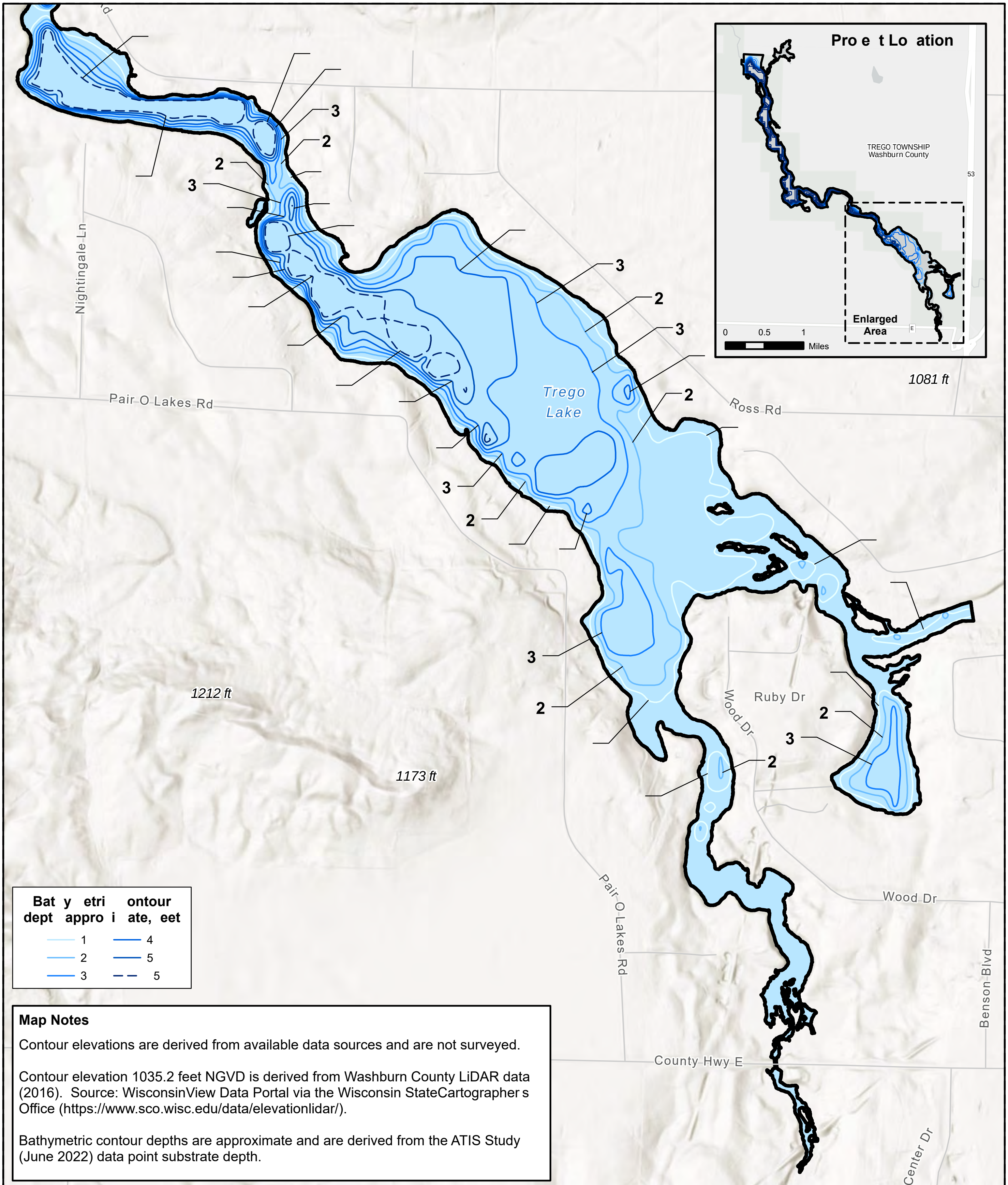
APPENDIX E-2 Upper Trego Reservoir Bathymetry



Map Notes

Contour elevations are derived from available data sources and are not surveyed.

Contour elevation 1035.2 feet NGVD is derived from Washburn County LiDAR data (2016). Source: WisconsinView Data Portal via the Wisconsin StateCartographer s Office (https://www.sco.wisc.edu/data/elevationlidar/).

Bathymetric contour depths are approximate and are derived from the ATIS Study (June 2022) data point substrate depth.

