 54888

David & Lisa Wangen
16301 Griffon Court
Lakeville, MN 55044

Dean & Mary Johnson
1424 Saint Claire
Saint Paul, MN 55105

Debi Johnson
W6414 Namekagon Drive
Trego, WI 54888

Deborah Tessmer & Doreen Cory
W5944 Pair O Lakes Road
Trego, WI 54888

Deering Family Trust
13155 Ottawa Court
Savage, MN 55378

Donna Kodet
2517 Saint Anthony Blvd.
Saint Anthony, MN 55418

Donna Leehey
N8423 River Road
Trego, WI 54888

Douglas Eugene & Pamela Jean Roose
W6062 Pair O Lakes Road
Trego, WI 54888

Douglas G. & Joann M. Kirchner
N6279 740th Street
Beldenville, WI 54003

Drew Allen Ringwald
W5893 O Brien Road
Trego, WI 54888

Duane Grimm Jr.
W6783 Bull Creek Road
Trego, WI 54888

Eric Ostrem
623 Kirchner Ave.
Mendota Heights, MN 55118

Ernest & Mary Emerson Trust
9 Dobbin Lane
Rolling Hills Estate, CA 90274

Eugene & Judith Brunette Trust
10375 Upper 196 Way W
Lakeville, MN 55044

Floyd Hansen Trust
2531 Orchard Lane
White Bear Lake, MN 55110

Trego Adjacent Owners (continued)

Francis & Lisa Joyce
4812 Waylon Street
Eau Claire, WI 54703

Frank & Cheryl Klink
13803 55th Street N.
Oak Park Heights, MN 55082

Frases Bay Park Resort
N8347 Bay Park Road
Trego, WI 54888

Frederick Mundt Trust
3616 Edwardsville Road
Edwardsville, IL 62025

Gail & Ruth Lynum
W6058 Pair O Lakes Road
Trego, WI 54888

Gary Allan & Carolyn Kaiser
2964 35th Ave.
Elk Mound, WI 54739

Gary & Janelle Schmitz
19825 Orr Ave.
Hastings, MN 55033

Geoffrey & Jill Shuger
N7756 Bushey Road
Trego, WI 54888

Gerald Tepsa
1709 Moss Road
Fall Creek, WI 54742

Gerald Schneider
2072 Australia Way W, Apt. 16
Clearwater, FL 33763

Germaine Roman Trust
N8434 County Hwy. K
Trego, WI 54888

Glenn & Lorri Peterman
613 Newcastle Lane
Grand Prairie, TX 75052

Gregg & Terry Schindeldecker
PO Box 47
Shell Lake, WI 54871

Gregory & Lori Babin
4641 Helmo Ave. N
Oakdale, MN 55128

Gregory & Melissa Gauger
1120 Second Street
Spooner, WI 54801

Gregory Sulek Trust
2610 W Manitou Trail
McHenry, IL 60051

Gregory & Shelly Stage
31723 Newport Curve
Lindstrom, MN 55045

Heather Mclean
927 E 9th Street
Duluth, MN 55805

J Patrick & Heather Nally
8157 E 300 N
Fowler, IN 47944

James Irrgang
N7536 Ruby Drive
Trego, WI 54888

James & Kathy Shattuck
N8760 River Road
Trego, WI 54888

James & Ulla Marianne Wettstein
W6000 Pair O Lakes Road
Trego, WI 54888

Trego Adjacent Owners (continued)

James & Susan Riege
290 Elmer Street
Platteville, WI 53818

James Walther
N9881 Gardner Lake Road
Springbrook, WI 54875

Janice Chaffee
N8617 Ricci Road
Trego, WI 54888

Jay Wallish & Jean Rowles
1432 Rose Place
Roseville, MN 55113

Jay Grimm & Jean Serum
N8640 River Road
Trego, WI 54888

Jeffrey & Kathy Potocnik
N7420 Trego Haven Road
Trego, WI 54888

Jeffrey & Shelby Shirley
44998 150th Ave.
Zumbrota, MN 55992

Jeffrey Johnson
6837 Orchard Ave. N
Brooklyn Center, MN 55429

Jeffrey Petro, Sr. & Sheryl Petro
1993 Woodland Drive
Caledonia, WI 53108

Jeffrey & Gail Meier
1724 N Jefferson Street
New Ulm, MN 56073

Jeffrey & Jennifer Gutzmer
414 Roosevelt Drive
Dresser, WI 54009

Jeffri & Jane Erdman
W6006 Pair O Lakes Road
Trego, WI 54888

Jennifer Drazkowski & Christopher Driscoll
4512 29th Ave. S
Minneapolis, MN 55406

Jill Marie Crumpler
12664 Central Ave NE, Apt. 229
Blaine, MN 55434

Jodi Brendel
3845 Joppa Ave. S
Minneapolis, MN 55406

Joe & Julie Kusilek
120 Stratford Way
Hudson, WI 54016

Joel & Kathleen Cleveland
905 Kingsview Lane N
Plymouth, MN 55447

John & Kathleen Schaefer
10108 Drew Lane N
Brooklyn Park, MN 55443

John Kirkwood
1944 Beaver Dam Court
Eagan, MN 55122

John & Bonnie Linde
1208 Trappers Path
Buffalo, MN 55313

John Peter Warian Trust
6580 Jocelyn Road N
Stillwater, MN 55082

John & Paula Ford
370 Bianco Drive
Elk Grove Village, IL 60007

Trego Adjacent Owners (continued)

John Zweber & Emily Cloutier
3790 Rustic Place
Shoreview, MN 55126

Johnson Trust
N8416 Bay Park Road
Trego, WI 54888

Jones Trust
1420 Harmony Drive
Mahtomedi, MN 55155

Joseph & Tara Corbett
5501 Doncaster Way
Edina, MN 55436

Joseph & Carolyn Weber Trust
M6074 Highway U
Portage, WI 53901

Joseph & Gerald Nordquist Trust
3015 35th Ave.
Rock Island, IL 61201

Judith & Thomas Ketcik
7321 Oakwood Ave.
Los Angeles, CA 90036

Judith Vincent Trust
107 Bridgewater Way Apt. 107
Stillwater, MN 55082

Karl & Elizabeth Sievers
4104 Crystal Court
Norman, OK 73072

Kathryn Huemoeller Trust
2880 Center Road SW
Prior Lake, MN 55372

Keith Buttleman Trust & Barbara Luck Trust
2503 Haller Lane E
Maplewood, MN 55119

Kenneth & Susan Holm
4400 Sportsman Drive
Eau Claire, WI 54703

Kenneth & Pamela Johnson
1214 139th Street E
Rosemount, MN 55068

Kevin & Suzanne Bohnsack
14956 Oakcrest Circle
Savage, MN 55378

Kevin & Stephanie Leasure
2738 139th Lane NW
Andover, MN 55304

Kim & Carol Mclennan
N7569 Wood Drive
Trego, WI 54888

Kirk & Janet Doman
2543 Haller Lane E
Maplewood, MN 55119

Larry & Dawn Kanarski
7006 Crest Drive
Maple Grove, MN 55119

Larry Neil & Helen Faye Pederson
W6381 Namekagon Drive
Trego, WI 54888

Lawrence & June Daellenbach
2218 Barnabee Road
LaCrosse, WI 54601

Lee & Susan Johnson
5263 Nolan Pkwy.
Oak Park Heights, MN 55082

Leslie & Elizabeth Dwight
1652 Hague Ave.
Saint Paul, MN 55104

Trego Adjacent Owners (continued)

Lisa & James Kirk
6812 Cloverdale Ave.
Crystal, MN 55428

Lois Truh Trust
719 Iowa Ave. SE
Huron, SD 53750

Lorraine Wolden
10909 Sheridan Ave. S
Bloomington, MN 55431

Louis & Mary Villella
N8390 Bay Park Road
Trego, WI 54888

Lynn Ann & Gary Lloyd
1350 Edgerton Street
Saint Paul, MN 55130

Marilyn Kaneshiro
522 Vale Street
Spooner, WI 54801

Marjorie Costello
504 Scalzo Drive
Spooner, WI 54801

Mark & Alice Jarstad
201 Dugan Ave.
Wabasha, MN 55981

Mark & Deborah Brinkman
4327 Alabama Ave. S
Saint Louis Park, MN 55416

Mark & Theresa Hei
565 Flora Street S
Prescott, WI 54021

Mark Fritz Sr. Le & Janet Fritz Le
N7499 Liesch Road
Trego, WI 54888

Mark & Michelle Andersen
844 Winslow Ave.
Saint Paul, MN 55107

Mark & Cynthia Fagerstrom
4333 Beaver Dam Road
Eagan, MN 55122

Marlene Sexton
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Mary Fox
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Mary Krieg Trust
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Wadsworth, IL 60083

Mary Poplawski & Jean Podoll
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Michael & Hollie Yeager
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Michael & Brenda Barr-Klabacka
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Sun Prairie, WI 53590

Michael Hermann
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Rochester, MN 55906

Myrle & Cheryl Pumper-Duden
W5995 Ross Road
Trego, WI 54888

Nancy Markgren & Kimberly Fox
N5652 White Oak Court
Spooner, WI 54801

Nathan & Amy Alpert
10970 Kingsborough Court
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Nathan Daedlow & Emily Benz
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Trego, WI 54888

Nicholas & Karen Tseffos Trust
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Appleton, WI 54914

Northside Story LLC
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Plymouth, MN 55442

Pamela Holden
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Augusta, WI 54722

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Eagan, MN 55122

Paul & Sandra Swenson
N8117 River Road
Trego, WI 54888

Paul & Margo Weyandt
W6384 Namekagon Drive
Trego, WI 54888

Paul & Patricia Forsman
N7557 Wood Drive
Trego, WI 54888

Perry & Jeanne Labelle
N8125 River Road
Trego, WI 54888

Philip & Julie Swintek Trust
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Phillip & Marie Schuettpelz
N7724 Bushey Road
Trego, WI 54888

Pierce Trust
N7865 Trego Landing Road
Trego, WI 54888

Pierce Trust
N7901 Trego Landing Road
Trego, WI 54888

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Trego Adjacent Owners (continued)

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Riber Trust
W6139 River Road
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201 Saratoga Circle
Madison, WI 53705

Richard Ford Family Trust
325 Charing Cross Road
Elk Grove Village, IL 60007

Richard & Chandra Speich
W6652 Smock Valley Road
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Richard & Sandra Mc Mahon Trust
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Robert & Lauriann Seaton Trust
258 19th Ave. S
South Saint Paul, MN 55075

Robert Klinger Jr. & Barbara Jean Klinger
W6061 Green Road
Trego, WI 54888

Robin Bridge Trust
W6054 Pair O Lakes Road
Trego, WI 54888

Roger & Karen Turner
N8375 River Road
Trego, WI 54888

Ronald & Marie Clare
N7748 Bushey Road
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Ronald & Tracy Leigh Carmody
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Soholt Family Land Trust
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Wane & Mary Olson
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Blaine, MN 55449

NPS Comments on DLA

United States Department of the Interior
National Park Service
St. Croix National Scenic Riverway
401 N. Hamilton Street
St. Croix Falls, Wisconsin 54024

IN REPLY REFER TO:
1.A.1

September 22, 2023

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N. E., Room 1A
Washington, D.C. 20426

Re: National Park Service Comments on Xcel Energy's Draft License Application for the Hayward (P-2417) and Trego (P-2711) Hydroelectric Projects.

The National Park Service (NPS) has reviewed Xcel Energy's (Licensee) Draft License Application (DLA) for the Hayward and Trego Projects dated June 29, 2023. The NPS recommends the following, which are expanded upon within the attached enclosures. Enclosure 1 contains NPS recommendations on the Licensee's application documents. Enclosure 2 contains information on the Wild and Scenic River Section 7(a) Determination process. Enclosure 3 consists of specific comments and questions on the DLA.

The NPS authority to consult with the Federal Energy Regulatory Commission (FERC) and Applicants concerning a project's effects on outdoor recreation resources is found within the Federal Power Act (18 CFR 4.38(a), 5.41(f)(4)-(6), and 16.8(a)); the Outdoor Recreation Act (Pub Law 88-29), the NPS Organic Act (39 Stat. 535), the National Trails System Act (Public Law 90-543), the National Trails System (Public Law 96-370), and the Wild and Scenic Rivers Act (PL 90-542).

The Hayward and Trego Hydroelectric Projects are on the Namekagon River, within the St. Croix National Scenic Riverway, a unit of the National Park System and Wild and Scenic River System. The St. Croix National Scenic Riverway was established when the enabling legislation, the Wild and Scenic Rivers Act, was signed into law on October 2, 1968. The purpose of the St. Croix National Scenic Riverway is to preserve, protect, and enhance the values of the St. Croix and Namekagon rivers and their immediate environment for the benefit and enjoyment of present and future generations. The Riverway was designated as a wild and scenic river for the following values: free-flowing character; exceptional water quality; and aquatic, riparian, recreational, cultural, geologic, scenic, and-aesthetic.

The NPS appreciates consideration of these comments on the Hayward and Trego DLA. Should you have any questions or comments, please contact Lisa Yager, Chief of Resource Stewardship and Education, at lisa_yager@nps.gov or 715-483-2290.

Sincerely,

CRAIG HANSEN Digitally signed by CRAIG HANSEN Date: 2023.09.26 16:30:28 -05'00'

Craig Hansen
Superintendent, St. Croix National Scenic Riverway

Enclosures:
Enclosure 1 – NPS Recommendations
Enclosure 2 – Wild and Scenic River Section 7 Determination
Enclosure 3 – Specific Comments and Questions on the Draft License Application

Enclosure 1 – NPS Recommendations

This enclosure contains the National Park Service (NPS) 10(a) recommendations under the Federal Power Act.

10(a) Recommendations

1. **Develop a Comprehensive Vegetation and Recreation Management Plan for Trego**

The NPS recommends that the Licensee develop a Comprehensive Vegetation and Recreation Management Plan (Plan) that addresses the following issues:

- Sedimentation
- Vegetation
- Recreation

Xcel should develop the Plan in consultation with the NPS, Wisconsin Department of Natural Resources (WDNR), and Trego Lake District (TLD). The Plan should, at a minimum:

- Define the roles and responsibilities of Xcel Energy and consulting parties.

Vegetation Management Plan Components:

- Expand the Licensee's proposed aquatic and terrestrial invasive species biennial surveys[1] to map and monitor the extent of wild rice and other native vegetation. The surveys should also include mapping the water depths and substrates to understand the sedimentation and how that affects growth patterns. After each biennial survey, evaluate the change in aquatic vegetation over time to identify trends. This would allow an understanding of the extent of all vegetation that may impede recreation access. It would also provide an understanding of changes over time in native vegetation locations and quantity, including wild rice, a significant cultural resource.

- Expand the geographic scope of the Plan and surveys to include the upstream area Xcel has proposed to remove from the Project boundary.

- Develop the proposed aquatic and terrestrial invasive species rapid response action in consultation with NPS, TLD, WDNR, NPS, and interested Tribal Governments.

- Identify management actions to address recreation access and manage wild rice in consultation with the Tribes, NPS, WDNR, and TLD.

- Review and incorporate input from other plans and studies conducted by WDNR, TLD, and NPS to inform management and rapid response actions.

Recreation Management Plan Components:

The NPS supports the proposals from Xcel at the Trego Project North Tailwater Access / Canoe Portage and South Tailwater Access identified in the Draft License Application (DLA). The NPS recommends that

[1] Northern States Power Company, a Wisconsin corporation submits Draft License Application for the relicensing of the Hayward Hydroelectric Project et. al. under P-2417 et. Al., Accession Number: 20230629-5179, June 29, 2023, Draft License Application – Exhibit E, p. 159.

Xcel implement their proposals along with the following bullets in the Recreation Management Plan and at the Project recreation facilities:

- North Tailwater Access / Canoe Portage
    - Regularly clean and maintain the take-out on Trego Lake of vegetation and sediment.
    - Improve entrance to North Tailwater Access portage and tailwater fishing sites from the gravel access road and River Road shoulder.
    - Include the access path in current mowing intervals to help minimize presence of ticks and create a safer environment for recreationists.
    - Improve the put-in by adding signage.
    - Expand the fishing area, add trash receptacles and rod holders.
- South Tailwater Access
    - Provide barrier-free picnic tables, a viewing area, and parking spot(s) at the South Tailwater Access.
    - Install and maintain trash receptacles.
    - Replace existing and add signage, expand the fishing area, and evaluate lighting needs at the stairway.
- Non-Licensee Owned Recreation Sites. Two sites provide access to the flowage that Xcel does not own, including the Town of Trego Boat Landing and the Town of Trego Park Boat Landing. The consultants and visitors identified improvements to recreation facilities and experiences in the recreation study and visitor survey. The NPS recommends that Xcel partner with the owners of these facilities to improve recreation access and accessibility of these sites that provide access to the flowage.

- Monitor recreational use at the Project every five years to determine the adequacy of recreation facilities over the license term. Every ten years, conduct visitor surveys. Consult with NPS and other parties on potential actions needed.

- Report daily flow data (date/time, elevation (feet), discharge (cfs), and full pool (feet)).
- Conduct surveys and outreach to boating and paddling users, TLD, NPS, WDNR, Trego Town, and outfitters to document recreation access and navigational issues and concerns.

- Identify management actions to address recreation access and manage wild rice in consultation with the Tribes, NPS, WDNR, and TLD.

- Monitor and document the effectiveness and impacts of implemented vegetation management actions such as mechanical harvesting, dredging, drawdowns, invasive removals on recreational navigation, and wild rice preservation. Identify triggers for management alternatives, such as the need for a new public recreation access site.

- Schedule and conduct an annual coordination meeting with the NPS and other interested parties (e.g., Trego Lake District, WDNR) to discuss the measures needed to ensure public safety, manage Project recreation facilities and use, and meet Project visitor needs, consistent with applicable laws, regulations, and policies.

Vegetation and Recreation Plan Rationale:

FERC and Xcel address sedimentation, recreation access, and vegetation issues in current license requirements, including:

- Drawdown management plan – including studies of recreational use, the extent of aquatic vegetation, and analysis of the effect of the vegetation and sedimentation on recreational access and use (Article 405).
    - The Drawdown Management Plan article led to a FERC-approved Vegetation Management Plan.[2]
- Recreational improvements and maintenance – including regularly cutting emergent aquatic vegetation at its upstream canoe take-out area to improve access (Article 407)
- Periodic monitoring of recreation uses and needs (Article 408)

In the DLA, the Licensee proposes mitigation measures to address aquatic invasives through periodic surveys and rapid response. It also proposes one-time financial support for a mechanical harvester for the TLD to address recreational navigation in support of the 2022-2026 Trego Aquatic Plants Management Plan (APMP).

Given the trend of expansion of sedimentation and aquatic vegetation, including wild rice beds, to expand non-navigable areas, the NPS recommends that Xcel develop an integrated management plan to monitor use and create a framework for consideration of management actions. Given the changing conditions, the NPS recommends Xcel consider whether management alternatives other than mechanical harvesting may be needed during the new license term to ensure continued quality visitor experiences and wild rice protection. If the navigation issues continue to grow, a new recreation access will likely be needed during the license term. Other management actions to enhance wild rice beds may also be needed.

In addition, the NPS questions the adequacy of the proposed measure, a one-time financial support for purchasing a mechanical harvester, to address recreation navigational access and vegetation management issues through the 30–50-year license term. As stated above, the NPS questions whether mechanical harvesting is the only approach that will be needed and if this method will be appropriate for all vegetation management needs. The funding also does not seem adequate to cover the cost of purchasing, operating, maintaining, and storing a harvester over the life of the license.

The Trego Project reservoir offers a variety of recreation opportunities, including, but not limited to, boating, paddling, fishing, and birding. A Recreation Management Plan would address a long-term recreation vision for the Trego Reservoir, including opportunities for existing and potential future recreation needs. The Recreation Management Plan would also address ongoing management needs for recreation throughout the license term, which is needed to ensure the recreation experiences are enhanced and resources are protected. In addition, recommended improvements on the reservoir will help improve the overall recreational experience through maps, portage opportunities, signage, site improvements, fishing rod holders, and better management of the resources.

[2] Northern States Power Company, Vegetation Management Plan, under Article 405, (Document Accession # 19970115-0125), January 2, 1997.

The Licensee in the DLA does not propose to continue surveys to monitor the adequacy of recreational facilities or monitor native species, including wild rice. Given the close connection between these issues, the NPS recommends a comprehensive planning approach throughout the life of the license. Developing an integrated Plan will help address related sediment, vegetation, and recreation issues together. It will also allow for an adaptive approach to address changing conditions over time.

Furthermore, the NPS recommends that the Licensee monitor and publicize daily flow data. Daily flow data will help stakeholders better understand flow rates, pool elevations, and inform the public and visitors of what to expect while on the reservoir and riverway. Flow data information can be used to educate visitors on river and flowage conditions and improve safety. There is only one gauge at Leonards, which creates an information gap for the public, Tribes, and stakeholders. The publication of flow information could be online, real-time postings, similar to other hydropower projects. Flow is the key physical driver of the riverine environment and an indicator for visitor use and safety. The NPS requests that the Applicant share flow data and consult with the WDNR, TLD, and the NPS on the best way to communicate the information.

Trego Project Recreation Facilities Rationale:

- North Tailwater Access / Canoe Portage

At the Xcel-owned North Tailwater Access canoe portage take-out located on Trego Lake, the area is full of vegetation and muck. NPS staff used the Xcel's take-out to paddle Trego Lake. At the canoe portage take-out, NPS staff experienced a highly vegetated and muck-filled access site, see Photo 1 and 2. The access site needs to be regularly cleaned and maintained, especially during high recreation months, for easy access, visibility, and safety. Additionally, Xcel's DLA recognized the ongoing concerns regarding sedimentation and aquatic vegetation growth that impede recreational navigation.[3]

Another impediment to recreation at the North Tailwater Access is the chain-link fencing and walk-through door at the gravel access road and River Road. From direct experience of NPS staff, they found it difficult to carry their kayaks through the gated entrance area to access the North Tailwater Access site. The open walk-through gate was narrow and difficult to carry a kayak/canoe through. Recreationists must also make a sharp right turn when entering through the open gate to the access site. The sharp turn is required due to the entrance facing a forested area and berm, see Photo 3.

Moreover, Xcel should consider mitigations to minimize visitor exposure to ticks at the North Tailwater Access/Canoe Portage. The presence of ticks is a safety hazard due to the diseases they may carry, some of which can be serious. Since the site is already maintained through mowing, continuing a frequent mowing interval will help minimize the presence of ticks, tick-borne diseases, and create a safer environment for recreationists.

A further enhancement includes adding signage. There is limited signage at the North Tailwater Access/ Canoe Portage. The NPS supports Xcel's large, highly visible red take-out sign. Providing a kiosk with important safety information, emergency numbers, and maps of recreation sites within and outside of

[3] Northern States Power Company, a Wisconsin corporation submits Draft License Application for the relicensing of the Hayward Hydroelectric Project et. al. under P-2417 et. Al., Accession Number: 20230629-5179, June 29, 2023, Draft License Application – Exhibit E, Page E-191

the project boundary will aid recreationists in understanding their nearby surroundings and being able to orient themselves.

Survey respondents indicated they would like the fishing area expanded and to have fishing rod holders installed at the North Tailwater Access.[4] Tailwater fishing is a significant draw to recreationists. Enhancing and maintaining these measures will help meet current and future recreational needs. Installing and maintaining trash receptacles will also help visitors keep the site clean. This would help provide a safer and hygienic access and portage site. "NSPW does not provide waste receptacles at any of its recreational facilities."[5]

- South Tailwater Access

Providing barrier-free picnic tables, a viewing area, and parking spot(s) at the South Tailwater Access site with universal design standards will improve accessibility. People of all abilities should be able to recreate, and including barrier-free amenities at the South Tailwater Access will help meet that objective.

Survey respondents indicated a need for Xcel to install and maintain trash receptacles.[6] "NSPW does not provide waste receptacles at any of its recreational facilities"[7] With Xcel providing trash receptacles, it will help the site clean and safer. It would also help to minimize trash from entering the St. Croix National Scenic Riverway.

Survey respondents indicated that there is a need for Xcel to replace current signage, add new signage, expand the fishing area, and add lighting to the stairway.[8] These enhancements and improvements are supported and recommended by the NPS. Providing a kiosk and signage with important safety information, natural and cultural resource information, regulations, emergency numbers, and maps of recreation sites within and outside the Project boundary will aid recreationists in understanding their surroundings and being able to orient themselves. Moreover, tailwater fishing is a significant draw to recreationists. Expanding the tailwater fishing site and including rod holders would help enhance and meet current and future recreational needs. Furthermore, evaluating lighting needs will help stakeholders better understand what is needed at the stairway. Lighting can help create a safer environment for visitors. People usually fish early in the morning or late evening, when natural light is

[4] Northern States Power Company, a Wisconsin corporation submits Draft License Application for the relicensing of the Hayward Hydroelectric Project et. al. under P-2417 et. Al., Accession Number: 20230629-5179, June 29, 2023, Draft License Application – Exhibit E, Page E-189

[5] Northern States Power Company, a Wisconsin corporation submits Draft License Application for the relicensing of the Hayward Hydroelectric Project et. al. under P-2417 et. Al., Accession Number: 20230629-5179, June 29, 2023, Draft License Application – Exhibit E, Page E-98 and E-99

[6] Northern States Power Company, a Wisconsin corporation submits Draft License Application for the relicensing of the Hayward Hydroelectric Project et. al. under P-2417 et. Al., Accession Number: 20230629-5179, June 29, 2023, Draft License Application – Exhibit E, Page E-189

[7] Northern States Power Company, a Wisconsin corporation submits Draft License Application for the relicensing of the Hayward Hydroelectric Project et. al. under P-2417 et. Al., Accession Number: 20230629-5179, June 29, 2023, Draft License Application – Exhibit E, Page E-98 and E-99

[8] Northern States Power Company, a Wisconsin corporation submits Draft License Application for the relicensing of the Hayward Hydroelectric Project et. al. under P-2417 et. Al., Accession Number: 20230629-5179, June 29, 2023, Draft License Application – Exhibit E, Page E-189

minimal. Evaluating the need for a lighted stairway will help visitors find, ascend, and descend the staircase.