X: 2400100 1 2 23.01 TECH Hayward and Trego Project Maps Trego DLA PRO Trego DLA Maps Trego DLA Maps.aprx

Proposed Project Boundary

0 500 1,000 Feet

Note t e i pounded Proposed Pro e t Boundary is esta lis ed at ele ation , 3 2 eet NG D 2

Xcel Energy

Mead & Hunt

Trego Hydroelectric Project
Bathymetric Map Based on 2022
Substrate Survey Data Points

FERC No. 2711

Source Layer: WI 2022 NAIP (natural color, 0.6-meter resolution)

APPENDIX E-3 Aquatic and Terrestrial Invasive Species 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
May 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

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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 system, Hayward and Trego lakes are both 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 separate areas were included in the upland terrestrial meander survey (Figure 11B); the Hayward Lake Boat Landing and City Beach area and the area around the Dam. 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 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 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 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 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 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 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, 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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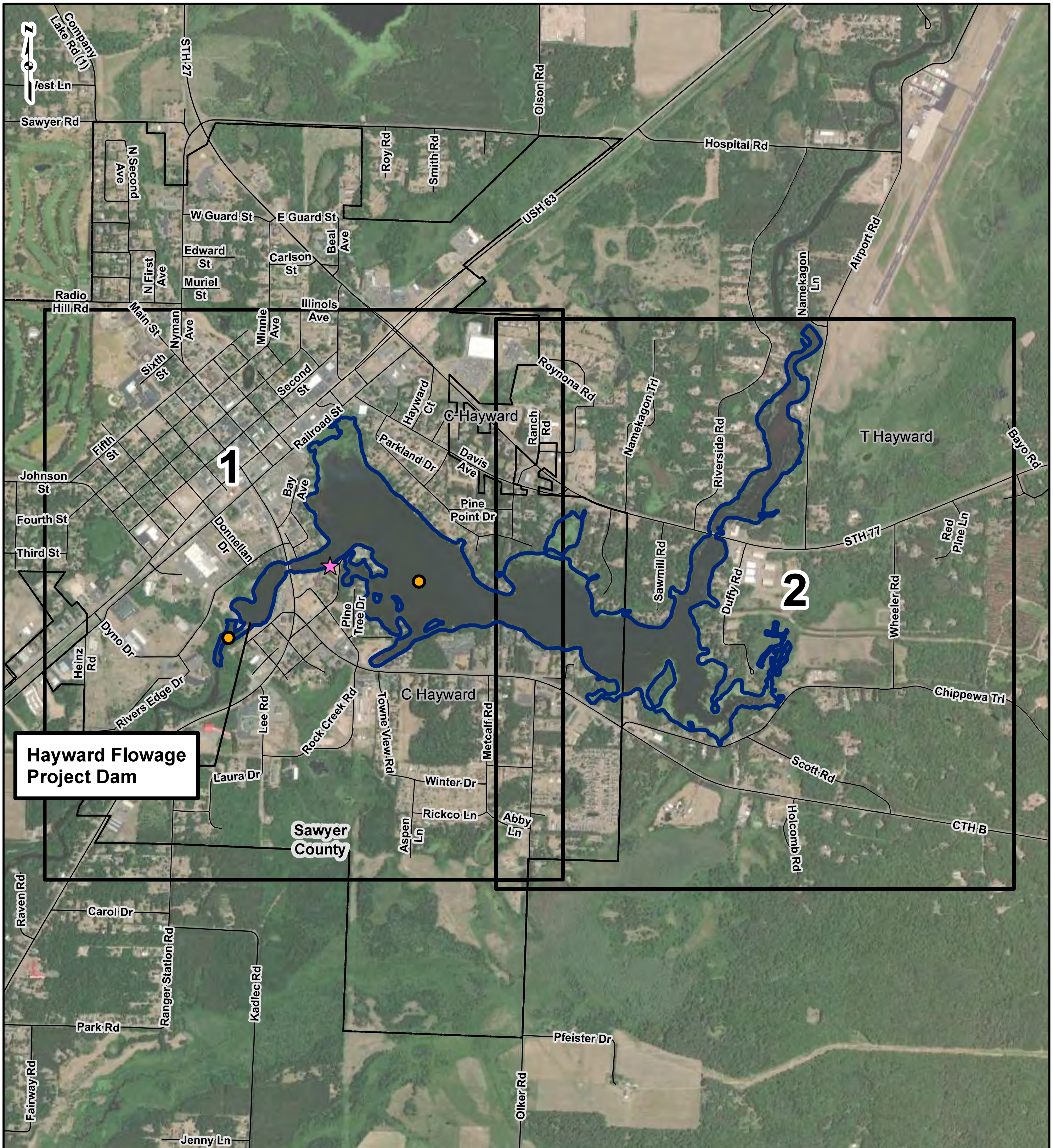
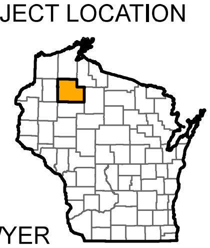
FIGURE 1
Hayward Project Location and Overview Map



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

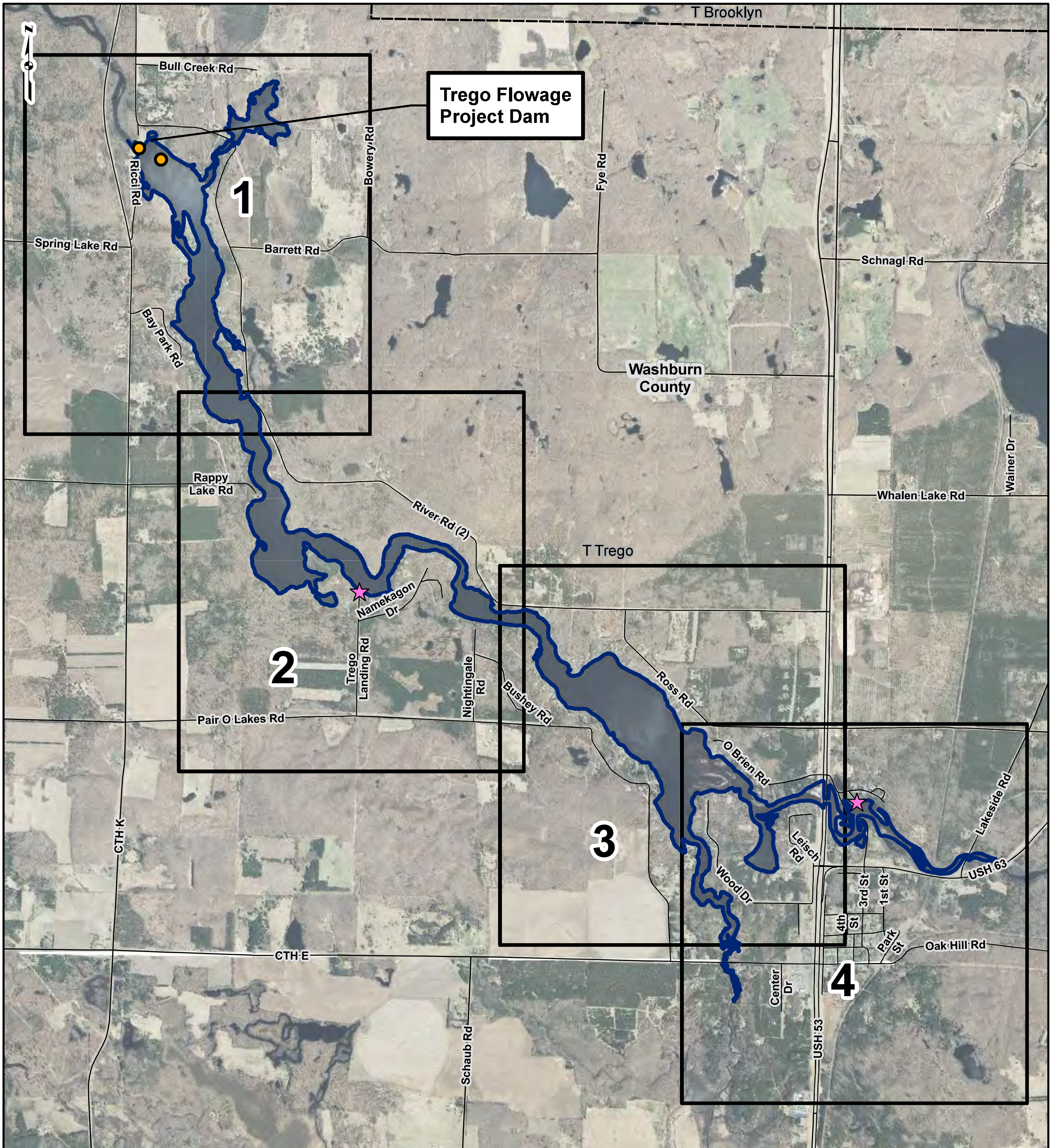
Mead & Hunt

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

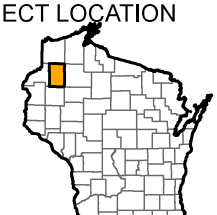
REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/31/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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.