2. New Recreation Access Site

The NPS recommends that Xcel partner with the NPS and other interested parties to explore developing a new river access site to meet the current and projected future recreation demand.

New Access Rationale

As described in Recommendation 1 – Integrated Vegetation and Recreation Plan and Recommendation 11 – Boundary Change, the sedimentation and aquatic vegetation growth patterns at Trego Lake are causing recreation navigation issues. Recreation access and navigation at Trego Lake have grown more challenging throughout the life of this license. This trend is expected to continue throughout the new license term as more sediment accumulates behind the dam and aquatic vegetation and wild rice grow and expand. Trego Town Park and Landing provide public access to the upper end of the Project, but this area has problems with sediment and vegetation. Given the repercussions of this trend for recreation access, the NPS recommends that Xcel work with the NPS and other interested parties to explore developing a new access site to ensure the public can use the river.

3. Develop a Recreation Management Plan and Improvements at the Hayward Project:

The National Park Service recommends that Xcel implement a Recreation Management Plan (Plan) and improve and install recreation-related facilities and amenities at the Hayward Project.

Xcel should develop the Plan in consultation with the NPS and WDNR. The Plan should, at a minimum include the following:

- Define the roles and responsibilities of Xcel Energy and consulting parties.
- Implement the recreation facility improvements outlined below.
- Monitor the recreation facility condition and visitor use and develop management actions based on that monitoring over the life of the license as outlined below.

The NPS supports the proposals from Xcel at the Hayward Project identified in the DLA. The NPS recommends that Xcel implement their proposals along with the following bullets in the Recreation Management Plan and at Xcel's recreation facilities/sites:

Canoe Portage:

- Improve canoe portage signage and incorporate a map and safety information in a kiosk.

Location to Be Determined:

- Install and maintain barrier-free picnic tables, a viewing area, and parking spot(s).
- Install and maintain trash receptacles at the put-in, take-out, and tailwater fishing area.

Non-Licensee Managed Recreation Sites:

- Presently, three sites provide recreation access and opportunities to visit the flowage that Xcel does not own, including the Hayward City Boat Landing, Hayward City Beach & Barrier-Free Fishing Pier, and the Hayward Bartz's Bay Informal Ice Fishing Access. The consultants and visitors identified improvements to recreation facilities and experiences in the recreation study

and visitor survey. The NPS recommends that Xcel partner with the owners of these facilities to improve recreation access and accessibility of these sites that provide access to the flowage.

Further Hayward Recreation Management Plan Components

- Monitor recreational use at the Project every five years to determine the adequacy of recreation facilities over the license term. Every ten years, conduct visitor surveys. Consult with NPS and other parties on potential actions needed.
- Report daily flow data (date/time, elevation (feet), discharge (cfs), and full pool (feet))
- Conduct surveys and outreach to boating and paddling users, NPS, WDNR, the City of Hayward, and outfitters to document recreation access issues and concerns.
- Identify management actions to address recreation access in consultation with the NPS, WDNR, and the City of Hayward.
- The Licensee will schedule periodic coordination meetings with the NPS and other interested parties (e.g., City of Hayward, WDNR) to discuss the measures needed to ensure public safety, manage Project recreation facilities and use, and meet Project visitor needs, consistent with applicable laws, regulations, and policies.

Hayward Project Recreation Facilities and Management Plan Rationale:

At the Hayward project site, NPS staff examined Xcel-owned recreation sites. NPS supports Xcel reviewing and maintaining or improving signage, including a Part 8 sign, at the Canoe Portage Take-Out and Carry-In Access site. NPS recommends improvements to signage and additional signage. Signage was present for the canoe portage, but current signs are challenging to locate when portaging. Adding additional and improvements to signage to make it more visible will help recreationists understand where they need to go when portaging. Additionally, a kiosk with safety information, natural and cultural resource information, regulations, and maps that include recreation sites within and adjacent to the project boundary will aid recreationists in understanding their surroundings and being able to orient themselves.

Furthermore, the NPS recommends that the Licensee monitor and publicize daily flow data. Daily flow data will help stakeholders better understand flow rates, pool elevations, and inform the public and visitors of what to expect while on the reservoir and riverway. Flow data information can be used to educate visitors on river and flowage conditions and improve safety. There is only one gauge at Leonards, which creates an information gap for the public, Tribes, and stakeholders. The publication of flow information could be online, real-time postings, similar to other hydropower projects. Flow is the key physical driver of the riverine environment and indicator for visitor use and safety. The NPS requests that the Applicant share flow data and consult with the WDNR and the NPS on the best way to communicate the information.

Survey respondents indicated a need for barrier-free amenities and facilities at the Hayward Project.[9] Currently, "NSPW is not proposing to add picnic tables, barrier-free viewing, or barrier-free parking as

[9] Northern States Power Company, a Wisconsin corporation submits Draft License Application for the relicensing of the Hayward Hydroelectric Project et. al. under P-2417 et. Al., Accession Number: 20230629-5179, June 29, 2023, Recreation Report for the Hayward and Trego Hydroelectric Projects, Page 5-11

the Hayward City Beach already provides these facilities."[10] While accessible sites are provided at Hayward City Beach, installing and maintaining these amenities and facilities at the Project will increase and improve accessibility at the Hayward Project. The location should be determined in consultation with the NPS, WDNR, and other interested stakeholders.

There are no trash receptacles at Xcel-owned recreation sites at the Hayward Project. "NSPW does not provide waste receptacles at any of its recreational facilities."[11] Installing and maintaining trash receptacles will help keep public areas clean and provide a safer site for people to recreate. Additionally, trash receptacles can potentially help minimize and mitigate trash from entering the St. Croix National Scenic Riverway.

The Hayward Project reservoir offers a variety of recreation opportunities, including, but not limited to, boating, paddling, fishing, and birding. A Recreation Management Plan would address a long-term recreation vision for the Hayward Reservoir, including opportunities for existing and potential future recreation needs. The Recreation Management Plan would also address ongoing management needs for recreation throughout the license term, which is needed to ensure enhanced recreation experiences and protected resources. In addition, recommended improvements on the reservoir will help improve the overall recreational experience through maps, portage opportunities, signage, site improvements, barrier-free facilities, and better management of the resources.

4. Water Quality Monitoring and Management Plan(s) for Trego and Hayward

The NPS recommends that the Licensee develop a Water Quality Monitoring and Management Plan consistent with WDNR requirements and include consultation with the NPS and WDNR. The Plan should, at a minimum, include:

- Conduct water quality monitoring on regular internals of the flowage and river. The scope and level of effort should be similar to the baseline studies conducted during the relicensing process and follow WDNR protocols for the data.
- Based on the monitoring results, develop management actions to improve water quality parameters in consultation with the NPS and WDNR.
- Report daily discharge data annually (date/time, elevation (feet), discharge (CFS), full pool (feet), and temperature)
- The Plan shall be reviewed and updated periodically throughout the license in consultation with the NPS And WDNR.

Water Quality Rationale:

Water Quality is a river value and a fundamental value that needs to be protected and enhanced as part of the St. Croix National Scenic Riverway. Aquatic is an outstandingly remarkable value for these segments of the Riverway based on extensive and exemplary aquatic species assemblages. Exceptional

[10] Northern States Power Company, a Wisconsin corporation submits Draft License Application for the relicensing of the Hayward Hydroelectric Project et. al. under P-2417 et. Al., Accession Number: 20230629-5179, June 29, 2023, Draft License Application – Exhibit E, Page E-99

[11] Northern States Power Company, a Wisconsin corporation submits Draft License Application for the relicensing of the Hayward Hydroelectric Project et. al. under P-2417 et. Al., Accession Number: 20230629-5179, June 29, 2023, Draft License Application – Exhibit E, Page E-98 and E-99

water quality and largely free-flowing conditions provide unique habitat conditions, including stable substrates for mussels.

Water quality issues have been identified in and adjacent to the project area. In its water quality study, the Licensee identified impairment of water quality due to algae but did not identify a source of the problem. Harmful algae blooms and cyanobacteria have been found downstream in the St. Croix National Scenic Riverway. Harmful algae blooms and cyanobacteria can potentially affect public use and recreation. If additional water quality problems are identified in the future, there may be a need to develop public health and safety measures.

There is a potential for increased water temperatures associated with climate change, causing water quality problems. Although Xcel will utilize run-of-river to operate the projects, the presence of the dams may result in increased water retention times, exacerbating the water quality problem. Flow is the key physical driver of the riverine environment. Flow data is required to calculate concentration data and water quality loadings. Flow data is critical for analysis of water quality trends, nutrient loadings, and analysis of water quality trends (Magdalene et al. 2016).[12] Continuing to monitor water quality and flow/discharge and consult with WDNR and NPS on potential management actions to address issues identified during the monitoring will help ensure water quality is protected and visitor safety is addressed over the life of the license.

5. Shoreline Monitoring and Management Plan for Trego and Hayward

The NPS recommends that Xcel develop a Shoreline Monitoring and Management Plan (Plan). The Plan should, at a minimum, include the following:

- Develop survey protocols and methodology in consultation with the NPS, WDNR, and TLD.
- Conduct shoreline surveys within one year of licensing, followed by every five years to map and photo document the shoreline condition and erosion activity. Assess the changes over time to identify any issues with the shoreline, such as extensive erosion.
- The NPS recommends an adaptive approach based on the findings of the survey. If erosion occurs more rapidly, the NPS recommends Xcel complete the survey every two years. If the studies find little erosion, Xcel could move the survey interval to five years. Develop triggers within this Plan and the Historic Properties Management Plan that consider survey frequency in response to resource conditions, planned drawdowns, and after high-water events.
- Based on the results of the studies, develop management actions to address any issues in consultation with the NPS, WDNR, and TLD.
- The Plan should be reviewed and updated every five years in consultation with the NPS, WDNR, and TLD.

[12] Magdalene S., D.R. Engstrom, J. Elias, D. VanderMeulen, and R. Damstra. 2016. Large rivers water quality monitoring protocol: Great Lakes Inventory and Monitoring Network (Version 1.1). Natural Resource Report NPS/GLKN/NRR—2016/1262. National Park Service, Fort Collins, Colorado.

Shoreline Rationale:

Xcel proposes to conduct periodic shoreline surveys every ten years.[13] The NPS recommends that surveys be conducted more frequently to capture changes in the shoreline due to erosion and Licensee shoreline stabilization activities. A five-year survey timeframe is consistent with EPA National Lakes Assessment Design protocols.

In recent public meetings, the NPS has received comments and public concerns about the increased use and different types of boats compounding shoreline erosion. Xcel did not identify this issue in their recreation or shoreline surveys. The NPS recommends the Licensee develop a new shoreline survey and an adaptive approach to ensure public safety and protect shorelines from project operations and erosion from boat use.

6. Aesthetic Design Guidelines and Best Practices

The NPS recommends that the Licensee develop guidelines and best practices for visual, night sky, and soundscape protection. The guidelines and best practices will serve as a guide to future maintenance and capital improvement projects. Xcel should develop the guidelines in consultation with the NPS. The guidelines and best practices, at a minimum, should include:

- Visual design guidelines and best practices ensure the protection of the viewshed, and that future construction and maintenance projects blend in with the landscape. Guidelines should follow these principles:
  - Shape matters. Many landscapes have dominant characteristics related to forms and lines– irregular mountaintops, curving rivers, and horizontal plains. Echoing the natural forms and lines of the area will help a project fit in. For example, low, horizontal structures often blend in flat, open landscapes, while taller structures work better in areas with tall trees or buildings.
  - Be color-smart. Color is one of the most critical decisions in the design aspect of any project. Use colors that blend with the surrounding landscape to help your Project fit in. Dark colors recede, while light colors are usually more noticeable. Consider seasonal variation in the surrounding landscape when choosing colors.
  - Stay in scale. Plan the size and height (scale) of a project to fit with surrounding elements and not become a dominant feature. Avoid breaking the skyline from key vistas with new elements so the horizon retains its current character.
  - Site Right. Select sites for projects that will avoid or minimize adverse effects on existing views. Consider distance from key views, minimizing site footprints, and clustering development.
  - Keep them hidden. Screen project facilities with natural topography or vegetation when possible. Contouring and/or adding native plantings may be options for concealing projects when existing topography and vegetation are insufficient.

[13] Northern States Power Company, a Wisconsin corporation submits Draft License Application for the relicensing of the Hayward Hydroelectric Project et. al. under P-2417 et. Al., Accession Number: 20230629-5179, June 29, 2023, Draft License Application- Exhibit E – Page 26.

- Reflect on materials. Low-reflective materials help reduce glare from sunlight. More heavily textured materials in natural landscapes often blend better than those with a smooth finish.
- Keep your focus. Avoid creating new focal points. Successful projects can perform a function (e.g., directional signage or interpretive panels) without detracting from the visual experience.
- Vegetation. Consider selective clearing or thinning of vegetation as part of vista management if important views are blocked by vegetation. Also, promote the use of native species when revegetating disturbed areas. Avoid planting straight lines of trees or shrubs since artificial lines draw attention in a natural landscape.

- Night Sky guidelines and best practices should address project lighting needs and replacements. Existing lighting should be evaluated to see if the lighting is necessary or could be removed. Necessary lights should be replaced with dark sky friendly lights in the next replacement cycle. The NPS recommends the Licensee follow NPS guidelines found here and summarized below:
  - No Lighting at All – the first question in considering what type of outdoor lighting is appropriate for an area or structure/facility is whether there even needs to be a light.
  - LEDs in Warm Colors – 2700 Kelvin or below. Use energy-efficient LEDs that have a warm color hue, e.g., yellow, amber, not blue or white (note: the most highly efficient LEDs are not preferable because they have a lot of blue, which creates more glare and blind spots, has potential health effects, and isn't considered wildlife friendly).
  - Recessed and Fully Shielded – Hockey puck style lights that can be inserted under a soffit or some other architectural feature; avoid globes or diffusers that hang below the light fixture; use “full cut off” shielding – allows excess light to be directed downward and not upward.
  - No Upward Facing Lights – Outdoor lighting should be designed and installed to be downward facing (e.g., park signs and flags often have upward facing lighting that can be easily made to point downward.). Avoid lights that are directed laterally as well.
  - Lighting Fixtures That Include or Can Accommodate Timers, Motion Detectors, Hue Adapters, and Dimmers – these adaptive technologies can increase energy efficiency and substantially reduce impacts to park natural and cultural resources. Further, they can enhance visitor health and safety.
  - Lowest Lumens Possible – Lumens are the unit of measurement used to specify the intensity or brightness of LED bulbs. The number of lumens needed to light an area safely is usually much lower than most people think, especially outdoors. LEDs are also much brighter and more energy efficient than other types of lighting, so you can go with a much lower wattage LED and still have the same brightness level. For example, a 250-watt incandescent bulb has the same lumens as a 30-watt LED bulb. Field adjustable wattage selectors are also a good option for reducing impacts, increasing cost savings, and extending product life.
  - Proper Installation - Lights should be installed with the proper angle and height as designed. Another benefit of using LEDs for outdoor lighting is that LED luminaires allow for precise control of the beam spread. The size of the lighted area will change depending on the height of the fixture or pole, so the beam spread should be accounted for during installation to avoid lighting a greater area than needed. For example, a Type I beam

spread is typically used for roads, while Type V may be more appropriate for a parking lot. Proper installation and spread angle can also reduce the number of lights needed.

- Soundscape Protection Best Management Practices should include management strategies and operational scenarios to minimize noise caused by Project Operations and maintenance activities to reduce noise for projects that have the potential to impact wildlife and visitor experience.

Aesthetics Rationale:

Scenery and aesthetics are an outstandingly remarkable value of the Namekagon River. The Saint Croix National Scenic Riverway is known for its high aesthetic value. Visual impacts caused by construction and maintenance projects can impact visitor experiences at the Project and within the park. The NPS recommends that the Licensee follow the NPS guidelines to protect visual resources and prevent impacts from future license implementation and maintenance projects.

Noise and light pollution create audible and visual disruptions to natural areas. Scientific research shows they also have significant impacts on humans and wildlife. Light pollution disrupts people's sleep and children's behavior. Noise and light pollution can modify animals' overall fitness and predator-prey relationships. Affected areas can experience altered ecosystems when animals avoid or become attracted to artificial sound and light. The NPS's Natural Sounds and Night Skies Division is a global leader in working to reduce sound and light pollution. Since the Trego and Hayward projects are located within a National Park and on a National Wild and Scenic River, the NPS strongly recommends that the Licensee adopts best practices to protect night skies and soundscapes and minimize impacts caused by the Project's operation and maintenance.

7. Cultural Resources Programmatic Agreement and Historic Properties Management Plan

Section 1.3.4 states that "NSPW anticipates the Commission will meet its obligations under NHPA Section 106 through the execution of the Programmatic Agreement[14]." The NPS agrees with this statement that a new programmatic agreement (PA) should be *executed* for the purposes of the Hayward and Trego projects. A new PA is needed: to provide Tribal Nations the opportunity to be parties to and consult on the development of the Section 106 agreement; for the agreement to incorporate Tribal input and perspectives; and for the agreement to acknowledge reserved treaty rights and resources within the Project area. The NPS recommends developing the new PA with interested Tribal Nations, WI SHPO, the NPS, and any additional consulting parties. The NPS requested formal consulting party status to the Section 106 process for these undertakings pursuant to 36 CFR § 800.3(f) in a letter dated 04/27/21 to Secretary Kimberly Bose. As a formal consulting party to the Section 106 process, the NPS requests the opportunity to participate in the development of the PA to satisfy Section 106 for these undertakings occurring within the Congressionally-authorized boundary of this NPS unit.

Xcel also intends to develop a Historic Properties Management Plan (HPMP) for this Project. The HPMP should be developed in consultation with the Wisconsin SHPO, interested Tribal Nations, the NPS, and any additional consulting parties. The NPS requested formal consulting party status to the Section 106 process for these undertakings pursuant to 36 CFR § 800.3(f) in a letter dated 04/27/21 to Secretary

[14] Northern States Power Company, a Wisconsin corporation submits Draft License Application for the relicensing of the Hayward Hydroelectric Project et. al. under P-2417 et. Al., Accession Number: 20230629-5179, June 29, 2023, Draft License Application- Exhibit E – E-3, Page 26.

Kimberly Bose. As a formal consulting party to the Section 106 process, the NPS requests the opportunity to participate in developing the HPMPs for these undertakings occurring within the Congressionally-authorized boundary of this NPS unit.

Xcel proposes to conduct shoreline surveys to monitor potential effects to archeological resources every ten years. The NPS recommends that surveys be conducted more frequently to capture potential erosion and changes in the shoreline due to more erratic weather events, recreational uses that create increased wake, etc. Under the ten-year cycle, erosion could occur and naturally revegetate before it is observed through regular monitoring. Given the additional stressors on the shoreline, a five-year survey timeframe would be more appropriate. For reference, the existing HRMP required shoreline monitoring every two years for the first four years of the license, followed by periodic monitoring at a frequency agreed to by the Wisconsin SHPO. The new HPMP should establish a threshold that would trigger a shoreline survey after high-water events of a certain intensity. The new HPMP should also continue stipulating the existing HRMP that archeological surveys and monitoring occur on normally inundated lands during drawdown events.

Cultural Resources Rationale:

The Licensee developed the PAs as part of the last relicensing process 30 years ago. The existing PAs are outdated, inadequate, and inconsistent with the Advisory Council on Historic Preservation guidance for Section 106 agreements. The NPS was not a party to these agreements, nor were Tribal Nations. Developing a new agreement for the projects would enable interested Tribal Nations an opportunity to engage in an agreement that reflects their priorities and acknowledges treaty rights and resources within the Project. In multiple places, the DLA erroneously states, "Per the requirements of the Programmatic Agreement, NSPW will develop an HPMP in consultation with the Wisconsin SHPO and interested Native American Nations.[15]" The existing PA actually states, "The Licensee will file one copy of the HRMP with the Commission and one with the Wisconsin SHPO for review. If the Wisconsin SHPO agrees with the HRMP, the Licensee will implement it." The existing PA is insufficient to meet the United States Government's responsibilities to Tribal Nations pursuant to treaties, laws, and policies. The existing PA also erroneously describes protocols for the curation of archeological collections. Because NPS and Tribal Nations were not consulted or afforded the opportunity to participate in the development of the current PA, their policies, protocols, and perspectives about curation are not reflected in the existing PA. Executing a new PA for the Hayward and Trego Projects is necessary and appropriate. Cultural is an outstandingly remarkable value for these segments of the Riverway based on the Native American heritage and the presence of resources highlighting logging history. Sturgeon (from which the Namekagon River gets its name) and wild rice beds are specifically called out as contributing to these segments' American Indian heritage.

8. Interpretive Waysides

The NPS recommends that the Licensee develop and install waysides to interpret the ruins and remnants of logging mills and dams within the Project boundaries to the public. The NPS also recommends that the Licensee consult with Tribal Nations to see if they would be interested in participating in the development of content for interpretive waysides sharing Tribal culture and history.

[15] Northern States Power Company, a Wisconsin corporation submits Draft License Application for the relicensing of the Hayward Hydroelectric Project et. al. under P-2417 et. Al., Accession Number: 20230629-5179, June 29, 2023, Draft License Application- Exhibit E –Page 222.

Waysides Rationale:

The existing 1993 PA states, "In their HRMPs, Licensees will propose, in detail, ways to interpret Historic Properties for the benefit of the public." The existing 1997 HRMP for the Hayward Project states, "No interpretive activities relating to historic attributes are contemplated for the Hayward Hydroelectric Project[16]." The existing 1995 Cultural Resources Management Plan for the Trego Project states, "No interpretive activities relating to historic attributes are planned for the Facility[17]." This underscores the need for the development of new PA and HPMPs. It also speaks to the potential for increased interpretation of the significance of the area's cultural resources to the public. As mentioned above, cultural resources are an outstandingly remarkable value for these segments of the Namekagon River based on the Native American heritage and the presence of resources highlighting logging history. Water control features, dams, mills, and camps are specifically called out within the significant logging history. Providing interpretive material about sites within the Project boundary would enable visitors to learn more about the area's rich history and cultural value.

9. National Register Nomination

The NPS recommends that Xcel complete a National Register (NR) nomination for the Trego Hydropower District, which was previously deemed eligible for the NR.

National Register Rationale:

A nomination identifying the characteristics that make the property eligible for the NR would ensure Xcel is preserving what is important about the property. A nomination will also enable visitors to learn more about the unique historical features of the Project.

10. Submerged Resource Study.

The NPS recommends that Xcel conduct a submerged resource study during any planned drawdowns throughout the life of the license. The study should focus on the areas made dry or visible by drawdowns.

Submerged Resource Rationale:

Conducting a submerged resource study during any planned project drawdowns will enable the identification and documentation of submerged resources. This documentation will help identify management actions to protect important cultural resources.

11. Proposed Boundary Change.

The NPS recommends that the Licensee:

- Revise the proposed boundary to include the inlet area in the Trego Project boundary area.

[16] Northern States Power Co submits Historic Resources Management Plan for Hayward Hydroelectric Project per Art 413 under P-2417, Accession Number19970116-0040, 1997.

[17] Northern States Power, WI submits draft cultural resources management plan per Art 406 re Trego Hydroelectric P-2711, Accession Number19950523-0070, 1995.

- Develop an integrated management plan that addresses recreation access and vegetation management affected by reservoir sedimentation, including the area proposed for removal from the Project Boundary (see Recommendation 1 – Integrated Vegetation and Recreation Plan).

Boundary Rationale:

The Licensee proposes removing the inlet area from the Trego Project boundary because it is beyond the maximum operating elevation created by the Trego Dam.[18] Yet, the NPS has identified evidence included in the DLA that the inlet area is affected by backwater effects created by the continued presence of the dam and ongoing operations, resulting in sediment continuing to build up.

The NPS is concerned about ongoing sedimentation in the Trego reservoir, causing recreation access and aquatic vegetation management issues. FERC explains boundary requirements as follows:

> *"The FPA requires the project licensee to provide safe public access to project lands and waters and include those lands necessary for project operations in the project boundary. In accordance with this law, the Commission requires that the project boundary contain the primary recreational facilities used to access project waters, as well as the lands necessary to ensure access for the term of the license, and the lands necessary to ensure an appropriate buffer between the project and neighboring lands."*[19]

The NPS had requested a study in response to the Notice of Intent and Pre-Application Document to assess this issue, but the Licensee has not conducted the study, NPS study request #3: HYDRAULICS, SEDIMENTATION, AND CHANNEL CHANGE[20]. The primary purpose of the study was "to determine whether the area proposed for removal from the Trego boundary in the vicinity of the U.S. Highway 63 bridge is influenced by project operations and is needed for project purposes such as public recreation, shoreline control, or protection of environmental resources as described in FERC regulations (18 CFR 4.41(h)(2); 18 CFR 4.51(h)(2));18 CFR 4.61(f))." The Licensee rejected the NPS study request despite repeated requests during the consultation process to date.[21]

The NPS does not think removing the proposed area upstream of Highway 53 from the boundary is appropriate because DLA information about the 1979 impoundment drawdown noted that sediment was scoured from the area. Then, the river channel returned to its pre-dam condition of 1927. Thus, the NPS concludes that this area is subject to backwater effects from the Project. In addition, the area provides public access to the upper end of the reservoir via the Trego Town Park and Landing. The area has issues similar to the upper end of the reservoir with the growth of aquatic vegetation and accumulation of sediment that has led the Licensee to propose mitigation measures to address recreational navigation.

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[18] Northern States Power Company, Preliminary Application Document (PAD), (Document Accession #: 20201130-5007), November 27, 2020, Page 21.

[19] FERC Hells Canyon FEIS (FERC/FEIS-0199). 2007, Section 3.12.2.1 Boundary Modifications

[20] NPS PAD and Study Request Comment Letter (Document Accession #: 20210428-5022), April 27, 2021, Page 23-27.

[21] NPS PAD and Study Request, (Document Accession #: 20210428-5022), April 27, 2021; NPS Comments on Summary of Study Plans, (Document Accession #: 20210901-5018),August 31, 2021; NPS Comments on the Aquatic and Terrestrial Invasive Species Draft Study Plan, (Document Accession #: 20220209-5002), February 8, 2022.

Susannah Erwin, Ph.D. and Sharla Stevenson, both hydrologists and NPS experts on this topic have reviewed relevant sections of the DLA and referenced reports related to sedimentation and provide the following:

The NPS disagrees with the Licensee's interpretation of the sedimentation issue described in the DLA[22]

The NPS contends that the following Licensee statement regarding sedimentation is not entirely accurate. The DLA states:

> *"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."*[23]

The NPS agrees that sediment transport and deposition are natural processes. However, the Trego Flowage is not a natural lake; it is an artificial impoundment created by a dam. The NPS contends that a more accurate interpretation of the previous study is as follows:

- As the 1989 WDNR report describes, sediment in the Namekagon is supplied by natural processes occurring in the watershed.
- Sediment deposition occurs in the impoundment because of the project impoundment's continued existence and the Project's operations. If the impoundment was not present and the Namekagon was a free-flowing river, the depositional patterns would be much different.
- The 1989 WDNR report describes the results of a 1979 reservoir drawdown completed by the Licensee to facilitate repairs to the dam. The report states, "S*ediment which had been deposited in the inlet area was significantly scoured by the drawdown. The stream channel closely returned to the configuration existing prior to dam construction in 1927."*[24]
- As the report describes, the change in project operations during the reservoir drawdown described in the report increased water velocities and, consequently, sediment transport, causing scouring of sediment which had been deposited in the upper inlet area during normal operations. The NPS asserts that this

[22] Northern States Power Company, a Wisconsin corporation submits Draft License Application for the relicensing of the Hayward Hydroelectric Project et. al. under P-2417 et. Al., (Document Accession #: 20230629-5179), June 29, 2023, Exhibit E, Page E-123-124.
[23] Northern States Power Company, a Wisconsin corporation submits Draft License Application for the relicensing of the Hayward Hydroelectric Project et. al. under P-2417 et. Al., (Document Accession #: 20230629-5179), June 29, 2023, Exhibit E, Page E-124.
[24] Northern States Power Company, a Wisconsin corporation submits Draft License Application for the relicensing of the Hayward Hydroelectric Project et. al. under P-2417 et. Al., (Document Accession #: 20230629-5179), June 29, 2023, Exhibit E, Appendix E-33, Page 180-182,728).

indicates that the continued presence of the dam and project operations contribute to the sedimentation issue in the inlet. The NPS proposed sedimentation study would document the extent and magnitude of this sediment deposition and backwater effect. However, the NPS thinks that the conclusions of the 1979 reservoir drawdown cited above provide sufficient evidence of the backwater effect and the nexus between sediment accumulation in the inlet area and the existence and Project operation of Trego Dam.

- In addition, these backwater effects are reflected in the DLA description of the Mussel Survey Reach 1 (in the vicinity of Wagon Bridge Road, as 'a slow-flowing, impounded riverine reach with fine substrate. Current velocity was slow although there was a discernible flow...'.[25]

12. Guidance and Coordination for Future Actions

The NPS recommends that it be explicitly identified as an agency to be consulted on all potential future maintenance activities that occur below the ordinary high-water mark due to its responsibilities under Section 7(a) of the Wild and Scenic Rivers Act (WSRA).

Future Actions Rationale:

The DLA includes a discussion of future maintenance work necessary for the operation of the projects for which the full scope of environmental effects cannot be fully defined.[26] The Licensee identifies examples of "…activities that can be considered as in-kind replacements and which would not require prior authorization from the resource agencies or Commission."

The DLA also cites current license provisions under Article 3, L-Form Articles. The Licensee proposes that the new licenses include the same provisions to enable "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." In addition, the Licensee identifies requirements and/or conditions that it will follow to ensure that adverse impacts can be avoided when in-kind future maintenance activities that could produce adverse impacts to: structures or facilities (9.1.1), terrestrial areas (9.1.2), and aquatic areas (9.1.3).

Because both the Hayward and Trego projects are located within a National Wild and Scenic River, all federally-assisted water resources projects are subject to a determination by the NPS that the activity does not have direct and adverse effects on the values for which the river was designated. The Commission does not have this responsibility.

[25] Northern States Power Company, a Wisconsin corporation submits Draft License Application for the relicensing of the Hayward Hydroelectric Project et. al. under P-2417 et. Al., (Document Accession #: 20230629-5179), June 29, 2023, Exhibit E, Sec.5.5.1.4.2, Page E-151.

[26] Northern States Power Company, a Wisconsin corporation submits Draft License Application for the relicensing of the Hayward Hydroelectric Project et. al. under P-2417 et. Al., (Document Accession #: 20230629-5179), June 29, 2023, Exhibit E, Page E-219 – 222.

The NPS has repeatedly highlighted its WSRA responsibilities during consultation in this licensing proceeding.[27] The NPS seeks consultation with the Licensee on all construction activities, including dam safety measures, to ensure that wild and scenic values are protected and enhanced.

Other Recommendations and Resources of Interest

The NPS is also interested in the protection and management of other resources, including sturgeon, mussels, and water quality. These resources are river values protected and enhanced as part of the Wild and Scenic River designation. The NPS recommends that Xcel work with interested stakeholders to discuss and develop protection, mitigation, and enhancement measures associated with these resources.

[27] NPS PAD and Study Request, (Document Accession #: 20210428-5022), April 27, 2021; NPS Comments on Summary of Study Plans, (Document Accession #: 20210901-5018), August 31, 2021; NPS Comments on the Aquatic and Terrestrial Invasive Species Draft Study Plan, (Document Accession #: 20220209-5002), February 8, 2022; NPS Comments on February 2 and 3, 2022 Draft Study Plans, (Document Accession #: 20220304-5265), March 4, 2022.

Photo 1- Trego Dam Portage Take-Out

Photo 2 – Trego Dam Portage Take-Out

Photo 3 – Parking and Entrance for Trego Dam North Tailwater Access / Canoe Portage
Red: chain link fence
Blue: location of entrance

Photo 4 – Hayward Dam Canoe Portage Sign

Photo 5 – Hayward Dam Portage Put-In

Enclosure 2 - Wild and Scenic River Section 7 Determination

Enclosure 2 contains information on the Wild and Scenic River Determination.

As described in the cover letter, the NPS administers the Namekagon River as part of the National Wild and Scenic Rivers System and the National Park System, as established by Congress in 1968 (Public Law 90-542).

Prior to the FERC issuing a new license, the NPS will need to evaluate the proposed license under Section 7(a) of the Wild and Scenic Rivers Act to determine whether it will have direct and adverse effects on the values for which the river was designated. If the NPS identifies direct and adverse effects, the license/project will need to be modified to ensure that park resources are protected. Continuing impacts on resource values must be identified to incorporate protection and enhancement measures into a new license.

In order to develop Section 7(a), the NPS needs adequate information to assess the direct and adverse effects to free-flowing conditions, water quality, and the outstandingly remarkable river values. The NPS will identify and share any information gaps with the Licensee.

Enclosure 3 - Specific Comments and Questions on the Draft License Application

Based on our review of the DLA, the NPS offers the following specific comments, questions, and corrections.

Exhibit E, Section 1.3.7, p. E-4 – Wild and Scenic Rivers Act (WSRA) needs to be rewritten as the WSRA Section 7(a) standard cited is incorrect. The 'direct and adverse effect standard' is recommended by the Interagency Wild and Scenic Rivers Coordinating Council in its 2004 Technical Guidance Paper: Wild and Scenic Rivers Act: Section 7 for instances where an existing hydroelectric facility is included in a designated river corridor, and modifying or relicensing of the facility is not prohibited by the Wild and Scenic Rivers Act. The statement should be revised to state as follows:

> *"Section 7(a) of the Wild and Scenic Rivers Act (WSRA) (Public Law 90-542) requires federal administering agencies to make a determination as to whether the operation of a project under a license within a wild and scenic river corridor would ~~unreasonably diminish~~ have a direct and adverse effect on the values for which such river was designated. "~~the scenic, recreational, and fish and wildlife values present within any designated wild or scenic rivers.~~*

Exhibit E, Section 1.3.7, p. E-4 – Wilderness Act - The St. Croix National Scenic Riverway is not part of the National Wilderness Preservation System.

Exhibit E, Section 2.2.2.2, p. E-18 – Recommend changing "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" to "NSPW will develop a PA and HPMP in consultation with the Wisconsin SHPO, interested Native American Nations, the NPS, and additional consulting parties." The existing language incorrectly describes the requirements of the existing PA, which actually states, "If the Wisconsin SHPO agrees with the HRMP, the Licensee will implement it." A new PA is needed.

Exhibit E, Section 3.2.2.2, p. E-25 – Recommend changing "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" to "NSPW will develop a PA and HPMP in consultation with the Wisconsin SHPO, interested Native American Nations, the NPS, and additional consulting parties." The existing language incorrectly describes the requirements of the existing PA, which actually states, "If the Wisconsin SHPO agrees with the HRMP, the Licensee will implement it." A new PA is needed.

Exhibit E, Section 4.11, p. E-105 – The second paragraph states, "To meet the interests and requirements of all consulting parties". Please clarify which consulting parties this refers to, their interests and requirements, and how Xcel determined that.

Exhibit E, Section 4.11.1.4, p. E-106 – Recommend changing "Per the requirements of the Programmatic Agreement, an HPMP will be developed in consultation with the Wisconsin SHPO and interested Native American Nations" to "NSPW will develop a PA and HPMP in consultation with the Wisconsin SHPO, interested Native American Nations, the NPS, and additional consulting parties." The existing language incorrectly describes the requirements of the existing PA, which actually states, "If the Wisconsin SHPO agrees with the HRMP, the Licensee will implement it." A new PA is needed.

Exhibit E, Section 4.11.3, p. E-106 – Recommend changing "Per the requirements of the Programmatic Agreement, an HPMP will be developed in consultation with the Wisconsin SHPO and interested Native

American Nations" to "NSPW will develop a PA and HPMP in consultation with the Wisconsin SHPO, interested Native American Nations, the NPS, and additional consulting parties." The existing language incorrectly describes the requirements of the existing PA, which actually states, "If the Wisconsin SHPO agrees with the HRMP, the Licensee will implement it." A new PA is needed. Recommend changing "within 10 years of license issuance" to "within 5 years of license issuance".

Exhibit E, Section 4.14.1.6, p. E-115 – After "The Project is located within the territory ceded in 1837 (Loew, 2001)." add "Ten Ojibwe Tribes have reserved treaty rights within the 1837 ceded territory."

Exhibit E, Section 5.14.1.6, p. E-207 – After "The Hayward Project is located within the territory ceded in 1837 (Loew, 2001)." add "Ten Ojibwe Tribes have reserved treaty rights within the 1837 ceded territory."

Exhibit E, Section 5.4.2, p. E-138. Trego Lake Impaired Water for excess algae. If it isn't a nutrient problem, why is Trego Lake impaired due to excess algal growth, and what is the remedy?

Exhibit E, Section 5.5.3 p. E-160 – Deviation Requirements - Compliance monitoring plan – Will any new monitoring equipment be installed within the WSR?

Exhibit E, p. E-149. The description of the location of Reach 1 of the Trego Mussel survey differs from the actual study's description in Appendix E-39, p.1. The DLA says Reach 1 extends upstream of Wagon Bridge Road, while the Mussel Study says it extends downstream.

Exhibit E, Section 9, p. E-219: The replacement of boat launch hard surfaces (in-kind) should be removed from the list of activities that do not require prior authorization from resource agencies. This would require consultation with the NPS.

Exhibit E, Section 9.1.1, p. E-220, Structures or Facilities: Add the following bullet:

- No changes shall be made to the structure or facilities below the ordinary high-water mark without consultation with the NPS under Section 7(a) of the WSRA.

Exhibit E, Section 9.1.3, p. E-221, Aquatic Areas: Add the following bullet:

- Prior to the activity, NSPW will consult with the NPS to ensure that wild and scenic values are protected and enhanced.
- The new detailed bathymetry map (Appendix E-2) only shows the proposed project boundary for Trego Lake, although a more general bathymetry map for the current boundary is presented (Appendix E-3, Figure 24).
- The NPS recommends the Licensee:
    - Extend the map to include 1-foot contour depths for the area Xcel proposes to remove from the current Project boundary.
    - Add a description of the changes observed from the bathymetric map presented in the PAD.
    - Add in the missing 1-foot contour depth labels to the map.

Document Content(s)

NPS Comment Letter re Trego Hayward DLA September 2023_signed.pdf.....1

Trego Lake District Comments on DLA

TREGO LAKE DISTRICT

PO Box 184 TREGO WISCONSIN 54888

September 28, 2023

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N. E., Room 1A
Washington, D.C. 20426

RE: Trego Lake District comments on Draft License Application for Subsequent Licenses Hayward Hydroelectric Project (FERC No. 2417-065) and Trego Hydroelectric Project (FERC No. P-2711-032).

Background information.

Trego Lake is a 383-acre lake in Northwest Wisconsin created by the Trego Dam, operated by Xcel Energy, and is part of the St. Croix Scenic Waterway. The Trego Lake District (TLD) was created in 1989 and is a local unit of government operating under the authority of Wisconsin Statutes Chapter 33. TLD has broad authority to protect and rehabilitate Trego Lake by protecting fish, maintaining water quality, marking navigation channels, controlling weeds and aquatic invasive species, and reducing sedimentation buildup. The TLD works to enhance the lake for both the riparian landowners and the public.

Need for Action on Sedimentation

TLD's primary concern with Xcel Energy's draft application is the failure to address the issue of sedimentation. It is the single most important issue affecting the health of Trego Lake. Sedimentation comes down the Namekagon River and deposits in Trego Lake. The existence of the dam precludes the sedimentation passing through. Although sedimentation is building up in Trego Lake, it received only passing comments by Xcel. Other agencies also requested that the effect of sedimentation be studied as part of this relicensing. Along with the recognition of sediment coming into Trego Lake and the study of its impact, TLD requests an action plan be developed to open channels closed because of sedimentation and a to prevent additional sedimentation coming into Trego Lake.

The National Park Service, in an April 27, 2021 letter to FERC requested and outlined three studies for the Trego Dam relicensing - Recreation Study; Shoreline Survey; and Hydraulics, Sedimentation, and Channel Change Study.

Regarding the study on Hydraulics, Sedimentation, and Channel Change, a similar study request was also submitted by the Wisconsin Department of Natural Resources (WDNR) and both are supported by the Trego Lake District. Nothing has been done on the Hydraulics, Sedimentation and Channel Change study and corresponding WDNR study. In addition, neither study has a comment or any response from the applicant or consultant in the draft application.

Sedimentation Issues in Trego Lake Raised During 1990s Relicensing

The issue of sedimentation cannot be ignored by Xcel as part of the relicensing. In 1989, A WDNR Sediment Study Report on Trego Lake[1] noted that 2000 cubic yards of sediment accumulate in Trego Lake each year.

[1] See Appendix A

The report stated: "The recently completed engineering study on the lake suggested removing between 3 to 4 feet of problem sediment from a 7-acre area in the inlet. Such a project would remove approximately 40,000 cubic yards of sediment and would cost between $80,000 and $200,000. At an infilling rate of approximately 2000 yards per year, the life expectancy of such a project would be 40 years." Since this project was never completed, we can assume that over the last 34 years, an additional 68,000 cubic yards of sediment have accumulated in the lake, or a total of 108,000 cubic yards. TLD's May 6, 2021, letter to FERC in support of the study reiterated these findings and concerns about the enormous impact sedimentation is having on the lake.

> "[A] February 27, 1992, FERC Environmental Assessment states: *Since the project's construction in 1927, considerable (emphasis added) sediment deposition has occurred, creating wetlands in inlets of the Trego impoundment, particularly the upstream end where the Namekagon River enters. In this area, 3 to 8 feet of sediment has been deposited (an estimated 145,000 cubic yards). Estimates show that 2000 cubic yards of sediment per year continue to settle in the upper reaches of the impoundment (WDNR, 1989). As a result of the shallow conditions, aquatic plants invade such areas, especially in the 15-acre Namekagon River inlet area."*[2]

The FERC Environmental Assessment cited highlights the significant impact of the estimated sediment rate, not just the amount of deposit. Additionally, the 1992 Environmental Assessment goes on to recommend developing a management plan to assess an option to address sedimentation and plant growth (a rejected drawdown plan, then supported by TLD). It recommends that "*the issue be reevaluated on a recurring basis every four years because of the high value of project impoundment for recreational activity as part of a National Wild and Scenic River.*" The conclusion from these statements is that sedimentation is an issue that needs to be reviewed and addressed.

Further, the October 31,1995 FERC Order Modifying and Approving Drawdown Needs Analysis states: ". . . the licensee is responsible for providing the recreating public access to the upper portion of the reservoir. . ."[3] To provide this access, the licensee (Xcel Energy) must study and address the sedimentation issue, which directly affects lake access, recreation, the growth of aquatic plants, and aquatic invasive species.

Additional Buildup of Sediment in Trego Lake since the 1990s

A 2022 aerial map of the southeast end of Trego Lake (See Figure 1) shows the sediment build up. Compare that photo with a 1966 WDNR topographical map of the same area of the lake which shows open water and depths of three to five feet. (See Figure 2) Sediment has overwhelmed this area and/or is pushing further into Trego Lake. Trego Lake has already gone 32 years without significant study on the impact of sedimentation, and an additional 30-plus years after relicensing without study would be contrary to Xcel's legal obligations to address recreation and subsequent environmental impacts on the project area and inconsistent with the 1968 Wild and Scenic River designation for the Namekagon River.

In order to address access issues for our riparian landowners and the public, TLD has shouldered the burden of sedimentation and has struggled in addressing weed control since the past relicensing agreement. A TLD timeline of events regarding sedimentation and weeds is attached in Appendix D. Without TLD spot dredging in this southeast area, 25% of homeowners are in jeopardy of losing lake access due to the build-up of sand and silt. For recreational users who use the lake for boating and fishing and canoeists who pass through our lake to enjoy the experience of the Scenic Wild River, the water depth will continue to decrease, making more of the lake inaccessible.

[2] See Appendix B
[3] See Appendix C

In 2015, TLD applied for and received grants from the WDNR, Washburn County, and the Town of Trego to dredge navigation channels in the inlet. TLD spent $90,000 to open our channels for navigation and lake access. Xcel was asked to participate but declined. Because of a significant high-water event, the channels lasted only two years. Without more significant funding, TLD has spot-dredged the channels in the south end each year, removing about 10 to 15 cubic yards of sand. The Trego Lake District purchased a mini-dredge and supporting equipment for $19,000 and, with the help of homeowner volunteers, has spent about 200 person-hours annually to keep minimal boat channels open for recreational purposes.

Again, the issue of sedimentation cannot be ignored by Xcel as part of the relicensing. It was recognized as an issue during the prior relicensing, it has continued through the present and will continue to fill in Trego Lake during the life of this license.

Sedimentation buildup creates an environment for weeds, including Aquatic Invasive Species (AIS) to grow. Weeds are cut each year to keep channels open and control the spread to other areas of the lake. Each year, TLD continues to expand the area of weed cutting at our own expense. Additionally, TLD is exploring other methods (such as chemical herbicides) to control AIS and open up navigation channels.

Integrated Management Plan

TLD believes there is a need for an integrated management plan that will span the life of the licensee's contract dealing with sedimentation, recreation, and vegetation not only for the homeowners on the lake but the public.

The TLD cannot shoulder the burden of a quality Scenic Wild River lake experience on its own. Among Xcel, the National Park Service, WDNR, Washburn County, Town of Trego, and TLD, we believe there is an obligation to each party to stop the degradation of Trego Lake from where the Namekagon River enters the lake through to the Dam. The sedimentation and vegetation issues will not stop until something is done to manage sedimentation. What will happen in the near future when twenty-five percent of our lake owners are cut off from the lake? What happens to the tax base for the county and town? What about the experience on the St. Croix Scenic Riverway when canoeists cannot pass through the lake without a mile portage because we have lost water depth?

Xcel's Offer to Purchase a Weed Harvester

As part of the 1990s relicensure, Xcel has partnered with TLD to harvest aquatic plants in the large basin where sedimentation has reduced depth allowing aquatic plants to grow. Per the agreement, TLD contacts and works with the harvesting company, marks the channels, and oversees the harvesting. Xcel/NSP pays the cost of harvesting, pays for navigational buoys for channels, and has the financial responsibility for the project. Based on Xcel's failure to meet their responsibilities under the current license, TLD is concerned that Xcel will not fulfill their responsibilities under the new licensure.[4]

Buried in the *Estimated Costs of Proposed Environmental Measures* section of the *Description of the Project* document, TLD finds the language: "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."

This "offer" has never been communicated to TLD in any form other than what is in the description document. Additionally, the amount identified is a one-time payment in 2023 dollars and does not take into account the increase of costs over time during the 40-year lifespan of the license. Furthermore, it ignores the changing

[4] TLD is outlining its concerns with Xcel's compliance to its previous license obligations in a forthcoming letter to FERC.

nature of a flowage over that time and the impact to the lake, its residents, and recreators that will enjoy it. Further, the offer addresses only the symptom and not the cause of the increased aquatic and invasive plants, which is sedimentation. TLD has been responsible for addressing sedimentation. The costs for these efforts since 2010 have come to about $125,000, not including all the hours TLD has accrued to plan, conduct, and maintain all or part of the dredge operation. Funds to conduct these efforts have come from grants, loans, donations, and tax levies. Nothing from Xcel.

TLD is concerned that this offer may be a strategy for Xcel to avoid future involvement to address the effects of sedimentation. In any event, the offer deals only with the symptom and not the fundamental cause of the problem.

Proposed Boundary Changes

As NPS has noted, TLD questions the reasoning behind Xcel's proposed change in the Trego Project Boundary as part of this 40-year relicensure. TLD is concerned about this proposed change because it could impact the sedimentation issue. Could a change in the project boundary permit Xcel to avoid its obligation to address sedimentation? Xcel should not be permitted to redefine its project boundaries when Xcel failed to address the very sedimentation causing the changed conditions and driving its request for the project boundary change.

NPS noted concerns in the closing of the Wisconsin Department of Transportation access site on the Namekagon River in Trego because of the re-routing of the intersection of U.S. Highways 63 and 53. TLD is also concerned about these closures. The loss of this access point may divert recreators to the Trego Town Park landing, which is congested with sediment and aquatic plants. In addition to the closed landings being used by those coming down the Namekagon River, it was also used by Trego riparian landowner canoeists, kayakers, and tubers to access the upper portions of Trego Lake. We think the three studies proposed by NPS are likely to document a need for improved access with the potential for modifications at the Trego Town Park landing.

Consequently, the decision on the boundary request needs to be either denied or deferred until the completion of the requested sedimentation study.

The TLD appreciates the opportunity to provide comments here and for all detailed study plans regarding the Hayward and Trego Hydroelectric Project relicensing. We look forward to working with the licensee, stakeholders, and the FERC on the licensing process for these projects.

Should you have any questions regarding these comments, please contact me.