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FIGURE 3

Hayward Point-Intercept Grid Provided by the WDNR

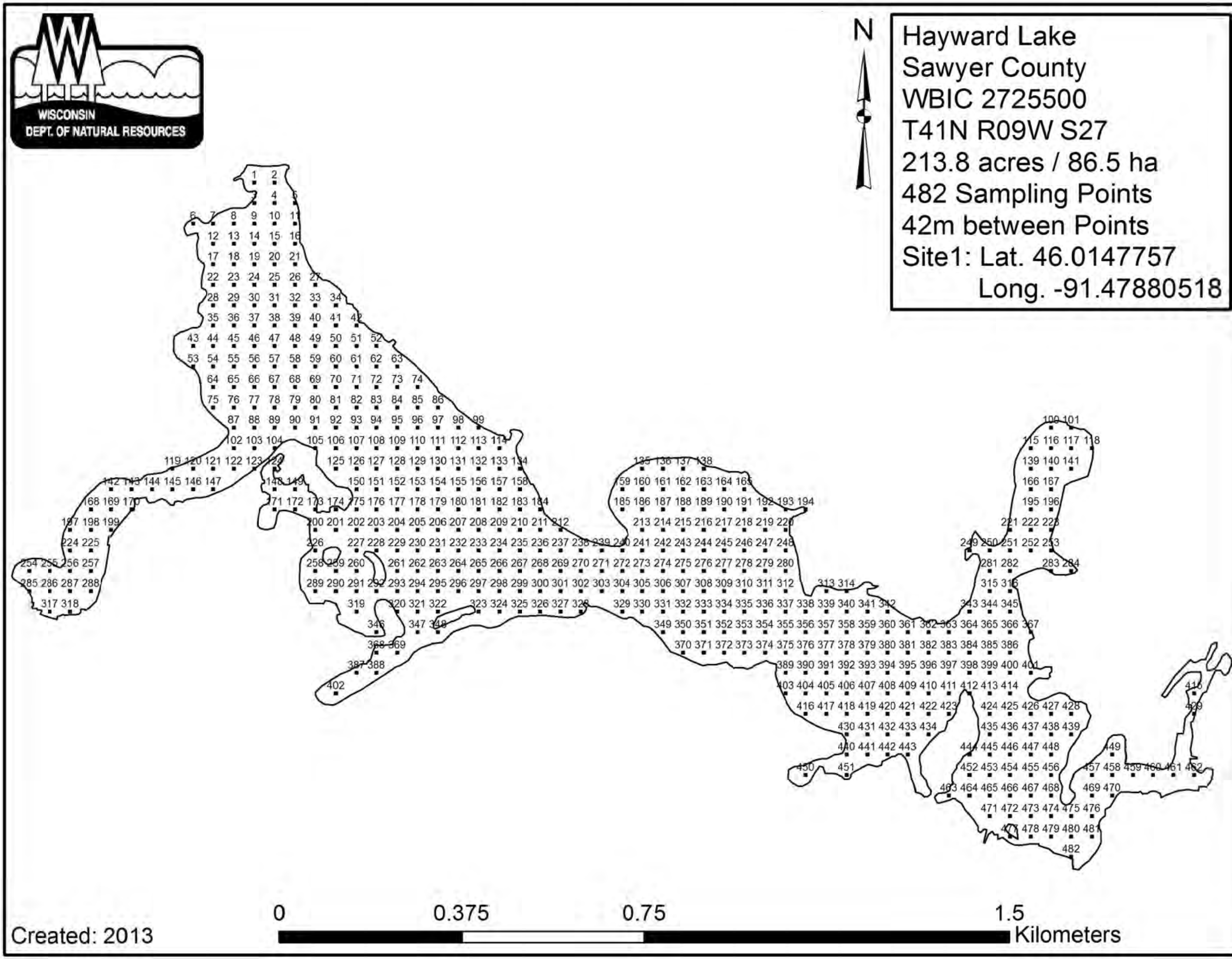
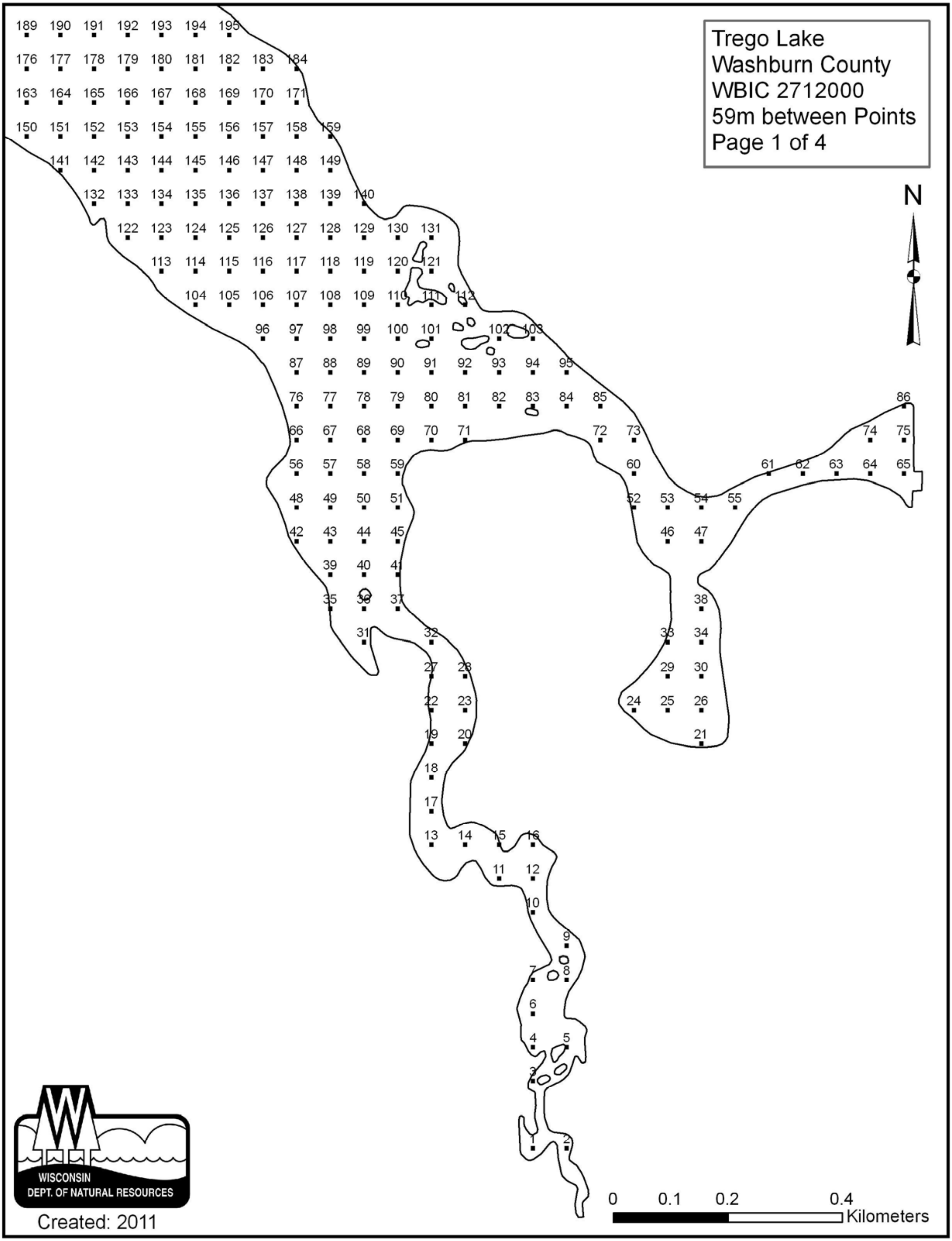

WISCONSIN
DEPT. OF NATURAL RESOURCES
N
Hayward Lake
Sawyer County
WBIC 2725500
T41N R09W S27
213.8 acres / 86.5 ha
482 Sampling Points
42m between Points
Site1: Lat. 46.0147757
Long. -91.47880518
0
0.375
0.75
1.5
Kilometers
Created: 2013