Sincerely,

Trego Lake District Board of Commissioners
For the Board, Charles Petersen, Board Chair
612-803-8765
cjpetersen@msn.com

Figure 1

Surface Water Data Viewer Map

Legend

- Municipality
- State Boundaries
- County Boundaries
- Major Roads
  - Interstate Highway
  - State Highway
  - US Highway
- County and Local Roads
  - County HWY
  - Local Road
- Railroads
- Tribal Lands

0.3 0 0.13 0.3 Miles

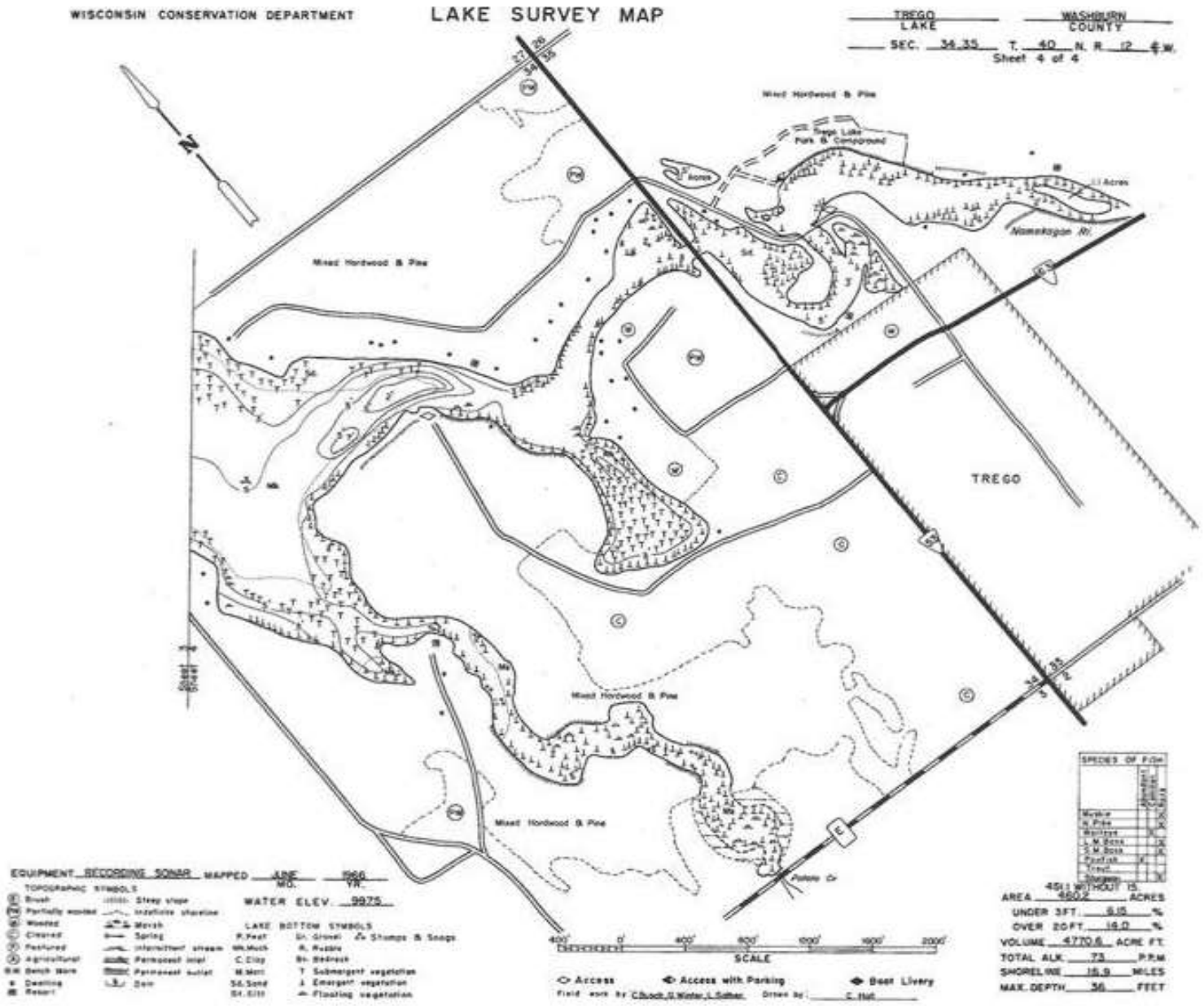
NAD_1983_HARN_Wisconsin_TM

1: 7,920

DISCLAIMER: The information shown on these maps has been obtained from various sources, and are of varying age, reliability and resolution. These maps are not intended to be used for navigation, nor are these maps an authoritative source of information about legal land ownership or public access. No warranty, expressed or implied, is made regarding accuracy, applicability for a particular use, completeness, or legality of the information depicted on this map. For more information, see the DNR Legal Notices web page: http://dnr.wi.gov/legal/

Notes

Figure 2



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Appendix A

1989 DNR Study without charts + maps - They didn't copy well

INTRODUCTION

The upper reaches of the Trego Flowage, Washburn Co., has shallowed from the accumulation of sediment causing access and use problems for riparians.

In response to requests by the Trego Lake Association and State Senator Robert Jauch, the Department of Natural Resources evaluated the nature of the sedimentation problem on Trego Flowage, the sources of the sediment reaching the flowage, and alternatives available to deal with the problems.

Data collected specifically for this study included 9 inlake sediment samples - to characterize the sediment accumulated in the lake, 45 depth transects - to define present flowage volumes, and 2 ground-penetrating radar transects - to describe the stratigraphy of accumulated sediment.

Summaries of Previous Aquatic Plant and Sedimentation Studies on Trego Flowage

Wisconsin Hydro Electric Company Permit Materials - 1923-1927

Original approval materials were submitted to the Wisconsin Railroad Commission for construction of the flowage between 1923 and 1927. This material included surveys of the area to be flowed and construction details on the dam. Information is on file at the Department of Natural Resources Bureau of Water Regulation and Zoning in Madison. Of note is the availability of the original gradients and channel configuration of the Namekagon River with a portion of the map shown in Figure 1.

DNR Internal Memorandum on Flowage Drawdown - 1979

An 11 foot drawdown of the flowage was conducted during November and December of 1978 by Northern States Power Company to facilitate repairs to the dam. The Department used the drawdown as an opportunity to evaluate the affects it had on flowage basin morphometry and aquatic plant communities.

The early winter drawdown caused the upper end of the flowage to deepen with water volume increasing by approximately 13 acre-feet (21,000 cubic yards). The drawdown steepened channel gradients, increased river velocities, and resulted in greater streamflow sediment carrying capacities. Sediment which had been deposited in the inlet area was significantly scoured by the drawdown. The

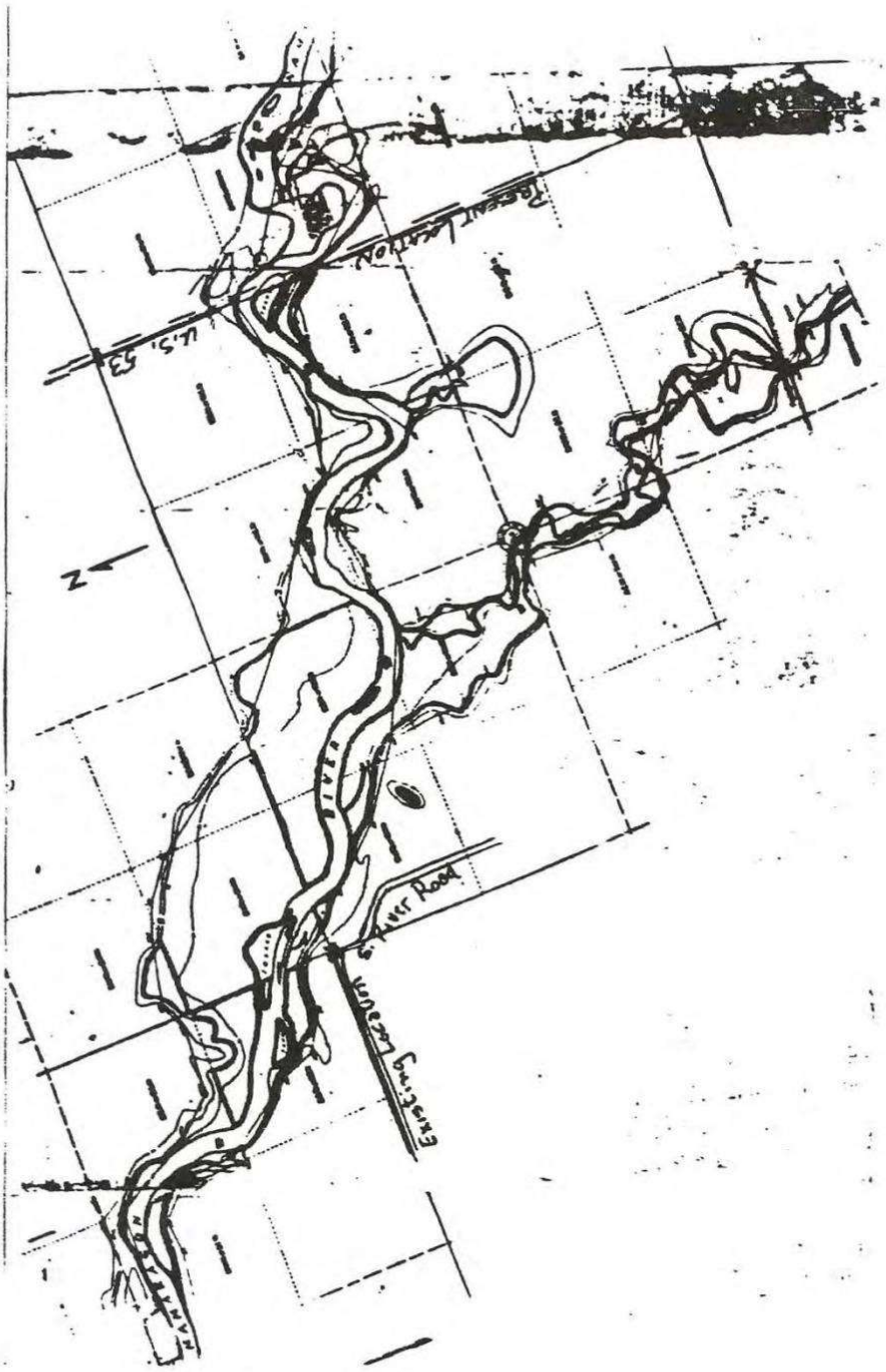

FIGURE 1. Namekagon River Channel Location, 1925.

stream channel closely returned to the configuration existing prior to dam construction in 1927.

In addition to the scouring, sediment was translocated from the inlet area by water level manipulations which allowed lake bottom sediments and plants to freeze into the lake ice. This sediment/ice mixture was then resuspended by raising water levels. Most of this resuspended material and virtually all of the coarser material directly scoured by the drawdown appears to have been retained in the lower reaches of the flowage. The partial drawdown appeared to affect only the upper reaches of the flowage where parts of the inlet were deepened and rooted plants were controlled for a period of a few years.

Sedimentation Study Engineering Report - 1988

Ripley Engineering Services, Inc. conducted a preliminary engineering evaluation of the sedimentation problem. As part of this study a 4 foot drawdown of the flowage was conducted to determine the extent of the sedimentation problem. Low level aerial photography visually documented the infilling of the inlet area that has occurred since the 1978 drawdown.

The report recommendations included dredging approximately 40,000 cubic yards of accumulated sediment from the inlet area and construction of a sediment trapping device above the lake. It also recommended that more detailed studies of the watershed be conducted to identify watershed sediment sources which are being deposited in the inlet area.

Corps of Engineers, Technical Paper - 1988

A field investigation of the sediment and aquatic plant problems on Trego Lake was conducted in May, 1988 by Corps of Engineers personnel from the Vicksburg, Mississippi Waterways Experiment Station and the St. Paul, Minnesota Regional Office. The reconnaissance study evaluated the nature of the inlake sedimentation problem, the source of sediments, and the mechanisms creating the problems.

The Corps evaluation concluded that river borne sediments are principally derived from natural sources although there was some concern for erosion problems caused by lumbering activities in the watershed.

The proposal to construct a sediment trap immediately above the lake was also discussed. The sediment trapping concept, which would have required an instream structure and constant maintenance, was thought not to be cost-effective.

The availability of Corp Aquatic Plant Control programs was mentioned but their use at Trego was determined to be unlikely

because of the limited scope of the problem area and the small number of properties affected.

EXISTING CONDITIONS

Flowage Development - Trego Flowage is an impoundment of the Namekagon River near Trego Wisconsin (Figure 2). A dam was constructed on the river in 1927 by the Wisconsin Hydro Electric Company to provide electricity to the Spooner area. The 31 foot head dam impounded an area of 470 acres and produced a long, narrow waterbody having 18 miles of shoreline. Approximately 120 homes, cottages, and resorts have been constructed adjacent to the flowage with development comprising 25% of the shoreline. The flowage and Namekagon River, upstream of the lake, are included in the St. Croix National Scenic Riverway system, the area meeting national criteria that it possess outstanding scenic and recreational value.

Inlake Water Quality - The existing water quality of Trego Flowage is very good. Nutrient levels are generally low, with total phosphorus concentrations averaging approximately 0.02 mg/l. Generally rooted aquatic plant densities are moderate to low, with exception being in the upper lake area shallow water depths and organic sediments create good conditions for aquatic plant growth.

Watershed Condition and River Morphology - The Namekagon at the Trego dam drains an area of 488 square miles (Figure 3). Most of the flowage's watershed is well protected forest land and experiences few of the typical nonpoint source pollutional problems that plague many of Wisconsin's lakes. Silviculture, recreational based industries, and some agriculture comprise land uses within the watershed.

The pitted and outwashed watershed has a complex geologic history, having been repeatedly glaciated and subjected to extensive river migration, meandering, braiding, and headward erosion. Soils in the watershed are predominently windblown sand deposits (loess) comprised mostly of clean, medium to coarse grained, material.

Presently the Namekagon river carries very low quantities of sediment compared to other, similar sized Wisconsin river systems. Eleven measurements of suspended sediment concentrations made between 1978 and 1983 by the U.S. Geological Survey in the river above the flowage, showed concentrations averaging 4 mg/l. This compares to an average suspended sediment concentration in Wisconsin rivers of 157 mg/l. These very low concentrations are consistent with the nature of this well protected river and watershed system.

The sediment that is carried by the system also appears to be

generated from mostly natural processes. The Namekagon River above the flowage is undergoing a natural transition from a meandering to a braided river system. Such river developments result in the undercutting of banks, slumping of unsupported banks, and subsequent transport of the eroded material downstream. Streambed erosion is also a source of sediment to the river but is limited in most of the stream reaches by an armored riverbed. Streambottom cobbles, boulders, and pea-gravel protect much of the finer, easily erodible, underlying material from erosion and downstream transport.

Although watershed soil loss is minimal, timber cutting on sloped land near tributary channels and construction activities that expose soils contribute some sediment to the system. River bank erosion is also being accelerated by the recreational use of the system where human traffic on exposed streambanks causes bank slumping. The steepest and most severely eroded area observed is the river bank used by recreationalists northeast of Earl.

INLAKE SEDIMENTATION

The sedimentation process occurring in the upper end of the lake has been ongoing since the flowage was initially constructed in 1927. When the hydraulic gradients and sediment carrying capacity of the Namekagon were reduced by the flowage construction, heavier, sand sized particles were dropped out of suspension and deposited in the inlet area of the flowage. Sedimentation probably began to cause problems even in the 1930's, although most concerns began to surface during the 1970's. Following the 1978 drawdown for dam repairs the inlet areas problems were reduced for several years, but have resurfaced again as sediment redeposited in areas previously scoured.

A component of this survey was to estimate sediment infilling rates to help define the scope of watershed erosion problems and to aid in predicting the longevity of a potential future sediment removal project. Direct measurements of sediment loads were beyond the scope of this survey. Indirect estimates were attempted utilizing changes in flowage volumes over time.

Original (pre 1927) channel configurations were available from DNR permit files. In 1978 depth data was obtained in the inlet area to document conditions existing prior to the drawdown. Post drawdown conditions were documented in 1979 (Figure 4). As part of this survey, 45 lake depth cross-sections (Figure 5) were collected on the flowage to document existing (1988) water volumes.

Transects of the inlet area were compared to post-drawdown conditions (Figures 6A thru 6D). It can be seen that in portions of cross-sections 5 and 6 up to 4 feet of sediment has accumulated

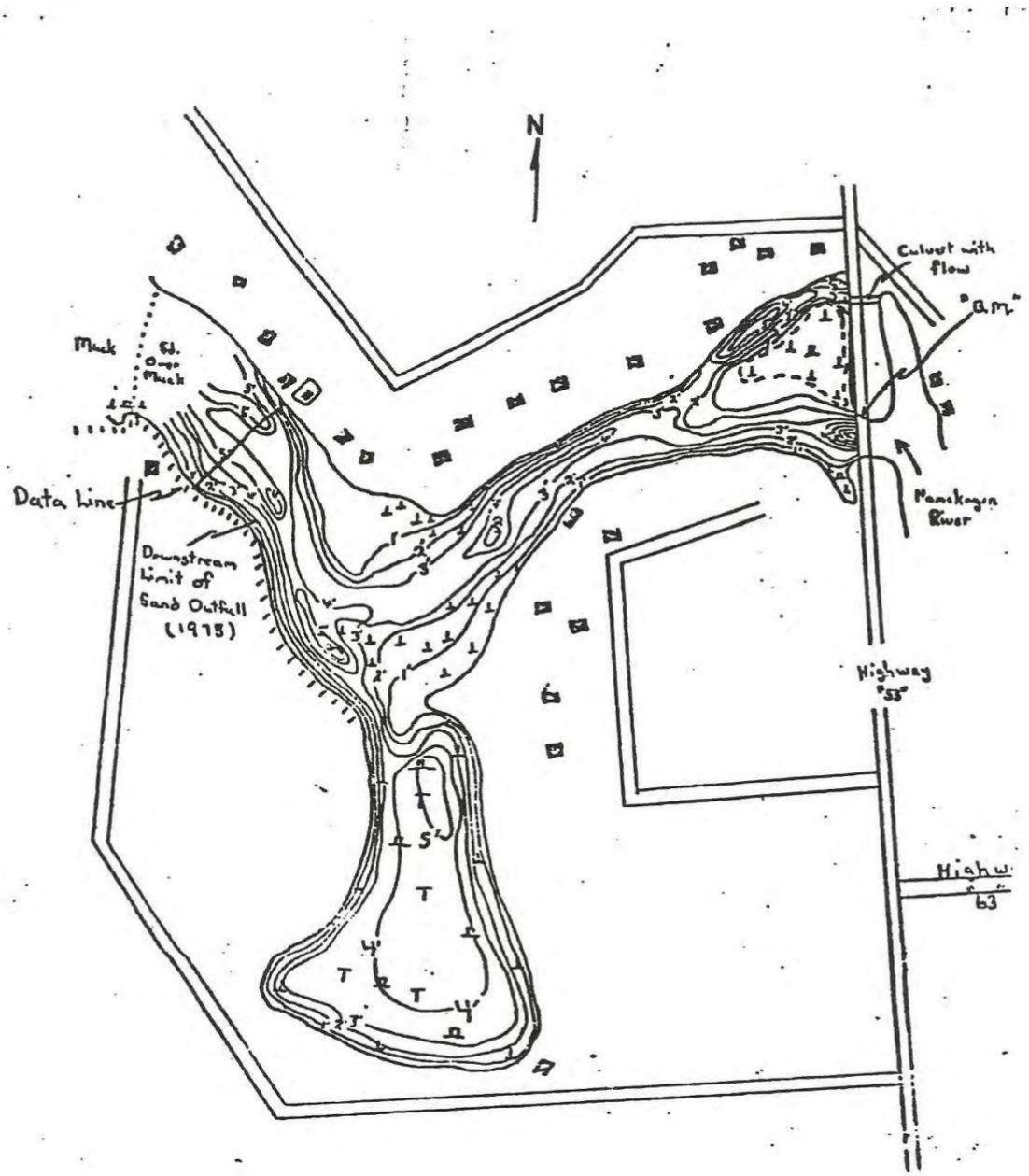

FIGURE 4. Trego Flowage Inlet Morphometry, 1979.

Trego Flowage

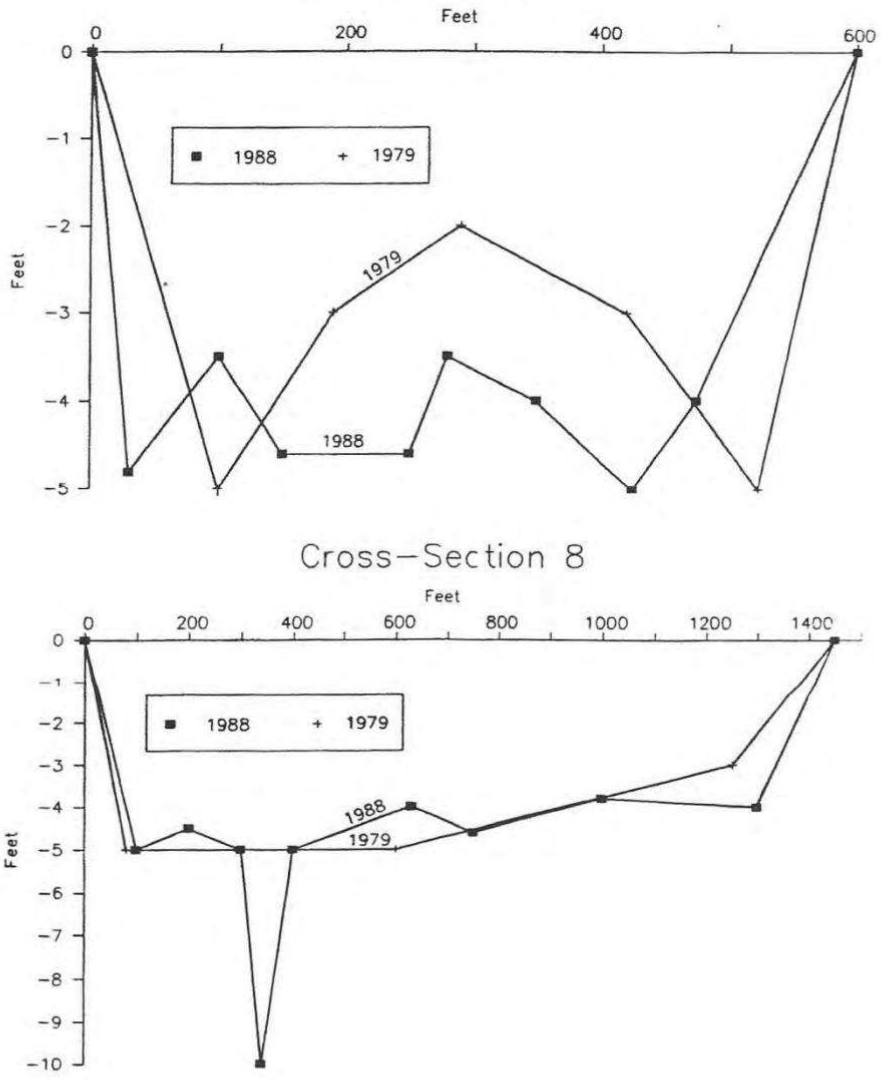

FIGURE 6-D. Trego Flowage Inlet Area Depth Profiles, 1979 and 1988.

since the 1978 drawdown. At cross-sections 1 and 7, lake depths have actually increased. Water depths have changed little at the others. Lake volumes between cross-sections 1 and 7 were calculated to be 46 acre-feet in 1978 and 46 acre-feet in 1988, showing no overall changes. As a note of caution, the comparisons presented here are not exact duplications of the 1978 transects since this information was not available nor are the effects of the recent 4 foot drawdown known. Therefore any comparisons and conclusions drawn from this data must be tempered by this fact and viewed as approximations.

Depth comparisons with the original (1925) survey information suggests that between 3 and 8 feet of sediment has accumulated in the upper most 15 acre inlet area between 1927 and 1988.

To estimate infilling rates it was assumed that an average of 6 feet of coarse grained sediment has accumulated of sediment has occurred in the 15 acre inlet area (145,000 cubic yards)since 1927. If deposited at a uniform rate over the 70 year period than 2000 cubic yards are accumulating in the flowage each year.

Below cross-section 7 very little additional sediment appears to have accumulated, although probing of the sediments during this study documented the presence of a 6 inch thick layer of sand sized material overlaying peat as far west as the Potato Creek inlet area. Presumably this is some of the material which had been scoured and redeposited by the 1978 drawdown.

The use of ground penetrating radar identified that prior to its being flowed, the former river fringe areas which now are the upper bay area of the flowage were low lying meadows having organic soils. A transect of the upper bay showed approximately 4 to 5 feet of varied density material has overlain the valleys original glacial deposits. Sediment samples collected as part of this study (Table 1 and Figure 7) show the upper layer of bottom sediments below the Potato Creek inlet area to be of organic origin. The lower deposits appear to be event deposited, having accumulated as a result of 4 to 6 major hydrologic events since the last period of glaciation 12,000 years ago. Recent accumulations of organic material appear to be low; a few inches or less.

These rates of infilling, when compared to rates observed in other Wisconsin impoundments, are extremely low but yet is consistent with the nature of this particular river system and it's well protected watershed. For example, approximately 110,000 cubic yards of sediment are deposited each year in Lake Altoona, near Eau Claire, Wisconsin by the Eau Claire River. The Eau Claire drains a 827 square mile watershed, approximately twice the size of the Namekagon, yet deposits more than 50 times the quantity of sediment than the Namekagon.

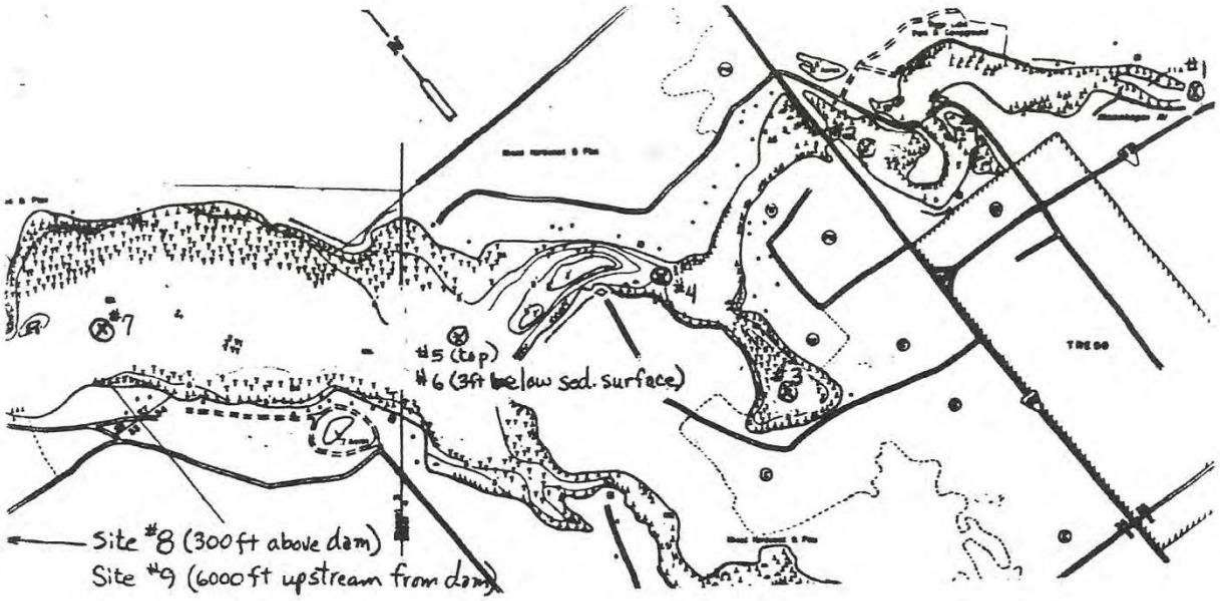

FIGURE 7. Site Locations for Sediment Samples.

Site ID	% Gravel	% Sand Very Coarse	% Sand Coarse	% Sand Medium	% Sand Fine	% Sand Very Fine	Silt & Clay	% Ash
1	1.8	4.3	13.8	54.3	25.3	0.2	0.3	99.4
2	0.0	1.1	16.1	63.0	18.9	0.3	0.6	99.2
3	2.1	4.3	15.8	31.2	17.8	1.3	29.6	88.1
4	1.0	7.4	29.6	49.2	11.3	0.5	1.0	99.2
5	0.0	0.0	0.2	2.6	14.2	20.8	62.2	67.3
6	4.6	5.6	12.2	19.4	27.2	13.4	17.6	94.9
7	0.0	0.0	0.2	0.4	2.2	1.8	95.4	59.2
8	0.0	0.0	0.3	1.5	0.3	0.3	97.6	70.5
9	0.0	0.0	0.2	0.2	0.6	0.4	98.6	58.4

TABLE 1. Sediment Characteristics.

MANAGEMENT ALTERNATIVES

Do Nothing

As described earlier, the Namekagon River system is undergoing a natural transition from a meandering to a braided river system. In this process banks are undercut and a source of sediment is provided to the system. This coarse grained material is transported to the headwaters area of the flowage and is deposited in backwater areas where hydraulic gradients have decreased. Ultimately sediment will completely fill the flowage until only a stream channel remains. At the present rate of deposition the flowage will be completely filled by the year 4000.

By taking no action access problems in the inlet area will continue to become worse and rooted aquatic plant densities in the upper bay will increase, further limiting use of the resource.

Watershed Protection

Sediment loads carried by the Namekagon are extremely low, implying that measures to reduce loads even further will be difficult. Even in situations where streambank erosion delivers significant quantities of sediment, as it does at Lake Altoona, streambank protection measures are often determined to not be cost-effective as it was recently documented for the Eau Claire River. It does not appear that a broad-based watershed improvement project is warranted at this time in the Namekagon basin.

However, control of some of the heavily used human access sites such as the one near Earl would be warranted. Similarly geneneral protection measures should be implemented to prevent future sediment delivery to the system. For example, buffer strips along stream channels should be maintained and the cutting of timber on steep slopes needs to be done carefully to minimize sediment loss.

Sediment Removal

Physical removal of sediment which has accumulated in the lake's inlet area is an alternative that would provide relief to local property owners and improve overall accessability. Sediment removal projects have been completed on many Wisconsin flowages in the past using both conventional mechanical methods, where the lake is first drawn down, or by hydraulic methods where lake level is maintained and material is removed by a floating dredge. The advantage of physically removing the material is the project can be very focused, removing only that sediment causing problems.

The recently completed engineering study on the lake suggested removing between 3 to 4 feet of problem sediment from a 7 acre area in the inlet. Such a project would remove approximately 40,000

cubic yards of sediment and would cost between $80,000 and $200,000. At an infilling rate of approximately 2000 yards per year, the life expectancy of such a project would be 40 years.

Construction of a Sediment Trapping Facility

The concept of a sediment trap was been proposed by Ripley Engineering with the trap being located immediately upstream of the flowage. Sediment traps have been effectively used in other situations where specific circumstances have warranted. Although the concept of a trapping device at Trego has some merit there are several limitations with this situation. These include 1) the need to construct facilities to allow the regular (monthly?) maintenance of the trap by removing accumulated material, 2) maintenance of equipment to both physically remove the sediment and transport it to a disposal site, 3) the potential difficulty of obtaining approvals from the state and federal regulatory authorities given the heavy public use of the area, and 4) the fact that sediment which may not have been deposited in problem areas would also be removed as well, increasing overall costs.

Periodic Drawdown

The 11 foot drawdown completed in 1978 provided significant relief to local property owners and controlled some of the rooted aquatic plants that caused problems in the upper bay area. The drawdown increased hydraulic gradients and caused the river to scour out a new channel. The scouring, along with effects of the freezing and refilling process on adjacent organic material resulted in the removal of approximately 20,000 cubic yards of material from the inlet area.

If conducted again an 11 foot drawdown would be expected to achieve results similar to those observed in 1978, with the river tending to re-scour a channel in a location close to that of it's original course prior to flowage (Figure 1).

Although accessibility would generally be improved it is likely that in certain areas, such as that area near immediately above the resort and at a site near the mouth of the bay area opposite the resort, additional sediment would have to be physically removed to achieve desired results. In addition some change in channel configuration could be encouraged by mechanically removing sediment during the drawdown process to better direct scouring to desired areas thereby improving overall results.

Further analysis would be required to determine the optimal magnitude of a drawdown and the time period required to achieve results. However at this time it would appear that natural downstream channel controls would limit the effectiveness of any drawdown greater than 10 to 11 feet. The optimal time period would also appear to be similar to that of the 1978 drawdown when the lake was down during the month of November. This time period would

seem to cause the least amount of environmental concern and would allow some control of rooted plants through exposure and freezing.

The monetary costs of a one-month drawdown would include the loss of power generation capability by Northern States Power at the dam site hydropower facility. The estimated loss in revenues from a one month fall drawdown is $12,000.

Appendix B

ENVIRONMENTAL ASSESSMENT
FOR HYDROPOWER LICENSE

Trego Hydroelectric Project

FERC Project No. 2711-002

Wisconsin

Federal Energy Regulatory Commission
Office of Hydropower Licensing
Division of Project Review
825 N. Capitol Street, NE
Washington, D.C. 20426

February 27, 1992

TABLE OF CONTENTS

LIST OF FIGURES

SUMMARY AND CONCLUSIONS

On March 22, 1991, Northern States Power Company (Northern States) filed an application for a new license for its existing Trego Hydroelectric Project, located on the Namekagon River in Wisconsin. The project is on a reach of the Namekagon River that is included within the National Wild and Scenic Rivers System; however, the project does not occupy federal lands. The existing project has a total installed capacity of 1.2 megawatts (MW). The original license was issued on March 11, 1977, for a period of 50 years from April 1, 1943, and expires on March 31, 1993.

The Department of the Interior (Interior) and American Rivers, Inc. oppose issuance of a new license for the Trego Project. As discussed in section C.4.a.(1), Interior and American Rivers claim that because the project is located on a designated National Wild and Scenic River, a unit of the National Park System, the Commission does not have authority to relicense the project. We believe the Commission has authority to license the project because the project was operating before designation of the St. Croix Wild and Scenic Riverway, and because the enabling legislation for the National Wild and Scenic Rivers Act (P.L. 90-542) does not prohibit the licensing of existing projects. In fact, the project's existing license was issued after the Riverway was designated. Neither Interior nor American Rivers object to the project for environmental reasons.

The environmental assessment (EA) analyzes the impacts associated with issuing a new license for the Trego Project and recommends terms and conditions to become a part of any new license issued. Measures recommended to enhance environmental resources and recreational opportunities include: (1) required future operation of the project in a run-of-river mode, using the new controls installed by Northern States in 1990 to narrow the normal operating range of the power pool to within 0.3 foot of total fluctuation, thus providing stabilized and near-natural aquatic conditions for fish and wildlife at the impoundment and downstream; (2) funding of support programs for the restoration of the lake sturgeon and gilt darter upstream of the project; (3) improved recreational access facilities at the existing canoe portage near the project dam, including signs, trash receptacles, portable toilets in summer, and periodic cutting of emergent vegetation at the canoe take-out area; (4) maintenance of the existing trashracks with 1.5-inch bar spacing to minimize fish entrainment and impingement; (5) formulation of a drawdown management plan to evaluate the need for and, if needed, implement a drawdown to control sediment accumulation and aquatic vegetation, and thus provide good recreational access and use of the upper impoundment; (6) formulation and implementation of a cultural resources management plan to protect archeological sites that may be affected by project operation; and (7) provision of fish passage facilities if future needs require.

The Wisconsin Department of Natural Resources (WDNR), Interior, and the Wisconsin State Historic Preservation Officer (SHPO) generally agree with these recommendations. With the exception of the drawdown management plan and cultural resources management plan, Northern States also agrees with these recommendations. Northern States does not believe that a drawdown management plan is needed now (for discussion, see section G.5.). Also, Northern States sees no need for any further cultural resources analysis (for discussion, see section G.6).

Overall, we believe these measures would preserve and enhance the fish, wildlife, and recreational values of the Namekagon River, and would be consistent with the management objectives of the National Park Service (NPS) for the St. Croix Wild and Scenic Riverway (U.S. Department of the Interior, National Park Service, 1976). At the same time, the project would continue to produce an estimated 7,580 megawatthours (MWh) of relatively low-cost, clean, and reliable electricity, and thus conserve nonrenewable energy resources and avoid the emission of additional noxious gases that contribute to atmospheric pollution.

ENVIRONMENTAL ASSESSMENT
FEDERAL ENERGY REGULATORY COMMISSION
OFFICE OF HYDROPOWER LICENSING
DIVISION OF PROJECT REVIEW

Trego Hydroelectric Project
FERC Project No. 2711-002
February 27, 1992

A. APPLICATION

1. Application type: Minor New License
2. Date filed with the Commission: March 22, 1991
3. Applicant: Northern States Power Company
4. Water body: Namekagon River River basin: St. Croix
5. Nearest city or town: Trego
6. County: Washburn State: Wisconsin

B. PURPOSE AND NEED FOR ACTION

1. Purpose. The Licensee, Northern States Power Company (Northern States), has filed an application for a new license for the continued operation of the Trego Project on the Namekagon River. This environmental analysis (EA) assesses the impacts associated with the issuance of a new license for the project and recommends terms and conditions to become a part of any license issued.

The Federal Power Act (Act) provides the Federal Energy Regulatory Commission (Commission) with the exclusive authority to license nonfederal waterpower projects on navigable waterways and federal lands. Pursuant to Section 15(a)(1) of the Act, upon expiration of a license, the federal government can take over the project (with equitable compensation), or the Commission can issue a new license to either the existing licensee or a new licensee.

For any license issued, the Commission must determine that the project adopted will be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes for which licenses are issued, the Commission shall give equal consideration to the purposes of energy conservation, the protection, mitigation of damage to, and enhancement of fish and wildlife (including related spawning grounds and habitat), the protection of recreational opportunities, and the preservation of other aspects of environmental quality.

The primary purpose of the Trego Hydroelectric Project is to continue to generate power. The existing project has, and would continue to have, a total installed capacity of 1.2 MW, and produce an average of about 7,580 MWh of energy per year.

2. Need for power. The energy from the project would continue to be useful in meeting a small part of the need for power projected by the Mid-America Interconnected Network (MAIN) Regional Electric Reliability Council. The project would continue to displace fossil-fueled power generation in the MAIN Region, thereby conserving nonrenewable fossil fuels and reducing the atmospheric emission of noxious byproducts caused by the combustion of fossil fuels.

C. PROPOSED PROJECT AND ALTERNATIVES

1. Description of the proposed action. Northern States proposes to continue operating its existing licensed project facilities (see figures 1 and 2). Operation of the project would continue to be in a run-of-river mode; no new construction is proposed.

The project dam, which has an overall length of approximately 625 feet, is comprised of two embankment sections, a spillway, and a powerhouse. Accordingly, the project facilities would consist of: (1) a northeastern earth embankment section with a length of 380 feet and a maximum height of about 30 feet; (2) a southwestern earthfill embankment section with a length of 110 feet and a maximum height of about 25 feet; (3) an Ambursen-type buttress, hollow, concrete gravity spillway structure 92 feet long by 27 feet high, surmounted by three Taintor gates, each 25.5 feet long by 10 feet high, and a 6-foot-wide trash gate and sluiceway; (4) an impoundment about 6 miles long, with a surface area of 470 acres and an estimated storage capacity of 4,700 acre-feet at the normal water surface elevation of 1,035.0 feet;1/ (5) a reinforced concrete, steel, and brick powerhouse 59.5 feet long by 30.2 feet wide by 74 feet high, located adjacent to the left end of the spillway structure; (6) powerhouse generating equipment consisting of two open flume vertical-axis Francis turbine-generator units rated at 700 kilowatts (kW) and 500 kW, for a total installed capacity of 1,200 kW; (7) a small substation; and (8) appurtenant equipment and facilities.

There is no primary transmission line beyond the project substation because the substation feeds directly into Northern States' distribution system.

2. Applicant's proposed enhancement measures. Northern States proposes to: (1) continue to operate the project in a run-of-river mode to minimize fluctuations of the surface elevation of the impoundment and maintain the natural volume and

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1/ The surface elevations shown are as measured from National Geodetic Vertical Datum (NGVD), the equivalent of mean sea level (msl).

periodicity of stream flow downstream of the project; (2) support programs for the restoration of the gilt darter and lake sturgeon upstream of the project; (3) keep the existing project intake structures (trashracks with 1.5-inch bar spacing) in place to minimize resident fish entrainment and impingement; (4) consult with the resource agencies and other interested parties on a recurring basis in evaluating the need for, and implementing, future drawdown(s) of the project impoundment to redistribute accumulated sediments in the upper impoundment and control associated nuisance aquatic vegetation; (5) notify property owners in the project area of the existence of archeological sites on their lands, and of the Wisconsin State Historic Preservation Officer's (SHPO) recommendations for protecting these sites; and (6) enhance existing recreational access near the project dam.

3. Federal lands affected. None

4. Alternatives to the proposed project.

a. _X_ No reasonable action alternatives have been found. The following action alternatives were considered but eliminated from further evaluation:

(1) Federal takeover: The federal government could, by Act of Congress, take over this project and operate it according to Section 14 of the Act. On its own motion or upon recommendation of a federal department or agency, the Commission could recommend this alternative to Congress, after notice and opportunity for hearing. No federal agency has recommended a federal takeover of the Trego Project; nor would we recommend any such action based on our analysis of the project's benefits, as described herein.

Although Interior does not recommend a federal takeover, it contends that the Commission does not have authority to issue a new license for the Trego Project without specific authorization from Congress (letter from Jonathan P. Deason, Director, Office of Environmental Affairs, Office of the Secretary, U.S. Department of the Interior, Washington, DC, November 20, 1991). Interior believes the Commission lacks licensing jurisdiction because the Trego Project is located within the St. Croix National Wild and Scenic River, a unit of the National Park System, administered by the NPS. Even though Interior opposes issuance of a new license at this time, it would not oppose Congressional legislation granting the Commission authority to issue a new license. Interior takes this position because the Trego Project was in operation before Congress designated the St. Croix River as a National Wild and Scenic River, and because the project has operated without sufficient adverse impacts to prompt Interior's objection to relicensing, except for the jurisdictional issue discussed above.

American Rivers also believes the Commission lacks authority to issue a new license for the project and states further that authority for the management of the project should be transferred to the NPS, in accordance with Section 10(c) of the Wild and Scenic Rivers Act (WSRA).

As Interior noted, the Trego Project was operating before the St. Croix River and Namekagon River, its major tributary, were designated as Wild and Scenic Rivers in 1968. The enabling legislation for the National Wild and Scenic Rivers Act (P.L. 90-542) does not prohibit the licensing of existing projects. When the present license for the Trego Project was issued in 1977, the St. Croix and the Namekagon Rivers, were already within the National Wild and Scenic Rivers System. In the intervening years, the Commission has exercised its jurisdiction over the licensed project under the Act on a continuing basis without objection by Interior. Under these circumstances, and in the absence of a clear Congressional directive to the contrary, we see no justification to now withdraw from the Commission's regulatory responsibilities under the Act, including the present review of the pending application for new license, consultation with all the resource agencies, including the Interior agencies, and the issuance of any new license with appropriate terms and conditions.

(2) Other alternatives: We also considered the following alternatives: (a) issuance of a nonpower license, (b) issuance of an annual license, and (c) denial of the license application. Since no entity has recommended that a nonpower license be issued for the project, this option does not appear to be relevant and has been dropped from further consideration. Issuance of an annual license is not expected to be necessary and is not considered further because sufficient time exists for action on the pending application before the present license expires in March 1993. Any denial of license would result in the cessation of hydropower generation at the project and the potential removal of all or part of the project works. No commenting entity has recommended this option for consideration. Furthermore, Northern States would have to find a replacement source of energy, leading to the likely consumption of fossil fuels, and thus resulting in increased atmospheric emissions. Thus, denial of the pending application was not evaluated in further detail herein.

b. Alternative of no action. No action would result in continuing to operate the project as it is presently, without the environmental enhancement measures outlined herein.

D. CONSULTATION AND COMPLIANCE

1. Fish and wildlife agency consultation (Fish & Wildlife Coordination Act).

a. U.S. Fish & Wildlife Service: _X_ Yes. ___No.
b. State(s): _X_ Yes. ___No.
c. National Marine Fisheries Service: ___Yes. _X_ No.

2. Section 7 consultation (Endangered Species Act).

a. Listed species: ___None. _X_ Present:
b. Consultation: _X_ Not required.

Remarks: Bald eagles (Haliaeetus leucocephalus) nest along the project impoundment, but are not affected by the project. The project is within the range of the gray wolf (Canis lupis), but suitable habitat does not exist within the project area.

3. Section 401 certification (Clean Water Act).

___Not required.
_X_ Required; applicant requested certification on 3/19/90.
Status : _X_ Waived by the certifying agency on 12/03/90.

4. Cultural resource consultation (National Historic Preservation Act).

a. State Historic Preservation Officer : _X_ Yes ___No.
b. National Park Service: _X_ Yes ___No.
c. National Register status: __None _X_ Eligible or listed.
d. Advisory Council: ___Not required. _x_ In progress.
e. Further consultation: ___Not required. _x_ Required.

Remarks: We are continuing to consult with the Advisory Council for Historic Preservation and the SHPO on the Trego Project, and on a Statewide Programmatic Agreement for Wisconsin. Such an agreement would stipulate generic license conditions for preserving National Register and eligible properties at all relicensed projects in Wisconsin, including the Trego Project. Whether or not a Statewide Programmatic Agreement is executed, Northern States must consult further with the SHPO, and prepare a plan for preserving National Register and eligible properties at the Trego Project.

5. Recreational consultation (Federal Power Act).

a. U.S. Owners: ___Yes. _X_ No.
b. NPS: _X_ Yes. ___No.
c. State(s): _X_ Yes. ___No.

6. Wild and scenic rivers (Wild and Scenic Rivers Act).

Status: ___None _X_ Listed. Determination completed: 11/02/68.
Administering agency: Department of Interior, National Park Service .

Remarks: By letter dated November 20, 1991, Interior said that because the project is located on a designated National Wild and Scenic River administered by the NPS as a component of the National Park System, the provisions of Section 7(a) of the Wild and Scenic Rivers Act are applicable. Interior noted that any proposed construction at the project would require that a Section 7 determination be made by the Secretary of the Interior.

7. Land and Water Conservation Fund lands and facilities (Land and Water Conservation Fund Act).

Status: _X_ None. ___Designated.

E. COMMENTS

1. The following agencies and entities provided comments on the application or filed a motion to intervene in response to the public notice dated July 16, 1991.

Commenting agencies and other entities	Date of letter
State of Wisconsin Public Service Commission	06/27/91
Wisconsin Department of Natural Resources	08/28/91
Trego Lake District	08/28/91
	11/01/91
	12/12/91
U.S. Department of the Interior	11/20/91

Motions to intervene	Date of motion
Wisconsin Department of Natural Resources	07/24/91
American Rivers, Inc.	07/29/91

Remarks: Interior and American Rivers oppose issuance of a new license for the Trego Project. As discussed in section C.4.a.(1), Interior and American Rivers claim that because the project is located on a designated National Wild and Scenic River, the Commission does not have authority to relicense the project.

2. In its December 12, 1991, response to Interior's contention that the Commission does not have the authority to issue a new license for the project, Northern States disagreed, saying that the Commission clearly possesses the authority to issue a new license for the project because neither the Act nor the WSRA prohibits the Commission from issuing a new license. On January 10, 1992, Northern States responded to the other comments filed on the application for new license.

F. AFFECTED ENVIRONMENT

1. General description of the locale.

a. Description of the St. Croix River Basin. The Trego Project is located on the Namekagon River, which is a tributary of the St. Croix River (see figure 2). The St. Croix River, located in northwestern Wisconsin and eastern Minnesota, is a tributary of the upper Mississippi River. The drainage area of the St. Croix River Basin is 7,650 square miles. The river flows through rolling glacial terrain, including agricultural and forest land. The entire mainstem St. Croix River is a Wild and Scenic River under the WSRA.

The Namekagon River is the largest tributary of the St. Croix River, with a drainage area of 488 square miles. The project is located 30 miles upstream from the St. Croix River confluence and 70 miles downstream from the river's origin at Lake Namekagon. The entire mainstem Namekagon is also located within the National Wild and Scenic Rivers System. The reach on which the project is located is designated "recreational," which allows limited development along the shoreline, including the shoreline of the project impoundment. One other licensed project, the Hayward Project, FERC No. 2417-001, is located on the Namekagon River, about 30 miles upstream of the Trego Project.

b. As of December 4, 1991, there are a total of 13 hydroelectric developments in the St. Croix River Basin (see figure 2), including six operating minor projects licensed by the Commission (one of which has two developments), two operating projects with license exemptions, and four operating projects without a license or exemption. On December 23, 1991, Northern States filed an application for a new license for its Hayward Project.

c. Target Resources. A target resource is an important resource that may be cumulatively affected by multiple development in a river basin. We have identified no target resources in the St. Croix River Basin, based on our evaluation of the significance and geographic distribution of existing resources and the comments of the resource agencies on the application for new license for the Trego Project.

2. Descriptions of the resources in the project impact area. (Source: Northern States Power Company, 1991(a), unless otherwise indicated).

a. Geology and Soils: The project is located near the northern limits of the Central Plain geologic province. The project area geology developed from glacial activity. The soil is generally sandy with pockets of heavier sandy loam. The topography is characterized by small ridges, lakes, and bogs.

b. Streamflow:

	cfs	flow parameter
low flow:	286	exceeded 90 percent of the time
high flow:	721	exceeded 10 percent of the time
average flow:	472	average annual

Remarks: Flows are from U.S. Geological Survey (USGS) data collected at gauging station No. 05332500, located on the Namekagon River at the Trego dam during the period from 1928 to 1970.

c. Water quality: Currently, the WDNR classifies the Namekagon River at the project site as one that must meet the following categorical standards: general; fish and other aquatic life uses; standards for recreational use; standards for public health and welfare; and standards for domestic animals. Furthermore, the reach of the Namekagon River which includes the project site is also classified under Wisconsin regulations as an outstanding resource water. The standards for fish and aquatic life include the following numerical standards: a minimum dissolved oxygen (DO) concentration of 5 milligrams per liter (mg/l) at all times, natural daily/seasonal water temperature fluctuations maintained with temperature not to exceed 89 degrees Fahrenheit for warm water fish, a pH within the range of 6 to 9, and substance toxicity concentrations within the Environmental Protection Agency (EPA) guidelines. Historical water quality data on the Namekagon River and the Trego impoundment, obtained by the USGS and the NPS from 1975 to 1983, show that the water quality in the project vicinity was good for most uses (Graczyk, 1986).

d. Fisheries:

Anadromous: _X_ Absent. ___ Present.

Resident: ___ Absent. _X_ Present.

The fishery of the Trego impoundment and the Namekagon River consists of a diverse community of species, and has received considerable management attention. Early management was primarily limited to stocking of gamefish, panfish, and forage fish. However, the emphasis of the stocking program has been, and continues to be, on walleye and muskellunge. As a result of these stocking efforts, the Trego impoundment has become known for its walleye, smallmouth bass, bluegill, and black crappie fishing.

Other game fish in the vicinity of the project include northern pike, largemouth bass, yellow perch, rock bass, pumpkinseed sunfish, and brown trout. Nongame fish include burbot, white sucker, golden redhorse, greater redhorse and river redhorse (both listed as threatened by the WDNR), shorthead

redhorse, northern hogsucker, yellow bullhead, black bullhead, brown bullhead, bowfin, golden shiner, madtom. log perch, mudminnow, common shiner, creek chub, and chestnut lamprey.

e. Vegetation:

Cover type	Dominant Species
Upland forest	Jack pine, aspen, white birch, red oak, Norway pine, white pine
palustrine forested wetland 2/	tamarack, black spruce, balsam fir, green and black ash, elm, and silver maple
palustrine scrub-shrub	willow
palustrine emergent persistent	cattail, bur-reed
lacustrine littoral and limnetic aquatic bed	flat-stem pond weed, coontail, water milfoil, water lily
lacustrine littoral emergent	wild rice

f. Wildlife: Upland forested areas near the project provide habitat for a variety of wildlife species including: ruffed grouse, woodcock, broad-winged hawk, osprey, bald eagle, bobcat, red and gray fox, porcupine, woodchuck, raccoon, red squirrel, short-tailed weasel, chipmunk, striped skunk, cotton-tail, snow-shoe hare, white-tailed deer, black bear, and numerous small mammal species. Wetland areas at the project, especially in the upper impoundment area, provide valuable habitat for mallard, blue-winged teal, wood duck, common and hooded merganser, great blue and green heron, common loon, and aquatic furbearers.

g. Cultural: National Register (listed and eligible) properties are present at the project. The Trego Dam Historic District, consisting of the existing powerhouse, south earthen dam, reinforced multi-section dam, north earthen dam, the high-voltage substation -- all constructed in 1926-27 -- and the highway bridge are eligible for listing in the National Register of Historic Places. It is a representative and highly intact example of small-scale hydroelectric facilities constructed by the second generation of electric utility systems in Wisconsin before World War II.

Also, an archeological survey of the project reservoir shoreline, conducted for Northern States by the Burnett County Historical Society, identified five archeological and two

2/ Wetland nomenclature follows Cowardin, et al. (1979).

historic sites that are, or may be, eligible for the National Register. The two historic sites are outside the reservoir operation limits; therefore, not affected by the project and not in need of further survey work. One of the archeological sites was determined not to be eligible during a more recent survey. Of the remaining four sites, site 34:2 is considered eligible based on existing data, and sites 29:1, 29:2, and 35:1 are recommended for further evaluation for eligibility by the SHPO.

h. Visual: The project area is mostly forested and highly scenic. Shoreline development is restricted because the project area is located within the St. Croix National Scenic Riverway. In the developed areas on the Trego impoundment, most of the buildings are situated back from the shoreline and among mature trees, so that the natural view is not appreciably altered. The scenic quality of the area attracts considerable recreational use.

i. Recreation: The Namekagon River, from the railroad bridge crossing near the village of Trego, downstream to Trego dam, is classified by the NPS as a Recreation River Area within the National Wild and Scenic Rivers System. This 6.5-mile-long reach includes the entire licensed Trego Project. The river upstream and downstream of the project is classified as a Scenic River Area (U.S. Department of the Interior, National Park Service, 1976).

The project impoundment and tailrace area provide a variety of public outdoor recreational opportunities, including canoeing and other boating, fishing, and sightseeing. The impoundment is stocked with gamefish and panfish. Annual visitation at the project is estimated at 5,000 visitors, with a daily peak of 750 visitors (Northern States, 1991(b)).

Northern States provides a canoe portage at the dam's north embankment, as well as public safety facilities, fencing, and signs at the project. Other recreational facilities adjacent to the project impoundment include four privately-owned resorts (three with campgrounds), two canoe rental establishments, a public boat landing, and an 11-acre park at the upper end of the impoundment maintained by the village of Trego. Facilities at this park include 50 picnic units, 61 campsites, a playground, and sanitary facilities.

The NPS has acquired ownership of three tracts of shoreland on the Trego impoundment which have a combined area of about 151 acres. The NPS has no present plans for the acquisition of other shoreland or land rights on the Trego impoundment. A 3.6-mile-long hiking and cross-country ski trail is maintained by the NPS along the right (north) shoreline of the impoundment. The trail was designed by the NPS for beginner and intermediate skiers. The NPS also operates a visitor information center just off

Highway 63, near the upper end of the impoundment. The NPS center is visited by canoeists and other outdoor enthusiasts traveling through the area.

j. Land use: Northern States owns about 19 acres of land near the project dam, as well as flowage or fee title rights for all lands under the 470-acre impoundment. Control of shoreland development is vested in the Washburn County Zoning Administration in accordance with the County's shoreland and other zoning ordinances. The County's shoreland zoning codes require a minimum 75-foot structure set-back, a 30 percent restriction on removal or cutting of vegetation within 35 feet of the shoreline, and prohibitions on filling, grading, and ditching.

Thirty percent of the impoundment shoreline is developed with private homes, cottages, resorts and campgrounds. The remaining project area has an undeveloped, forested character.

k. Socioeconomics: The project is located in the sparsely populated northwestern corner of Wisconsin. The 1990 population of Washburn County, Wisconsin, was 13,772 (personal communication, Statistical Information Assistant, Bureau of Census, Suitland, Maryland, November 21, 1991). Tourism is a major component of the local economy, together with agriculture, especially dairy farming.

G. ENVIRONMENTAL ISSUES AND PROPOSED RESOLUTIONS

There are 7 issues addressed below.

1. Project operation: Northern States now operates and proposes to continue operating the project in a run-of-river mode, in which inflow to the project impoundment equals outflow.

Based on its prefiling consultation with the resource agencies for relicensing, Northern States installed new operational controls in 1990 to narrow the normal range of the power pool to within 0.3-foot total fluctuation. Northern States attempts to maintain a winter pool elevation between 1,034.8 feet and 1,034.9 feet, and summer power pool elevation between 1,034.8 feet and 1,035.1 feet.

Agency recommendations. The WDNR recommends the project operate in a run-of-river mode, with the elevation of the impoundment maintained during normal operation between 1,034.8 and 1,034.9 feet in winter, and between 1,034.8 and 1,035.1 feet, during the remainder of the year (letter from William H. Clark, NWD FERC Project Manager, Wisconsin Department of Natural Resources, Spooner, Wisconsin, August 28, 1991). The WDNR says that under extreme conditions, the elevation of the impoundment should vary between 1,034.7 and 1,035.3 feet, or up to 0.6 foot,

for flood flows, equipment malfunctions, or operational emergencies, provided these terms are clearly defined and agreed to by the WDNR. To verify run-of-river operation, the WDNR recommends Northern States maintain its existing streamflow monitoring equipment, maintain daily operator logs and continuous circular chart recordings, and provide such records to WDNR within 30 days upon request.

Interior recommends Northern States maintain the surface elevation of the Trego impoundment at 1,035.0 feet, with a maximum elevation of 1,035.25 and a minimum elevation of 1,034.75 feet, or within an operating range of 0.5 foot (letter from Jonathan P. Deason, Director, Office of Environmental Affairs, Office of the Secretary, U.S. Department of the Interior, Washington, DC, November 20, 1991). Interior also recommends that the project impoundment should not be modified beyond its recommended elevation limits without the prior concurrence of the WDNR, the U.S. Fish and Wildlife Service (FWS), and the NPS. To demonstrate compliance with its recommended operational levels at the project impoundment, Interior recommends Northern States ensure that its upstream and downstream staff gages are clearly visible to the public, are acceptable to the FWS and the State, indicate the maximum and minimum allowed surface elevations at the impoundment, and maintain daily records and provide them to the FWS and the State upon request.

Applicant's response. Although Northern States attempts to limit normal impoundment fluctuations to the levels recommended by the WDNR, Northern States proposes a 0.3-foot normal operating range year-round (letter from Anthony G. Schuster, Vice President, Power Supply, Northern States Power Company, Eau Claire, Wisconsin, January 10, 1992). Northern States believes that a more restrictive operating range in winter would be both technically difficult to achieve and unjustified from an environmental perspective.

Northern States agrees with the WDNR's recommendation for a 0.6-foot impoundment variation during extreme conditions, except that the specified operating range should extend between elevations 1,034.6 and 1,035.2 feet. Northern States requests a slightly lower minimum elevation because of concern over future compliance and the operational limitations of its load control equipment, which are set to automatically shed load a final time with a falling impoundment at elevation 1,034.7 feet.

Northern States questions the WDNR's recommendation that future deviations from normal operation be clearly defined and agreed to by the WDNR. In addition to the extreme conditions referenced by the WDNR, Northern States says variations in the impoundment level could also be required during extreme drought, ice jams, or other unforseen events beyond its control. Northern States believes it should not be necessary to define every

possible occurrence when a variance from the normal operating range may be necessary. In response to Interior's recommendation on any changes in the project operating regime, Northern States suggests that the mode of project operation could be temporarily modified in the future if required by operating emergencies beyond its control or for short periods upon mutual agreement among itself, the WDNR, and the NPS.

Northern States concurs with the WDNR's and Interior's recommendations on streamflow gaging.

Conclusion. Although Northern States recently installed new monitoring equipment in an attempt to maintain the total fluctuation of the Trego impoundment to within 0.3 foot, it has had very limited operating experience in maintaining such tight control of the surface elevations. Furthermore, Northern States' turbine-generator units are old and do not have as much flexibility to adjust to different flow conditions as newer and more modern generating units. Additionally, even though Northern States has new monitoring equipment at the project, the equipment cannot respond to instantaneous flow changes when exercising control over the turbine-generator units and/or sluice gate, thus resulting in a time lag.

We conclude that many factors can cause changes in the elevation of the Trego impoundment, as described above. We also note the factor of wind tides (wind setup) at the project. Although the impoundment has a maximum width of only 0.35 mile, it is about 6 miles long, and can be affected by wind setup which causes different elevations at different locations on the impoundment at the same time. As a result of this factor, and the various other conditions that could periodically influence impoundment levels, we believe that Northern States should not be penalized if, while making a good faith effort to remain within the normal operating range, it fails to achieve any overly restrictive target elevation objectives.

Therefore, we recommend that any new license for the project include a requirement for operation in a run-of-river mode, and for a stabilized impoundment to the extent that operating conditions and equipment calibration permits. We also recommend that any new license set a target elevation for the Trego impoundment at 1,034.9 feet, but allow for a fluctuation of 0.3 foot around the target elevation. Hence, the impoundment would have to exceed 1,035.2 feet or fall below 1,034.6 feet before Northern States is subject to any compliance action. We also recommend that under extreme conditions, such as floods, ice jams, equipment malfunction, or operational emergencies, the normal elevation limits for the impoundment be lifted.

We conclude that it is unnecessary and unreasonable to require Northern States to enter into an agreement with the WDNR

to define all of the specific extreme operating conditions that could occur in the future.

Future operation of the project in a run-of-river mode would minimize fluctuations of the surface elevation of the project impoundment, and would maintain the natural volume and periodicity of stream flow downstream of the project. Thus, aquatic resources in the Namekagon River downstream of the project would be protected. Since the project would not alter streamflow in the Namekagon River upstream or downstream of the project, fish and wildlife habitats, including wetland areas, would not be affected by project operation. Furthermore, we conclude that our recommended operating regime is consistent with the stated management objectives of the NPS (U.S. Department of the Interior, National Park Service, 1976).

The monitoring system currently used at Trego dam was installed in 1990, and consists of a Montedora-Whitney Flow/Level Computer with sensors to monitor headwater and tailwater levels. Output from these sensors are recorded on continuous recording charts which provide a permanent record of project operation. In addition, staff gages are maintained on the dam headworks and in the project's tailwaters.

We conclude that Northern States' existing streamflow monitoring system is adequate to verify compliance with the run-of-river operation and impoundment level requirements, and recommend that the system continue to be used in the future, but with the improved visibility features suggested by Interior to permit easy public scrutiny of operations. In addition, in accordance with the recommendations of the WDNR and Interior, we conclude that Northern States should be required to provide data from the monitoring system to the USGS, the NPS, the FWS, and the WDNR within 30 days of any agency request for the data.

2. Sturgeon and gilt darter reintroduction: Lake sturgeon and gilt darter are state protected species (endangered and threatened, respectively). The presence of Trego dam serves as a barrier to upstream movement of these species; however, neither species is now known to exist in the Trego impoundment (letter from William H. Clark, NWD FERC Project Manager, Wisconsin Department of Natural Resources, Spooner, Wisconsin, September 24, 1990).

Northern States, in consultation with the WDNR, has committed to provide funding (totalling $5,000) for lake sturgeon restoration efforts upstream of the Trego dam. In general, the WDNR intends to use the funds to stock hatchery raised fingerling sturgeon in the Trego impoundment. The WDNR would monitor the success of the restoration program as part of its normal monitoring studies. The WDNR indicates that the slow growth and reproductive capacity of lake sturgeon warrants a long-term

commitment from both the WDNR and Northern States. Any new license would expire (i.e., 30 years) before a determination can be made regarding the success of the lake sturgeon restoration efforts. In addition, the WDNR requests funding ($500 initially and $2,000 later, if suitable habitat is found) for reintroduction of the gilt darter above the Trego Project. The WDNR recommends that the $5,000 for lake sturgeon restoration and the initial $500 for gilt darter habitat assessment be provided within 2 years of license issuance (letter to Lloyd Everhart, Northern States Power Company, from William H. Clark, NWD FERC Project Manager, Wisconsin Department of Natural Resources, Spooner, Wisconsin, March 21, 1991). Northern States has agreed to provide this funding within 6 months of license issuance (letter from Lloyd D. Everhart, Administrator, Hydro Licensing and Environmental Studies, Northern States Power Company, Eau Claire, Wisconsin, February 25, 1991).

The lake sturgeon and the gilt darter were historically found throughout the Namekagon River. However, the presence of Trego dam has limited the geographic range of both species to the Namekagon River downstream of the project, leading to their extirpation from the Namekagon River upstream of the Trego Project. It is the intent of the WDNR to restore the lake sturgeon and gilt darter to the Namekagon River upstream of Trego dam without reintroducing undesirable species, such as the common carp. The implementation of effective measures for lake sturgeon restoration and gilt darter reintroduction, in the form of stocking, would enhance the fish community structure upstream of Trego dam. Expanding each species' geographic range would also increase population size, and possibly lead to the removal of the species from the state protected list.

Therefore, if a license is issued for the Trego Project, we recommend that the licensee be required to provide $5,000 to the WDNR for lake sturgeon restoration and $500 to the WDNR for a study to assess the potential for restoring the gilt darter above Trego dam. If the study indicates that gilt darter restoration is feasible, Northern States should provide $2,000 to the WDNR for restoration efforts.

3. Fish entrainment and mortality: The WDNR states that fish entrainment is occurring at the Trego Project, but the magnitude of fish mortality is unknown, pending the results from planned and ongoing fish entrainment studies conducted at other locations in the state. The WDNR believes its continued stocking program for the Trego impoundment provides adequate mitigation for whatever fish entrainment and mortality losses may occur in the near future. Therefore, the WDNR recommends that any license issued contain a provision requesting reopening the license and consideration of amended terms and conditions by the resource agencies should new information suggest the need for mitigation of fish entrainment and associated fish mortality losses.

Northern States says that the potential for fish entrainment and fish mortality is low at the Trego Project. Northern States supports its conclusion with four observations: 1) 1.5-inch trashrack spacing keeps moderate and large fish out of the turbines; 2) the Trego impoundment and the Namekagon River below the project have robust fish populations; 3) there are no practical means to prevent entrainment of larval and juvenile fish; and 4) juvenile and larval fish are passing through the turbines and contributing to the downstream fishery.

Background. The Namekagon River and the Trego impoundment support resident populations of sport fish. Continued operation of the project would contribute to fish mortality if fish were not prevented from entering the project intake and passing through the turbines. Once entrained, fish could be killed or injured by the turbine or subject to pressure injury in the water conveyance system (Rochester et al., 1984). Recent studies on entrainment mortality of warmwater fishes at the Thornapple Hydro Project, FERC No. 2475, on the Flambeau River, Wisconsin, showed mortality rates of less than 10 percent (initial) and less than 16 percent (delayed) for fish that are entrained through the project turbines. In addition, the entrainment rates for walleye ranged from 28 percent to 52 percent; for smallmouth bass the rate was 50 percent; and for black crappie the entrainment rate ranged from 33 percent to 60 percent.

To lessen the potential for turbine mortality associated with the Trego Project, Northern States proposes to maintain the existing trashracks, which have a 1.5-inch clear spacing between bars with an intake velocity of less than 1 foot per second (fps).

Trashracks have been used at hydropower plants to deter fish from entering project intakes. Designed to physically block the passage of larger fish while permitting smaller fish to pass through, the effectiveness of trashracks is influenced by intake velocities and the size of bar spacings (Bell, 1986).

The influence of bar spacing on fish entrainment is related to the size of the fish. For fish of a given size, the greater the spacing between trashrack bars, the greater the probability of the fish passing through the trashrack. Trashracks designed to block fish passage at hydroelectric projects (1-inch bar spacing) have not been extensively studied. However, trashracks with 1- to 3-inch spacing have been found to prevent the passage of larger fish at steam electric stations (Stone and Webster Engineering Corporation, 1986). For the Trego Project, we calculate that a 1.5-inch bar spacing would protect walleye and smallmouth bass of approximately 15.5 inches and 13.5 inches, respectively. Black crappie and bluegill in the Trego impoundment, based upon the length frequency distribution, would not be protected.

Furthermore, as part of the lake sturgeon reintroduction program, fingerling lake sturgeon would be stocked at a size ranging from 5 to 9 inches in length. Fry may also be stocked, if available. These fish would be stocked at various locations upstream of the Trego impoundment to the base of the Hayward dam. It is expected that the proposed 1.5-inch bar spacing, together with an intake velocity of less that 1 foot per second, would minimize entrainment of lake sturgeon at the Trego Project (personal conversation, Larry Deamman, Regional Fish Manager, Wisconsin Department of Natural Resources, Spooner, Wisconsin, February 18, 1992). Fry or fingerling lake sturgeon that pass through the turbine units would benefit the lake sturgeon fishery downstream of the Trego Project.

The velocity of water in the intake can influence potential impingement on the trashrack in much the same manner as the trashrack bar spacing can influence fish entrainment. There is a positive relationship between fish size and swimming ability: the greater the intake velocity, the larger the fish must be to escape possible impingement. However, it is difficult to establish one optimal intake velocity applicable to a mixed array of fish species and sizes (Hansen and Li, 1978).

Conclusion. We conclude that Northern States' proposal to keep the existing water intake structures (i.e., trashracks) in place would minimize resident fish entrainment and impingement at the Trego Project. Although it is unclear what effects the trashrack bar spacing of 1.5 inches is having on the resident bluegill and black crappie fishery, and would have on the proposed lake sturgeon fishery, we do not believe there is any evidence at this time to support the need to alter the present design of the existing trashrack. In the event that evidence shows that the design of the existing trashrack should be changed at some time in the future, standard license article 11 affords the resource agencies the opportunity to recommend changes in project structures or operation for the conservation and development of fish and wildlife resources.

4. Fish passage: Currently, upstream and downstream passage of fish past the Trego dam is not a management objective for the Namekagon River (letter from William H. Clark, NWD FERC Project Manager, Wisconsin Department of Natural Resources, Spooner, Wisconsin, August 28, 1991). However, should management objectives change and fish passage be required, it may be necessary for Northern States to install appropriate upstream and downstream fish passage facilities. Interior requests reservation of authority to prescribe the construction, operation, and maintenance of fishways for the Trego Project pursuant to Section 18 of the Federal Power Act (letter from Jonathan P. Deason, Director, Office of Environmental Affairs, Office of the Secretary, U.S. Department of the Interior,

Washington, DC, November 20, 1991). Northern States accepts Interior's request for the reservation of authority.

Section 18 of the FPA provides the Secretary of Interior the authority to prescribe fishways.3/ Although fish passage facilities may not be recommended by Interior at the time of project licensing, such as for the Trego Project, the Commission should include license articles which reserve Interior's prescription authority.4/ We recognize that future fish passage needs and management objectives cannot always be predicted at the time of license issuance. Under these circumstances, and upon receiving a specific request from Interior, the Commission should reserve Interior's authority to prescribe fishways. Therefore, an article will be included in any license issued to reserve authority to the Commission to require the licensee to construct, operate and maintain such fishways as may be prescribed by Interior pursuant to Section 18 of the Act.

5. Drawdowns to reduce sedimentation and vegetation: Since the project's construction in 1927, considerable sediment deposition has occurred, creating wetlands in inlets of the Trego impoundment, particularly the upstream end where the Namekagon River enters. In this area, 3 to 8 feet of sediment has been deposited (an estimated 145,000 cubic yards). Estimates show that 2,000 cubic yards of sediment per year continue to settle in the upper reaches of the impoundment (WDNR, 1989). As a result of the shallow conditions, aquatic plants invade such areas, especially in the 15-acre Namekagon River inlet area.

Homeowners on the shoreline of the Trego impoundment, acting through the Trego Lake District (TLD), claim that shallow water conditions and associated weed growth limit access and public use at the Trego impoundment by constraining boating activities and other recreational uses. Based on these concerns, several recent investigations of the problem have been completed to determine the nature of the issue and alternative measures to improve conditions in the upper impoundment area (WDNR, 1989). The studies have shown that the sediment originates in the upstream watershed, mostly from natural sources; the TLD suggests that local construction activities have also added to the sediment levels in the impoundment. Several alternative measures have been evaluated to correct the problem, including construction of

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3/ Section 18 of the Act provides: "The Commission shall require construction, maintenance, and operation by a licensee at its own expense...such fishways as may be prescribed by the Secretary of Commerce or the Secretary of Interior as appropriate."

4/ Lynchburg Hydro Associates, 39 FERC ¶ 61,079 (1987).

an upstream sediment trap, dredging, a weed control program, as well as periodic drawdown of the impoundment.

In November and December 1978, Northern States conducted an 11-foot drawdown of the Trego impoundment to facilitate repairs to the dam. The drawdown increased hydraulic gradients and effectively scoured out most of the sediment and aquatic vegetation growing in the sediments in the upper impoundment area, thereby restoring the bottom to near preimpoundment conditions. In addition, sediment was removed by water level manipulations which allowed bottom sediments and plants to freeze into the winter ice, and the mixture of sediment and ice was then resuspended by raising water levels. The scouring, along with the effects of the freezing and refilling process, resulted in the relocation of about 20,000 cubic yards of material from the inlet area to other areas in the impoundment (WDNR, 1989).

TLD and agency recommendations. The TLD recommends a 30-day drawdown of 4-5 feet every 4-5 years, starting October 25 and ending December 5, to improve recreational access and uses in the upper Trego impoundment (letter to Northern States Power Company from Donald C. Hanson, Chairperson, Trego Lake District, Trego, Wisconsin, November 15, 1990).

The WDNR sees no present need for a drawdown of the impoundment. However, the WDNR says that it is likely that Northern States would need to schedule one or more project maintenance drawdowns during the term of any new license, and that the sedimentation issue should be considered in conjunction with any such drawdown. Therefore, the WDNR recommends that Northern States prepare a drawdown management plan in consultation with the resource agencies and the TLD within one year from the date of issuance of any new license. The plan must consider the effect of a drawdown on all project resources, and should ensure future resource protection, provide for participation by the affected property owners, outline responsibilities of all the interested parties for collecting the data, and define procedures for scheduling specific future drawdowns.

To establish baseline data for use in formulating future management decisions on drawdowns, the WDNR recommends that Northern States conduct a quantitative survey of aquatic macrophytes (vegetation) at the impoundment within one year from the date of issuance of any new license.

In addition, if a future drawdown is determined to be necessary, the WDNR stipulates that drawdowns should be scheduled to begin in early September and completed by mid-September, the rate of drawdown should not exceed one foot per day for the first four days to minimize the stranding of aquatic species in the impoundment, drawdowns should not exceed 11 feet in depth, and

the public should be notified before any drawdown occurs (letter to Northern States Power Company from William H. Clark, NWD FERC Project Manager, Wisconsin Department of Natural Resources, Spooner, Wisconsin, February 15, 1991). The WDNR says that Northern States should evaluate the need for a drawdown at about 10-year intervals over the term of any license.

To protect downstream fish and wildlife resources if a drawdown is determined to be needed, the WDNR recommends a 230-cfs minimum flow release during drawdown and refilling of the impoundment.

Further, the WDNR says that core sampling studies completed by Northern States indicate that several heavy metals 5/ are present in the Trego impoundment sediments in high enough concentrations to be of concern, based on EPA guidelines (letter from William H. Clark, NWD FERC Project Manager, Wisconsin Department of Natural Resources, Spooner, Wisconsin, August 28, 1991). To limit any water quality problems associated with sediment containing heavy metals being resuspended during reservoir drawdowns, the WDNR suggests that Northern States consider sediment management techniques as part of project operation. Also, the WDNR recommends that any new license contain a provision to reopen the license if new information shows a need for additional sediment sampling and appropriate management techniques.

Interior concurs with the WDNR that a drawdown management plan should be developed by Northern States, and that Northern States should ensure that: (1) the WDNR's recommended ramping rate is implemented during any drawdowns, and (2) the WDNR's recommended 230-cfs minimum flow is released during impoundment drawdown and refilling.

Applicant's proposal. In response to the comments and recommendations outlined above, Northern States remains committed to cooperate with the TLD and the resource agencies in conducting drawdowns and in developing a drawdown management plan when, and if, a project maintenance drawdown is scheduled. Northern States indicates that Trego dam is in excellent condition and, contrary to the view of WDNR, it foresees no need for any maintenance-related drawdowns for many years. Northern States opposes a license requirement to develop a drawdown management plan now, but suggests instead that such a plan should be formulated just before it is needed. Northern States acknowledges that macrophytes are now very abundant in parts of the impoundment.

5/ The heavy metals include arsenic (heavily polluted); and chromium, copper, and zinc (moderately polluted). In addition, the WDNR is concerned about the level of mercury in the Trego impoundment.

Northern States agrees to the recommendations of the WDNR and Interior on ramping the rate of drawdown and providing a 230-cfs minimum flow release during and after a drawdown of the Trego impoundment.

In regard to the WDNR's recommendation for a macrophyte survey, Northern States is not opposed to conducting a semi-quantitative macrophyte survey for management purposes at the project impoundment, but believes that such a survey would best be performed immediately before any planned drawdown in the future. It notes that historic macrophyte data is available as a baseline and that the year-to-year variability and seasonal changes in plant abundance could make data collected in the near term obsolete.

As to future sediment management techniques, Northern States is willing to work with the WDNR. However, its positions is that because the contaminants originated elsewhere in the watershed, it should not be accountable for their removal and disposable.

Conclusion. We conclude that TLD's drawdown proposal is unreasonable, based on: (1) the lack of technical evidence to support the need for a drawdown now or at any specified intervals in the future; (2) the questionable effectiveness of a five-foot drawdown in accomplishing the stated objective; (3) the high value of the present natural resource base, including wetland areas; and (4) the environmental concerns of the resource agencies.

However, we generally agree with the recommendation of the WDNR and Interior that a drawdown management plan should be prepared by Northern States. A properly managed reservoir drawdown could improve boating conditions on Trego impoundment and control undesirable aquatic plant species, while minimizing adverse impacts on other fish and wildlife resources. We believe that such a plan should include two components: (1) a needs analysis, subsequently updated at four-year intervals in cooperation with all the parties; and (2) if a need is identified, a drawdown implementation plan, including cooperative pre-drawdown studies to determine (a) the effects of a drawdown on all resources; (b) the specific timing, degree, and duration of the planned drawdown; and (c) monitoring of the drawdown and its effects, in consultation with all the parties.

We recommend that the plan be formulated and filed for Commission approval within one year from the date of issuance of any new license, and that subsequent updates of the plan should be scheduled in conjunction with the filing of the standard FERC Form 80, Licensed Hydropower Development Recreation Reports, for the project at four-year intervals.

The need for any future drawdown should be determined cooperatively with the WDNR, the FWS, the NPS, and the TLD, based on documented recreational, fish, and wildlife needs at the project (to be determined, at a minimum, by recreational and macrophyte surveys). In determining any recreational need for a future drawdown, Northern States' plan must fully consider the recommendations of the NPS, the primary administrative agency for recreation in the project area. In determining any need for future drawdowns based on fish and wildlife requirements, Northern States' plan should give major consideration to the recommendations of the WDNR and the FWS.

If a future drawdown of the Trego impoundment is necessary, as determined according to the requirements of the drawdown management plan, a drawdown is determined to be consistent with the management objectives of the NPS, and the environmental issues are resolved to the satisfaction of the resource agencies, Northern States shall conduct a drawdown, and implement the specific ramping rate, minimum flow, and other recommendations of the WDNR and Interior, as discussed herein.

We concur with the WDNR recommendation that any license should contain a provision for Northern States to conduct sediment sampling in conjunction with any planned drawdown of the Trego impoundment. Also, should new evidence show the need for sediment management techniques, standard license article 11 affords the resource agencies the opportunity to recommend changes in project structures or operation for the conservation and development of fish and wildlife resources.

6. Cultural resources: Relicensing the Trego Project provides the opportunity for continued protection of the following cultural resources: (a) the Trego Dam Historic District (District); (b) the archeological sites identified near the reservoir margin; and (c) other unidentified archeological sites that may be buried or inundated in the project area.

As discussed in section F.2.g., there is one eligible archeological site (34:2) and three archeological sites (29:1, 29:2, and 35:1) that may be eligible. The SHPO does not recommend any particular mitigation for site 34:2. The SHPO recommends that sites 29:2 and 35:1 be evaluated for National Register eligibility; and that site 29:1, which is partially inundated, be considered eligible until it can be evaluated when exposed through reservoir drawdown. The SHPO also recommends that Northern States conduct archeological surveys in the recreation areas recommended for improvement in the Northwest Regional Planning Commission's (NRPC) report (letter to Anthony Schuster, Northern States Power Company, from Richard Dexter, Chief, Compliance Section, Division of Historic Preservation, the State Historical Society of Wisconsin, Madison, Wisconsin, June 7, 1991).

Northern States says that, since it has not proposed any repair work or modification to the Trego Dam Historic District, there is no need for a mitigation plan for the structures that make up the District. Also, Northern States believes site 34:2, which is located on a high terrace above the Trego impoundment, would not be affected by project operation, and therefore, would not require protection measures.

Northern States says it has not been able to evaluate the eligibility of sites 29:2 and 35:1 because they are on private lands whose owners have denied access. Northern States proposes, as mitigation, to notify other property owners in the area of the existence of archeological sites on their lands, and of the SHPO's recommendations for protecting these sites.

Also, because all but one of the recreation improvements recommended by the NRPC are on either NPS or village of Trego land, Northern States disagrees with the SHPO's recommendation to survey these areas. For the recreation proposal that is on Northern States land, Northern States does not propose any further survey work because the area has already been surveyed, and there would not be any ground-disturbing activity, except where ground disturbance has already taken place. Finally, Northern States did not respond to the SHPO's recommendation concerning a future survey of site 29:1 (letter to Richard Dexter from Lloyd Everhart, Administrator, Hydro Licensing and Environmental Studies, Northern States Power Company, Eau Claire, Wisconsin, July 25, 1991).

Conclusion. As for Northern States' proposal to notify other landowners about archeological sites, we see no need for Northern States to take such action because we believe that site confidentiality may serve to prevent or impede vandalism at archeological sites. To avoid potential adverse effects to National Register listed or eligible properties at the Trego Project, we recommend Northern States consult with the SHPO and the NPS and file, for Commission approval, a cultural resources management plan that addresses the following issues.6/

a. Trego Dam Historic District. Continued operation and maintenance of the project would generally ensure the long-term preservation and protection of the District, and would therefore be beneficial. However, routine operation and maintenance could diminish the District's historic value, if these activities do

6/ We are not recommending any additional surveys at the areas proposed by the NRPC for recreational improvement because Northern States has insufficient control over the areas owned and operated by others, and because the recreational improvements proposed by Northern States would not require ground disturbance in any area where it has not already occurred.

not consider the area's historic qualities. Therefore, to ensure the historic values of the District are not inadvertently lost or diminished through operation and maintenance of the project, we recommend that Northern States consult with the SHPO to develop, and include as a provision in the cultural resources management plan for this project, a long-term operation and maintenance plan that would protect the District's history.

b. Archeological sites near the project impoundment. Although the NPS, in a letter dated March 8, 1991, expressed concern for potential effects to site 34:2 from Northern States' proposal to dredge the canoe access site, we conclude there would be no effect on the site because Northern States no longer proposes to dredge the access.

Archeological sites 29:2 and 35:1 (located on private lands abutting the impoundment) could be affected by erosion caused by project operation. Currently, there is minimal shoreline erosion, and we do not expect any increased erosion because our recommended operating range for the project impoundment would limit fluctuation to 0.6 foot. Since erosion is minor and Northern States has been denied access to the sites, we do not see a need for further surveys at this time. However, we recommend that Northern States include in its cultural resources management plan, a plan to: (a) monitor the reservoir shoreline, particularly the condition of sites 29:2 and 35:1, (b) file an annual report with the Commission and the SHPO on the monitoring results, and, (c) should monitoring indicate potential harm to these sites, attempt to access the sites to conduct the studies necessary to determine the sites eligibility, and develop a plan for avoiding or mitigating effects at the eligible sites.

Regarding site 29:1, we recommend that Northern States include in its cultural resources management plan measures to evaluate site 29:1 for eligibility when the reservoir is sufficiently drawn down to expose the site and allow for its evaluation. If the site is found to be eligible, Northern States should develop a plan, prepared in consultation with the SHPO, to protect the site.

c. Other unidentified archeological sites. There still could be eligible properties in the project area that could be adversely affected by unforeseen ground-disturbing activities or by project operation. Therefore, we recommend that Northern States include the following measure in its cultural resources management plan: Before engaging in any ground disturbance that has not been considered in this environmental assessment, or if properties are found during project operation, Northern States should take the following actions: (a) consult with the SHPO; (b) based on consultations with the SHPO, prepare a plan describing the appropriate course of action and a schedule for carrying it out; (c) file the plan for Commission approval; and

(d) take the necessary steps to protect the properties until notified by the Commission that all of requirements have been satisfied.

Finally, we recommend that the cultural resources management plan specifically provide for its being superseded by a Statewide Programmatic Agreement for Wisconsin if such an agreement is executed among the Commission, the Advisory Council, and the SHPO.

7. Recreation facilities: In 1990 Northern States conducted a recreational use survey of the project area. The Northwest Regional Planning Commission (NRPC) analyzed Northern States' survey results, investigated existing recreation facilities, and conducted a recreation needs assessment. The resulting report recommended that Northern States, and others administering lands on the project impoundment, provide improvements at several sites (Northern States Power Company, 1991(a), Appendix D). The NRPC recommends that Northern States: (1) construct signs indicating the parking area for walk-in fishing off North River Road; (2) dredge the upstream canoe take-out area; and (3) provide trash receptacles and restrooms for portage trail users. The NRPC notes that existing recreational facilities on or near the Trego impoundment would meet current recreational needs, provided that its recreation facility recommendations are implemented within 2 years.

The FWS recommends that Northern States, when requested by the WDNR, improve existing public access and recreational facilities or develop new facilities on the impoundment to optimize fishing, hunting, and boating activities.

To provide a baseline for future recreation development decisions, the WDNR asks Northern States to submit user count data from its 1990 recreational use survey to affected state and federal agencies within one year of license issuance (letter from William H. Clark, NWD FERC Project Manager, Wisconsin Department of Natural Resources, Spooner, Wisconsin, August 28, 1991). The WDNR also wants Northern States to develop the recreation facilities recommended by the NRPC, and to monitor recreational use and needs every 10 years for the term of the license.

Northern States agrees to provide the WDNR with the recreational use data (letter from Anthony G. Schuster, Vice President, Power Supply, Northern States Power Company, Eau Claire, Wisconsin, January 10, 1992). With respect to access at the canoe take-out, Northern States originally agreed to dredge an area 15 by 20 feet at the upstream canoe take-out. Northern States' hydrologist later determined that dredging was unnecessary for improving access (personal conversation, Pamela Gruber, Northern States Power Company, Eau Claire, Wisconsin, November 22, 1991). To avoid the adverse environmental impacts

of dredging, Northern States now proposes to improve the upstream canoe access site by cutting aquatic vegetation in an area 20 feet long by 3 feet wide. Northern States also agrees to provide the recommended signs at the North Road parking area and trash receptacles at the dam portage site. Northern States has not agreed to provide toilet facilities at the dam portage site due to the close proximity of such facilities to the earthen dike and river, but Northern States does agree to consider portable toilet facilities.

To improve public recreational access at the project, we agree that Northern States should, in consultation with the WDNR and the NPS, periodically cut the aquatic vegetation at the existing canoe take-out to facilitate boat access, provide signs at the North Road parking area, and provide trash receptacles at the dam portage site. Based on the high boating use in the area, Northern States should also provide portable toilet facilities at the dam portage site during peak recreational use periods each year. In addition, Northern States should be required to provide the 1990 use data to the WDNR, and to monitor recreational use throughout the term of the license. Licensees are required routinely to file a Form 80 with the Commission every 4 years. Licensees must monitor recreational use of the project in order to fill out the form, which is an accounting of the project recreational facilities and their use. Furthermore, we conclude that the planned recreational improvements are consistent with the stated management objectives of the NPS (U.S. Department of the Interior, National Park Service, 1976).

H. ENVIRONMENTAL IMPACTS

1. Assessment of impacts expected from the applicant's proposed project (P), with the applicant's proposed mitigation and any conditions set by a federal land management agency; the proposed project with any additional mitigation recommended by the staff (Ps); and any action alternative considered (A). Assessment symbols indicate the following impact levels:

O = None; 1 = Minor; 2 = Moderate; 3 = Major;
A = Adverse; B = Beneficial; L = Long-term; S = Short-term.

Resource	Impact P	Ps	A	Resource	Impact P	Ps	A
a. Geology-Soils	0	0		f. Wildlife	0	0	
b. Streamflow	0	0		g. Cultural: Archeological	1AL	2BL	
c. Water quality: Temperature	0	0		Historical	1BL	2BL	
Dissolved oxygen	0	0		h. Visual quality	0	0	
Turbidity and sedimentation	0	0		i. Recreation	1BL	2BL	
d. Fisheries: Anadromous	-	-		j. Land use	0	0	
Resident	1BL	1BL		k. Socioeconomics	0	0	
e. Vegetation	0	1BL					

Remarks:

d. The stocking program agreed upon by Northern States and the WDNR would restore lake sturgeon and gilt darter upstream of the Trego Project.

e. Implementation of a drawdown management plan could eliminate aquatic vegetation and scour the sediment. If the impoundment is invaded by noxious species, a drawdown could reduce or eliminate these species.

g. Developing and executing a cultural resources management plan would provide for the protection of National Register and eligible properties at the project.

i. Cutting the emergent vegetation at the canoe take-out on a periodic basis, and providing signs, toilets, and trash

receptacles would enhance recreational access and opportunities at the project. Implementation of a drawdown management plan could improve recreational access at the Trego Project.

2. Impacts of the No-Action Alternative

If a new license is not issued for the project, with the environmental enhancement measures proposed by Northern States, and the measures recommended by the resource agencies and the staff, Northern States would continue to operate the project in accordance with its existing license. Northern States is now required to make a minimum streamflow release of 230 cfs or inflow. Although Northern States has been operating the project in a run-of-river mode in recent years, and proposes to continue to do so in its application for new license, this operation is not required in the existing license; operation in this manner stabilizes the impoundment and downstream flows. The proposed and recommended recreational improvements (as described herein) would also not be required, as well as the proposed and recommended funding of fish restoration studies, and our recommended drawdown management plan and cultural resources management plan.

I. COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a) of the Federal Power Act (Act) require the Commission to give equal consideration to all uses of the waterway on which a project is located. When the Commission reviews a hydropower project, the environment, recreation, fish and wildlife, and other nondevelopmental values of the waterway are considered equally with power and other developmental values. In determining whether, and under what conditions, a hydropower license should be issued, the Commission must weigh the various economic and environmental tradeoffs involved in the decision.

Based on our independent review and evaluation of the project as proposed and the no-action alternative, we have selected issuance of a new license for the project, with additional staff-recommended enhancement measures, as the preferred option. Measures recommended to enhance environmental resources and recreational opportunities include: (1) required future operation of the project in a run-of-river mode, using the new controls installed by Northern States in 1990 to narrow the normal operating range of the power pool to within 0.3 foot of total fluctuation, thus providing stabilized and near-natural aquatic conditions for fish and wildlife at the impoundment and downstream; (2) funding of support programs for the restoration of the sturgeon and gilt darter upstream of the project through the WDNR; (3) improved recreational access facilities at the existing canoe portage near the project dam, including signs, trash receptacles, portable toilets in summer, and periodic

cutting of emergent vegetation at the canoe take-out area; (4) maintenance of the existing trashracks with 1.5-inch bar spacing to minimize fish entrainment and impingement; (5) formulation of a drawdown management plan to evaluate the need for and, if needed, implement a drawdown to control sediment accumulation and aquatic vegetation, and thus provide good recreational access and use of the upper impoundment; (6) formulation and implementation of a cultural resources management plan to protect archeological sites that may be affected by project operation; and (7) provision of fish passage facilities if future needs require.

In addition to these environmental enhancement measures, the project would provide continued developmental benefits. An estimated 7,580 MWh of relatively low-cost electricity, with an estimated levelized replacement value of about $318,000, would continue to be generated annually from a clean, domestic, reliable, and renewable energy resource for use by Northern States' customers in portions of Wisconsin, Michigan, Minnesota, North Dakota, and South Dakota. Northern States' current average cost for power produced by the project, including operation and maintenance, property taxes, cost of capital, and depreciation, is estimated at $17.40 per MWh of energy.

Since more than forty percent of the applicant's energy requirements are satisfied by coal-fired, steam-electric, generating facilities, any necessary replacement energy for the 7,580 MWh of annual generation from the project would probably come from coal-fired generation. Thus, continued generation from the project would: (1) conserve non-renewable energy resources; (2) avoid problems related to the extraction and transportation of additional fossil fuels and the handling and disposal of associated wastes and byproducts such as coal fly ash and flue gas desulfurization sludge; and (3) avoid the emission of additional noxious gases that contribute to atmospheric pollution and global warming.7/

7/ A coal-fired, steam-electric, power plant serving as an alternative source of capacity and annual energy production equal to that of the project would consume approximately 3,160 tons of coal annually. Assuming the sulfur content of the coal to be 1.0 percent, the combustion of this quantity of coal would produce 61 tons of the oxides of sulfur, 28.5 tons of the oxides of nitrogen, 1.5 tons of carbon monoxide, and 7,280 tons of carbon dioxide per year. State of the art pollution control technology is capable of effecting a 95-percent reduction in the amount of produced oxides of sulfur released to the atmosphere and a 60-percent reduction in the atmospheric release of the oxides of nitrogen -- at a cost. Sulfur dioxide and nitrous oxides are considered prime contributors to the production of acid rain, and carbon dioxide is considered to be a prime contributor to global warming.

On balance, the environmental and recreational resources that we are enhancing are worth the costs of these measures. Several environmental resources are considered especially important at this project. As stated in this EA, the fish, wildlife, and recreational values of the Namekagon River are outstanding, as indicated by its inclusion within the National Wild and Scenic Rivers System. Thus, the natural resource values in the project area are of national significance. Our objective is to preserve the present balance among these different values, and provide improvements where feasible and appropriate, based on continued consultation between Northern States and all the interested parties.

The costs of our recommended environmental and recreational measures for the Trego Project are relatively minor, with the exception of impoundment drawdown. We have evaluated the cost of a one-month drawdown every five years, as recommended by the Trego Lake District. We estimate that a one-month project shutdown would reduce project generation by about 580,000 kWh. We further estimate that the 50-year levelized cost of alternative fuel for Northern States to replace the lost generation would be about 42.0 mills per kWh. Based on this information, we estimate that a one-month shutdown would cost Northern States about $24,000 each time the impoundment is drawn down. This amounts to about 7.5 percent of the project's gross benefits in any one year.

We considered the uncertain present need for a management drawdown, the concerns of the resource agencies over the environmental impacts of a drawdown, as well as the cost of a drawdown in lost power generation and lost economic benefits. As a result, we conclude that further study of the drawdown issue should be conducted by Northern States to substantiate the need for a drawdown, and if a need is substantiated, an implementation plan for a drawdown should then be coordinated by Northern States in consultation with all the interested parties. We further recommend that the issue be reevaluated on a recurring basis every four years because of the high value of the project impoundment for recreational activity as part of a National Wild and Scenic River.

Section 10(a)(2) of the Act also requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. Under section 10(a)(2), federal and state agencies have filed a

total of 9 comprehensive plans relevant to this project. 8/ No conflicts were found.

Based on our comprehensive evaluation of the project, we conclude that continued operation of the project would provide net positive benefits in the public's interest. Therefore, pursuant to sections 4(e), 10(a)(1) and 10(a)(2) of the Act, we find that the Trego Hydroelectric Project is best adapted to a comprehensive plan for the proper use, conservation, and development of the Namekagon River and other project-related resources.

J. CONSISTENCY OF FISH AND WILDLIFE RECOMMENDATIONS

Pursuant to Section 10(j) of the Act, we are making a determination that the recommendations of the federal and state fish and wildlife agencies are consistent with the purpose and requirements of Part 1 of the Act and applicable law. Section 10(j) of the Act requires the Commission to include license conditions, based on the recommendations of federal and state fish and wildlife agencies, for the protection, mitigation of adverse impacts to, and enhancement of fish and wildlife. We have addressed the concerns of the federal and state fish and wildlife agencies and made recommendations consistent with those of the agencies.

We believe several of the measures (i.e. 3,5,6,8-11) recommended in the WDNR's letter of August 28, 1991, are not appropriate fish and wildlife recommendations under section 10(j) because they do not provide terms and conditions for the protection, mitigation of damages to, and enhancement of fish and wildlife as stipulated in Section 10(j) of the Act. However, we have considered these measures under our Section 10(a)

8/ St. Croix National Scenic Riverway final master plan, 1976, National Park Service; Land protection plan, 1984, St. Croix National Scenic Riverway, National Park Service; Land protection plan, 1981, Lower St. Croix National Scenic Riverway, National Park Service; Statement for management, St. Croix and Lower St. Croix National Scenic Riverways, 1986, National Park Service; Comprehensive master plan for the management of the upper Mississippi River system - Environmental report, 1986, National Park Service; St. Croix River Basin areawide water quality management plan, 1980, Wisconsin Department of Natural Resources; Statewide comprehensive outdoor recreation plan, 1985, Wisconsin Department of Natural Resources; An evaluation of the sedimentation process and management alternatives for the Trego flowage, Washburn County, Wisconsin, 1989, Wisconsin Department of Natural Resources; and North American waterfowl management plan, 1986, U.S. Fish and Wildlife Service and Canadian Wildlife Service.

responsibilities of the Act and addressed them in this EA. We agree with these measures. We have not addressed measures 10 and 11, which require compliance with Wisconsin statutes and codes. This is the responsibility of the state of Wisconsin.

K. CONCLUSION

Issuance of a new license for the continued operation of the Trego Project would result in the implementation of several environmental enhancement measures, as described herein. In addition, ongoing planning and consultation activities would be required of the licensee to ensure the continued monitoring of environmental needs in the project area. Since the project is constructed and operating, there would be no project-related construction impacts associated with the recommended issuance of a new license.

On the basis of our independent environmental analysis, issuance of a new license for the Trego Project would not constitute a major federal action significantly affecting the quality of the human environment.

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Appendix C

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Northern States Power Company — Project No. 2711-003
Wisconsin

ORDER MODIFYING AND APPROVING DRAWDOWN NEEDS ANALYSIS
(Issued October 31, 1995)

On November 30, 1994, Northern States Power Company (licensee) filed a drawdown needs analysis pursuant to article 405 of the Order Issuing License issued June 2, 1994 for the Trego Project.

Article 405 requires the licensee to file a needs analysis that includes a study to determine the amount of recreational use at the impoundment, a qualitative and quantitative aquatic macrophyte survey to determine the extent of aquatic vegetation in the impoundment, and an analysis of the effect of the vegetation and sedimentation on recreational use of the impoundment. The analysis should also contain alternative management techniques and options to drawdown. The analysis should be developed in consultation with the U.S. Fish and Wildlife Service (FWS), National Park Service (NPS), the Wisconsin Department of Natural Resources (WDNR), and the Trego Lake District (District).

Background

Trego Flowage is a 460-acre impoundment formed by the Trego Dam on the Namekagon River. The WDNR and the U.S. Army Corps of Engineers (COE) estimate that sediment is deposited at a rate of about 2,000 cubic yards per year. Sedimentation has caused shallower water at the upper end of the impoundment, thereby encouraging weed growth and the development of wetlands.

In a study by the COE, it was reported that soil loss from the Trego Flowage watershed was minimal and that sediment carried by the system was primarily generated from natural processes upriver of the project. The study concluded that the Namekagon River is exhibiting normal streambed erosion and was undergoing a natural transition from a meandering system to a braided system. Timber cutting on sloped land near tributary channels, construction activities, and recreational activities were cited as contributing to the sediment load.

The COE study found that an average of 6 feet (145,000 cubic yards) of coarse-grained sediment accumulated in the 15-acre inlet area from 1927 through 1988. If deposited at a uniform rate over the 70-year period, approximately 2,000 cubic yards were deposited annually. This infilling rate was reported to be low when compared to other Wisconsin impoundments.

During relicensing of the Trego Project, owners of property on the shoreline of the Trego impoundment, acting as the District, commented that sediment and weeds limit access to the impoundment for recreational purposes. The District recommended that the licensee draw down the reservoir four to five feet for one month every four to five years to remove sediment and discourage weed growth. Article 405 was added to the license to evaluate this recommendation.

Needs Analysis

The filed plan contained the results of a recreation survey. The survey identified recreational users at the project as boat fishermen, shoreline fishermen, canoeists, and recreational boaters. Less frequently identified activities included camping, hiking, swimming, and picnicking.

A plant survey was conducted on the upper one-third of the flowage near the entry point of the Namekagon River, the area where sedimentation and aquatic plant growth were greatest. A total of 27 different species were identified. The different species appeared as submersed plants, floating-leaf plants, emergent plants, and algae. Plant growth was generally moderate with thick growth in some locations.

The licensee determined that a drawdown was not necessary at this time and could result in greater adverse environmental impacts since a drawdown would affect the entire reservoir in order to solve a localized problem. Previous drawdowns provided only temporary relief from the macrophyte problem for 2 to 3 years. Drawdowns also cause sediment to be relocated to lower portions of the reservoir and may cause the spread of plant growth to lower reaches of the reservoir.

Sedimentation and macrophyte growth make the upper one-third of the lake difficult to access for recreational purposes in the spring and summer months. The licensee recommended a localized macrophyte management plan which involved harvesting, chemical control, hand raking, or a combination of these options to clear paths to enable boats to reach open water and to clear areas in front of residences for swimming and wading purposes. The plan would include harvesting in the early summer and spot treatment with herbicide in late summer to keep corridors open if necessary. Residents would be encouraged to remove vegetation to provide swimming and wading areas in front of their property.

The licensee suggested that the District may be the most appropriate organization to develop, finance, and implement the plan. The District would establish macrophyte management goals that reflect recreational use of the reservoir and would obtain the necessary WDNR and NPS permits. The licensee would meet with

residents to determine their expectations and to educate them on the function and values of macrophytes.

Comments

In a letter dated December 17, 1994, the District disagreed with the plan because they felt the assessment only addressed the symptom of excessive aquatic vegetation and not the cause of the problem which is excessive sedimentation. The District recommended a drawdown and dredging of the problem area and the establishment of permanent sediment traps upstream. In their plan 100,000 cubic yards of sediment would be dredged from an area 3,000 feet by 225 feet by 4 feet deep. The projected cost of this project would be approximately $6 per yard with a total cost of $600,000.

The NPS agreed with the decision for site-specific harvesting of the macrophytes in the upper section of the flowage in a letter dated December 16, 1994. The NPS was concerned about the recommendation of spot treatment of macrophytes with the herbicide Sodium Salt of Endothol and wanted an opportunity to review the label for the herbicide.

The WDNR responded to the needs assessment in a letter dated January 31, 1995. The WDNR generally concurred with the results of the assessment and they agreed that a drawdown was not necessary at this time. They said, however, that the possibility of using this option should remain a consideration for the future. The WDNR discussed possible methods of chemical control that were more species specific but they stated that there were some regulatory concerns for both harvesting and herbicide treatment.

Chapter 30 of the Wisconsin Statutes requires that cut aquatic plants be removed from the waterbody and not be allowed to drift. Other methods of weed removal may also require permits. The WDNR also requires permits for herbicide treatments because of concerns regarding adverse impacts on waterfowl.

The WDNR recommended that the licensee refine its recommended management plan to include plant-specific, site-specific, and seasonal considerations when selecting the proper treatment method to control aquatic vegetation.

Discussion and Conclusions

A drawdown of the reservoir is not necessary at this time. The localized vegetation clearing plan described by the licensee would provide most of the public recreational benefits of a drawdown without the severe impacts to wetlands and other habitats and the potential of relocating sediment to the lower reservoir. The boat lanes would allow residents along the weedy

upper one-third of the reservoir easier access to the open water of the lower two-thirds of the reservoir for boating. The boat lanes would also enhance fishing access to the fish habitat of the upper reservoir.

Although drawdown is not necessary at this time, it may still be considered a useful alternative in the future. Article 405 requires that the needs analysis be updated by the licensee in conjunction with the standard FERC Form 80, Licensed Hydropower Development Recreation Report, required by the Commission's regulations, 18 C.F.R. § 8.11 (1993). If any subsequent updates indicate that a need for a drawdown exists, the licensee shall proceed with the preparation of an implementation plan as outlined in article 405.

Construction of a sediment trapping facility immediately upstream of the facility is not recommended at this time since the actual levels of sediment entering the flowage from natural causes are relatively low. An earlier study by the COE found that a sediment trap was not cost effective.

In general, the proposed plan for localized control, including the harvesting of macrophytes to establish boat lanes, should effectively provide for boating access to the upper third of the reservoir, at least on an interim basis. The plan should be refined to address the aforementioned issues. Further, the staff believes that the licensee is responsible for providing the recreating public access to the upper portion of the reservoir; however, the District should assume the responsibility for undertaking whatever additional measures may be required to provide access for individual private development. Therefore, the Commission staff recommends that the licensee prepare a detailed vegetation management plan, to ensure that boat lanes are established to enhance public access within the upper reservoir. The detailed vegetation management plan shall address both mechanical harvesting and herbicide treatment. If herbicide treatment is proposed, the plan shall address species-specific, site-specific, and seasonal considerations. The plan should describe cooperative efforts with the District. A copy of the label and a material safety data sheet should be included in the plan for any chemicals proposed for use. The plan should be prepared in consultation with the WDNR, NPS, the FWS, and the District.

The drawdown needs analysis filed November 30, 1994, adequately describes current conditions around the reservoir and describes a reasonable, though general, plan for managing macrophytic vegetation without drawing down the reservoir. The drawdown needs analysis should be approved as modified below.

yThe Director orders:

(A) The drawdown needs analysis filed on November 30, 1994, pursuant to article 405, as modified by paragraphs (B) and (C), is approved.

(B) The licensee shall file for Commission approval a detailed vegetation management plan, to enhance public access within the upper reservoir. The plan should be filed within 6 months of the date of this order. The detailed vegetation management plan shall address both mechanical harvesting and herbicide treatment. If herbicide treatment is proposed, the plan shall address species-specific, site-specific, and seasonal considerations. A copy of the label and a material safety data sheet should be included for any chemicals proposed for use. The plan should be prepared in consultation with the Wisconsin Department of Natural Resources, the U.S. Fish and Wildlife Service, the National Park Service and the Trego Lake District. The licensee shall allow a minimum of 30 days for the agencies and the Trego Lake District to comment prior to filing with the Commission. If the licensee does not agree with a recommendation, the plan shall include the licensee's reasons, based on project-specific information.

(C) The Commission reserves the right to require changes to the vegetation management plan.

(D) This order constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 CFR § 385.713.

J. Mark Robinson
Director, Division of Project
Compliance and Administration

Appendix D.

Trego Lake District – Timeline (on issues with sedimentation and aquatic plants)
This time line is created primarily from documents located on the Trego Lake website: https://tregolakedistrict.com

- 1926/1927 – Trego Lake is created by placing a hydroelectric dam on the Namekagon River. The dam was constructed by the Wisconsin Hydro Electric Company to provide electricity.
- March 11, 1977 – Original FERC (or appropriate agency at that time) license for dam operation
- Late-Fall 1978 Draw down of 11 ft. on Trego Lake to do repair work on dam structure (noted in the 1994 Trego Flowage Macrophyte Survey and Management Plan)
- March 9, 1987 – Trego Lake Association formed to address sedimentation and weed growth in Trego Lake.
- Summer 1987 – First controlled harvest of weeds from Trego Lake. (manual harvest?)
- September/October 1987 – Senator Bob Jauch forwarded a sedimentation study to University of Wisconsin for a "Pilot Program for the purpose of studying sedimentation which effects all flowages in Wisconsin."
- October 19, 1987 – Drawdown of 4 ft. on Trego Lake and aerial photos taken to study the sedimentation problem. Department of Transportation and Engineer Rod Ripley developed report due early 1988.
- 1988 – Army Corps of Engineers study of sedimentation on Namekagon River/Trego Lake: (Authors: Nelson and Larson)
- May 1989 – Wisconsin Department of Natural Resources (WDNR) completes latest study and recommends a drawdown and dredging. Need for funding such project is determined. https://tregolakedistrict.com/wp-content/uploads/2021/04/1989-DNR-Trego-Flowage-Study-on-Sedimentation.pdf
- September 1989 – Trego Lake District created by the Trego Town Board – "public inland lake protection and rehabilitation district. . ."; https://drive.google.com/file/d/1oCYmMg9e3VrXPayjYElO78EU4k_0-oLR/view
- October 1, 1989 – Trego Lake Association transfers all of its records and funds to the Trego Lake District.
- May 24, 1991 – TLD Annual Meeting – Noted that Northern States Power (NSP) and WDNR grant applications to pay for dredge work not "honored." NSP stated they would try to solve the sedimentation problem but no date or process identified.
- May 24, 1991 – TLD Annual Meeting – notes regarding ongoing weed harvesting using Aquatic Nuisance Control of Amery, Wisconsin. Harvesting paid for by individual property owners(?).
- February 27, 1992 – Environmental Assessment of Trego Lake for dam licensing: https://tregolakedistrict.com/wp-content/uploads/2021/03/Environmental-Assessment-for-Dam-License-Februart-27-1992.pdf
- March 1992 – Mention of aquatic invasive species (AIS) curly leaf pondweed being a nuisance and a need for a program for weed control.
- July 26, 1993 – Notice of Trego Lake dam relicensing
- December 16, 1993 – Spooner Advocate article on Trego Lake sedimentation issue: https://drive.google.com/file/d/1c-Ngu2Np4msNg76oTav01NxX_MSGwIru/view
- May 28, 1994 – TLD Annual Meeting – ongoing work/communication with local, state, and federal elected officials on funding for dredging
- June 2, 1994 – FREC order issuing Dam License: https://tregolakedistrict.com/wp-content/uploads/2021/03/FERC-Dam-License-Trego-June-2-1994.pdf
- November 1994 – Trego Flowage Macrophyte Survey and Management Plan; prepared for NSP/Wisconsin as directed by Article 405 of its FERC Operating License for the Trego Hydro Project (FERC No. 2711)
    - Macrophyte Management Plan: https://tregolakedistrict.com/wp-content/uploads/2019/04/1994-Trego-Flowage-Lake-Plan.pdf
        - States an Army Corps of Engineers study (date?) determined approximately 2000 cubic yards of sediment are deposited in the lake annually.
        - 5 options identified: do nothing; watershed protection; sediment removal; construct sediment trap; periodic drawdown – all with pluses and minuses
- January 5, 1995 – Trego Lake Sedimentation Meeting with various officials from local, state and federal offices. Many options considered - summary: https://drive.google.com/file/d/120rtjzeNCBzhTCFfb_fj3ZXGuqOXzp6s/view
- May 27, 1995 – TLD Annual Meeting – vote on dissolution of TLD failed. Discussion on development of a five-year plan. Continuation of weed harvesting plus TLD will consider grants to pay for harvesting.

- October 31, 1995 – FERC modification to Trego Dam license: https://tregolakedistrict.com/wp-content/uploads/2021/03/FERC-modification-to-Trego-Dam-license-10-31-1995.pdf
- May 25, 1996 – TLD Annual Meeting – Weed Harvesting Committee researching grants to pay for harvesting activities.
- May 25, 1996 – TLD Annual Meeting – Statement that dam has been relicensed for 33 years and that one of the provisions of the license is that NSP file a detailed vegetation management plan to enhance public access within the upper reservoir. Plan should be prepared with input from local, state and federal entities.
- January 2, 1997 – Northern States Power (NSP) and Trego Lake District (TLD) agreement on Vegetation Management Plan: https://drive.google.com/file/d/1Wl4_hkXZ8SFnRV3wj9oGglTnLXpNrezm/view
- January 18, 1997 – NSP and TLD agree on weed harvesting activities. They have been submitted to FERC for approval. They include:
    - NSP agrees to:
        - Pay for cost of harvesting twice a year
        - Pay for cost of navigational buoys for marking channels
        - Pay for most of the financial responsibility of the project
    - TLD agrees to:
        - Contacting and working with harvesting company
        - Making sure the channels are marked properly
        - Overseeing the harvesting
- May and July 1998 – Weed Harvesting done under new agreement. NSP, in the future, is unwilling to finance a second cutting/harvest. July 25, 1998 TLD Quarterly Board minutes: https://drive.google.com/file/d/12oL1BR0Pk1zYW73OAPaUgbHgs-OQRRcL/view
- July 1999 – Weed harvesting done in July (single harvest?) - Xcel (NSP) reimbursed TLD for cost
- July 2000 – Weed harvest completed. - Xcel (NSP) reimbursed TLD for cost
- June 2001 – Weed harvest completed - Xcel (NSP) reimbursed TLD for cost
- July 2002 – Weed harvest completed - Xcel (NSP) reimbursed TLD for cost
- Summer 2002 – TLD Sedimentation Committee created
- January 2003 – WDNR states they would not support a draw-down of Trego Lake to research/address sedimentation issues
- June/July 2003 – Weed harvest completed - Xcel (NSP) reimbursed TLD for cost
- January 24, 2004 – TLD submits conceptual drawings and discussion of proposed channel and wetland improvements to address sedimentation to US Army Corps of Engineers (at the Corps request). Channels are described as approximately 25 feet wide and 4 feet deep.
- May 29, 2004 – Sedimentation Committee proposes to form wetlands by moving some of the sedimentation from the boat channels to other areas in the lake. DNR responded that movement of sedimentation in the lake is not permitted.
- July 2004 – Weed harvest completed - Xcel (NSP) reimbursed TLD for cost
- June 2005 – weed harvest completed - Xcel (NSP) reimbursed TLD for cost
- July 2005 – Army Corps identifies design concepts for sedimentation removal. TLD starts to develop plan to meet concepts identified.
- October 2005 – Application for WDNR dredging permit ($500) paid for voluntarily by impacted property owners.
- June 2006 – Sedimentation Committee proposes the following recommendations:
    - Establish and maintain channels in the upper end of the lake and address the symptoms of sedimentation. Need to obtain permit to do.
        - Cost of the permit and maintaining channels would be paid by property owners who use the channel
    - Remove sedimentation east of Highway 53 bridge. This would address the sedimentation coming into Trego Lake. Approximately 2000 cubic yards of sand flow down the river into the lake each year (Army Corps of Engineers' 1988 study).
        - Cost for regular removal of sedimentation before it enters the lake would be paid for by property tax on all property owner in the district.
- June 2006 – At TLD Annual Meeting, motion to obtain WDNR permits for dredging proposal passes 49 votes yes to 18 votes no.

- July 2006 – Weed harvest completed - Xcel (NSP) reimbursed TLD for cost
- June 16, 2007 – At TLD Annual meeting, motion for dissolution of district fails.
- June 16, 2007 – Permit paperwork in process for dredging work on Trego Lake
- June 29, 2007 – Weed harvest completed - Xcel (NSP) reimbursed TLD for cost
- January 2008 – WDNR dredging permits received
- June/July 2008 – Weed harvest completed - Xcel (NSP) reimbursed TLD for cost
- October 2008 – dredging spoils sites area prepared; possible dredging summer of 2009
- January 2009 – TLD Sedimentation Checking account created to hold funds donated to TLD for dredging purposes
- July 2009 – Weed harvest completed - Xcel (NSP) reimbursed TLD for cost
- Summer 2009 – Dredging company was trying out a new dredge and offered to use Trego Lake as a test site for no or minimal cost. Demand for new dredge was great so dredging did not take place because equipment was not available.
- July 2010 – Weed harvest completed - Xcel (NSP) reimbursed TLD for cost
- Summer 2010 – Waiting for dredge equipment availability
- October 2010 – TLD AIS Committee created to assess aquatic plants in lake and develop an AIS rapid response plan.
- June 2011 – Sedimentation Committee research and addressing insurance questions on use of dredging equipment.
- July 2011 – Weed harvest completed - Xcel (NSP) reimbursed TLD for cost
- July 2011 – Point survey completed of aquatic plants in Trego Lake
- July 22, 2011 – Special Board Meeting: Resolution - Further consideration of Sedimentation Committee proposal for dredging; to be funded entirely with private funds. Resolution passed. Meeting minutes: https://drive.google.com/file/d/1dIPj4AxDl8HyICZFWj62Tb3nlTEw1Ara/view
- June 2012 – Plant survey summary presented to TLD. See for details: https://tregolakedistrict.com/wp-content/uploads/2019/04/2011-TREGO-LAKE-AQUATIC-PLANT-SURVEY-SUMMARY.pdf
- June 2012 – Reauthorization of dredging project with donated funds. Waiting on dredge company to have availability of dredge for Trego Lake
- July 2012 – Weed harvest completed - Xcel (NSP) reimbursed TLD for cost
- Notes for 2013 not available
- January 2014 – Sedimentation permits with WDNR are requested to be extended. Also, the committee discusses the purchase of a dredge.
- July 2014 – Weed harvesting not completed because of minimal weeds to harvest
- July 2014 – Sedimentation Committee discusses hiring a commercial dredger to carry out the dredging permits. Cost is a large factor to consider.
- Fall 2014 – Commercial dredge company out of South Dakota has been identified to do the dredge work once funding is in place.
- January 2015 – Funds are identified from the Town of Trego, Washburn County and WDNR to conduct the dredge work.
- June 2015 – TLD annual meeting approves a resolution to authorize the TLD Board to implement the dredging project. Resolution, including particulars: https://drive.google.com/file/d/12KwD3UMyqRjsRJ0pfpcOazbew1Y6hS-K/view
- July 2015 – Weed harvest completed - Xcel (NSP) reimbursed TLD for cost
- January 2016 – Contract for dredging – bids advertised as required and an acceptable bid was received, contract negotiated, and signed.
- July 2016 – Weed harvest completed - Xcel (NSP) reimbursed TLD for cost
- July – September 2016 – Dredging work completed. 8.75 million gallons of water pumped. Channels 25 feet wide and 4 feet deep. Recent map shows channels dredged in 2016: https://tregolakedistrict.com/wp-content/uploads/2020/06/Top-View-of-Proposed-2020-Spot-Dredging-of-Previously-Dredged-Channels-in-2016.pdf
- July 2017 – Weed harvest completed - Xcel (NSP) reimbursed TLD for cost
- July 2018 – Weed harvest canceled – fewer weeds in channel. Deposit with weed harvester forfeited. After discussion, Xcel Energy agreed to reimburse Trego Lake District for forfeited deposit.

- August 2018 – Sedimentation Committee is re-created to deal with additional sedimentation and channel issues. Channels dredged in 2016 are filling in with sand.
- November 2018 – Xcel Energy reimbursed TLD for forfeiture of weed harvest deposit. Xcel is obligated under dam operating license to pay for annual weed harvesting.
- July 2019 – Weed harvest completed - Xcel (NSP) reimbursed TLD for cost
- August 2019 – Eurasian or hybrid watermilfoil is identified by WDNR staff in Trego Lake. (Later determined to be hybrid watermilfoil (HWM)). Hybrid watermilfoil has been observed in Lake Hayward which feeds into the Namekagon River and Trego Lake.
- October 2019 – TLD approves applying for WDNR Rapid Response Grant and for Lake Management Plan grant. Also, the Board authorizes engaging a consultant to assist TLD in addressing AIS and Lake Management Plan issues. Handout on AIS: https://tregolakedistrict.com/wp-content/uploads/2019/10/October-12-2019-Trego-Lake-District-meeting-PP-Presentation.pdf
- February 2020 – TLD is granted WDNR permit to dredge portions of Trego Lake. Maps shows dredge location options: https://tregolakedistrict.com/wp-content/uploads/2020/06/Top-View-of-Proposed-2020-Spot-Dredging-of-Previously-Dredged-Channels-in-2016.pdf
- June 2020 – TLD is awarded WDNR Rapid Response Grant.
- June 2020 – TLD adopts resolution for completing dredge project on Trego Lake. https://tregolakedistrict.com/wp-content/uploads/2020/06/UPDATED-Resolution-implementing-2020-2021-budget-on-dredging.pdf
- July 2020 – Weed harvest completed - Xcel (NSP) reimbursed TLD for cost
- August 2020 – Update on Weed Project: https://tregolakedistrict.com/wp-content/uploads/2020/08/Trego-Lake-Weeds-Project-Update-08-21-2020.pdf
- Fall 2020 – TLD purchases a Piranha mini suction dredge and other equipment to allow TLD members to dredge permitted locations in Trego Lake.
- November 2020 – Trego Dam relicensing preliminary application (series): https://tregolakedistrict.com/trego-dam-relicensing-december-2020/
- April 2021 – NPS Comments on PAD and Study Requests, Hayward, Trego Projects
- May 2021 -TLD letter to FERC in support of NPS study requests
- June 2021 – Weed harvest completed – Xcel (NSP) reimbursed TLD for cost
- June/July 2021 – Two areas spot dredged in Trego Lake to create minimal boating channels; north side channel dredged approximately 32 cubic yards and south channel 80+ cubic yard of sand was dredged; roughly 25 volunteers participated in the dredging projects
- August 27, 2021 - TLD Response to Consultant Response 08.27.21
- January/April 2022 – Aquatic Plant Management Plan completed for Trego Lake; plan runs from 2022 to 2026: https://drive.google.com/file/d/1z4g5rDPiwwwdahqkLXWx3vTXHoU3M0NG/view
- June 2022 _ TLD Annual Meeting authorizes $15,000 in the budget to harvest aquatic plants, primarily AIS. TLD Board to determine harvest locations
- June 2022 - Weed harvest completed – Xcel (NSP) reimbursed TLD for cost
- June/July 2022 - South channel 80+ cubic yard of sand was dredged over four days; roughly 15 volunteers participated in the dredging projects
- October/December 2022 – TLD Board reviews and adopts the following aquatic plant harvest for the summer of 2023, DNR permit pending of locations: https://tregolakedistrict.com/wp-content/uploads/2023/05/UPDATED-TLD-2023-Aquatic-plant-harvest-plan.pdf
- March 2023 – DNR permits all areas in Aquatic Plant Harvest Plan except the area in Appendix B (mouth of Potato Creek) because of the presence of wild rice
- June 2023 – TLD weed harvest completed primarily in large bay and one location west; areas west of landing not harvested because of lack of weeds – harvest completed in 5 days
- June 2023 - Weed harvest completed – Xcel (NSP) reimbursed TLD for cost; time and costs for Xcel harvest are separate account from TLD harvest

Document Content(s)

FERC Comments on DLA

FEDERAL ENERGY REGULATORY COMMISSION
Washington, D. C. 20426
October 2, 2023

OFFICE OF ENERGY PROJECTS

Project No. 2417-065 – Wisconsin
Hayward Hydroelectric Project

Project No. 2711-024 - Wisconsin
Trego Hydroelectric Project
Northern States Power Company

VIA FERC Service

Mr. James Zyduck
Director of Hydro Plants
Northern States Power Company
1414 West Hamilton Avenue
P.O. Box 8
Eau Claire, Wisconsin 54702-0008

Subject: Staff Comments on Draft License Application for the Hayward and Trego Hydroelectric Projects

Dear Mr. Zyduck:

On June 29, 2023, Northern States Power Company (Northern States Power) filed a draft license application (DLA) for the Hayward and Trego Hydroelectric Projects P-2417-065 and 2711-024. Pursuant to 18 CFR § 5.16(e), this letter contains staff comments on the DLA.

In general, the DLA describes the proposed project facilities and operations, and provides an analysis of the anticipated effects of proposed project operations. In some instances, however, the description and analysis of Northern States Power's proposal lacks sufficient detail for Commission staff to conduct its environmental analysis. Specific comments on the DLA are discussed in Schedule A, and we request that Northern Power address these comments in the final license application (license application) the projects, due to be filed on or before November 30, 2023. Additionally, when Northern States Power files the license application, it must present the results of its studies, pursuant to section 5.18(b)(5)(ii)(B), and cite all materials referenced, including all final study reports, pursuant to section 5.18(b)(5)(ii)(H).

If you have any questions, please contact Laura Washington at laura.washington@ferc.gov or at (202) 502-6072.

Sincerely,

JANET HUTZEL

Digitally signed by JANET HUTZEL
Date: 2023.10.02 11:13:50 -04'00'

Janet Hutzel, Chief
Midwest Branch
Division of Hydropower Licensing

Enclosure: Schedule A

SCHEDULE A
Comments on Draft License Application

Hayward and Trego Projects

Threatened and Endangered Species

1. Section 2.2.2.2, *Proposed Environmental Measures,* of the draft license application (DLA), states that Northern States Power Company (Northern States Power) would comply with the U.S. Fish and Wildlife Service's northern long-eared bat guidance. However, there is no description of the presence of the northern long-eared bat or its habitat at the project or of current or potential operation and maintenance activities that could affect the northern long-eared or tricolored bat or their habitat. In the final license applications (license applications), please describe any potential northern long-eared bat, tricolored, and little brown bat habitat at the project (including location and description of vegetation) and a description of activities (including location, specific activity, frequency, and duration) any operation and maintenance activities that could affect the rare, threatened, or endangered (RTE) bats or their habitat at each project.

2. Section 4.7, *Threatened and Endangered Species*, of the DLA, describes the state and federally listed RTE species that could be found at the project including the Canada lynx and the candidate species monarch butterfly. However, there is no description of current or potential operation and maintenance activities that could affect the RTE species and/or their habitat. In the license applications, please describe (including location, specific activity, frequency, and duration) any operation and maintenance activities that could affect RTE or candidate species or their habitat at each project.

3. Section 2.2.2.2 of the Exhibit E of the DLA, describes the proposed measures including specifically for recreation resources, including conduct routine maintenance of Northern State Power's FERC-approved recreation sites, including signage, over the term of any subsequent license. However, there is no description of location specific maintenance activities that would be conducted at the recreation sites other than maintaining signage and/or how these activities could affect other resources at the project, including RTE species. In the license applications, please describe (including location, specific activity, frequency, and duration) any proposed recreation related maintenance at the project that could affect RTE species at each project, if applicable.

Terrestrial Resources

4. Section 2.2.2.2 of the Exhibit E of the DLA, states that Northern State Power proposes to develop an Aquatic and Terrestrial Invasive Species Plan and conduct biennial invasive species survey. The DLA describes the invasive plant species that have either been observed or have the likelihood to be found at the project. However, there is no description of current or potential operation and maintenance activities that could affect the spread or reduction of invasive plant species and/or their habitat. In the license application, please describe (including location, specific activity, frequency, and duration) any operation and maintenance activities that could affect invasive species or their habitat at the project, if present. Please also describe any protection measures including monitoring, treatment and others that have historically, are currently, or are being proposed to manage invasive species at each project, if applicable.

5. Various sections of the DLA indicate differences between the current and proposed project boundaries. However, staff have determined that additional information is needed. So that staff can evaluate the proposed boundary changes, in the license application please: (1) describe all proposed changes to the project boundary, including justification; (2) provide the total acreage of lands and submerged lands within the current and proposed project boundaries; and (3) provide figures showing the current and proposed project boundaries.

Hayward Project

Recreation Resources

6. Section 4.8.1.3.6, *Adequacy of Existing Facilities to Address Current and Future Demand*, of the DLA provides estimates for total project recreation use (in recreation days) during the open water and winter recreation seasons. However, information about current capacity utilization of existing recreation sites is not provided. So that staff can assess the adequacy of existing recreation facilities, in the license application please provide estimates of the percent of capacity currently utilized for each of the six recreation sites, by recreation season, based on readily available information (e.g., spot count data).

7. Sections 4.8.1.3.4, *Recreation Spot Counts*, of the DLA states that recreation surveys resulted in a total of 84 spot count reports during which 175 users were observed. The section then states that the average spot count was 10.9 users per location. It appears that this average was calculated by dividing the total number of users observed by the number of sampling days (i.e., 175/16 = 10.9). Therefore,

this average does not indicate the average number of users per location, but rather indicates the average number of users observed per sampling day at the entire project (i.e., across all sites). Please clarify this in the license application.

While reporting the average number of recreation users observed at the project per sampling day is useful, to assess the adequacy of existing recreation sites, it would also be useful to calculate and report the average number of users observed during the spot counts for each of the six recreation sites, by recreation season (i.e., open water vs. winter). Doing so could also inform an estimate of the percent of capacity currently utilized at each site. Therefore, please provide these averages in the license application.

Trego Project

Recreation Resources

7. Section 5.8.1.4, *Adequacy of Existing Facilities to Address Current and Future Demand*, of the DLA provides estimates for total project recreation use (in recreation days) during the open water and winter recreation seasons. However, information about current capacity utilization of existing recreation sites is not provided. So that staff can assess the adequacy of existing recreation facilities, in the license application, please provide estimates of the percent of capacity for each of the four recreation sites, by recreation season, based on readily available information (e.g., spot count data).

8. Sections 5.8.1.3.4, *Recreation Spot Counts*, of the DLA states that recreation surveys resulted in a total of 84 spot counts. However, this number seems incorrect, as the study included 16 sampling days, in which spot counts were conducted at four recreation sites (i.e., 16*4 = 64). Please report the correct number of spot counts that were completed at the project in the license application.

   In addition, section 5.8.1.3.4 states that the average spot count was 2.13 users per location. It appears that this average was calculated by dividing the total number of users observed by the number of sampling days (i.e., 34/16 = 2.13). Therefore, this average does not indicate the average number of users per location, but rather indicates the average number of users observed per sampling day at the entire project (i.e., across all sites). Please clarify this in the license application.

   While reporting the average number of recreation users observed at the project per sampling day is useful, to assess the adequacy of existing recreation sites, it would also be useful to calculate and report the average number of users observed during

the spot counts for each of the four recreation sites, by recreation season (i.e., open water vs. winter). Doing so could also inform an estimate of the percent of capacity at each site. Therefore, please provide these averages in the license application.