FIGURE 4
Trego Point-Intercept Grid Provided by the WDNR


Trego Lake
Washburn County
WBIC 2712000
59m between Points
Page 1 of 4
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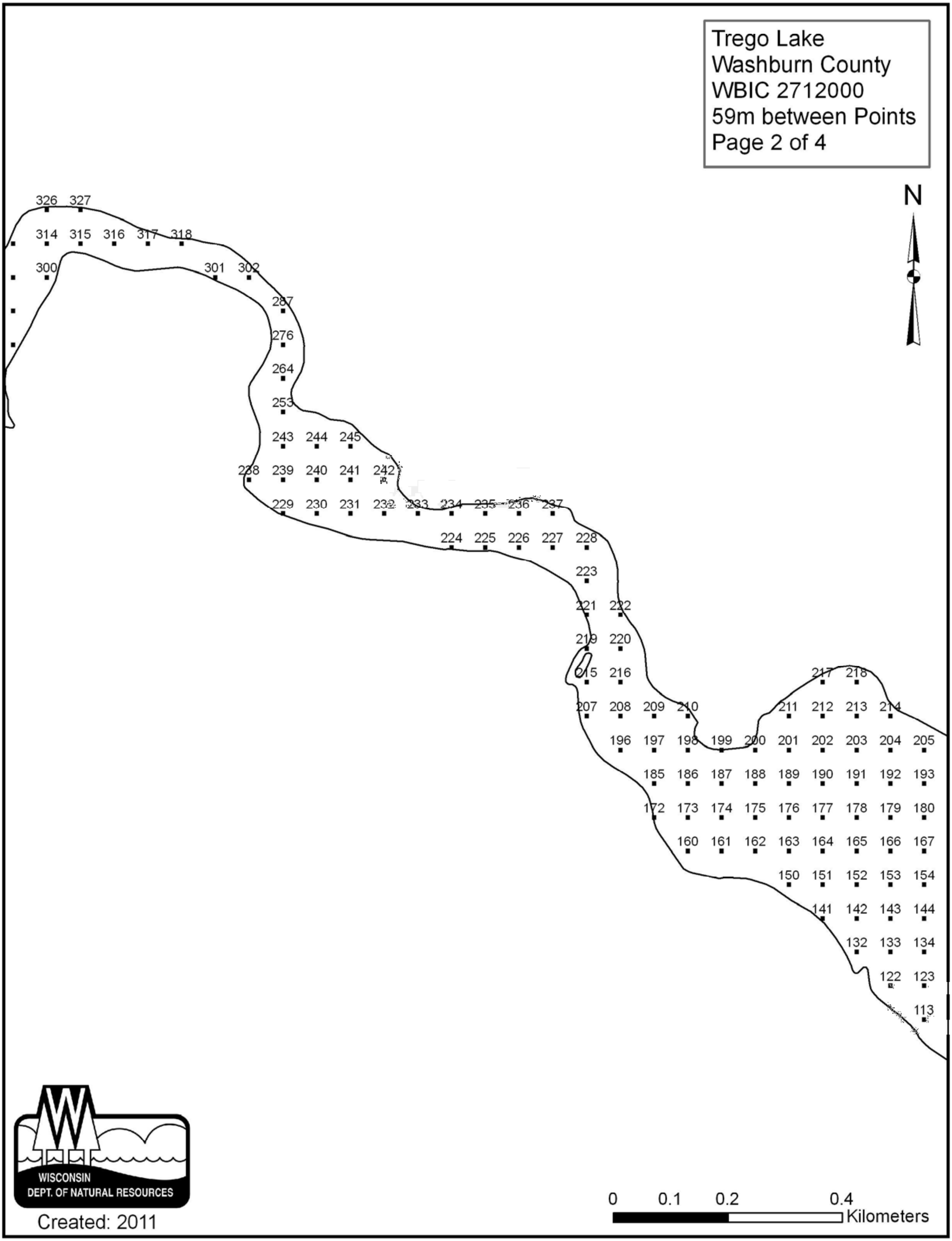
Created: 2011


Trego Lake
Washburn County
WBIC 2712000
59m between Points
Page 2 of 4
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326 327
314 315 316 317 318
300 301 302
287
276
264
253
243 244 245
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229 230 231 232 233 234 235 236 237
224 225 226 227 228
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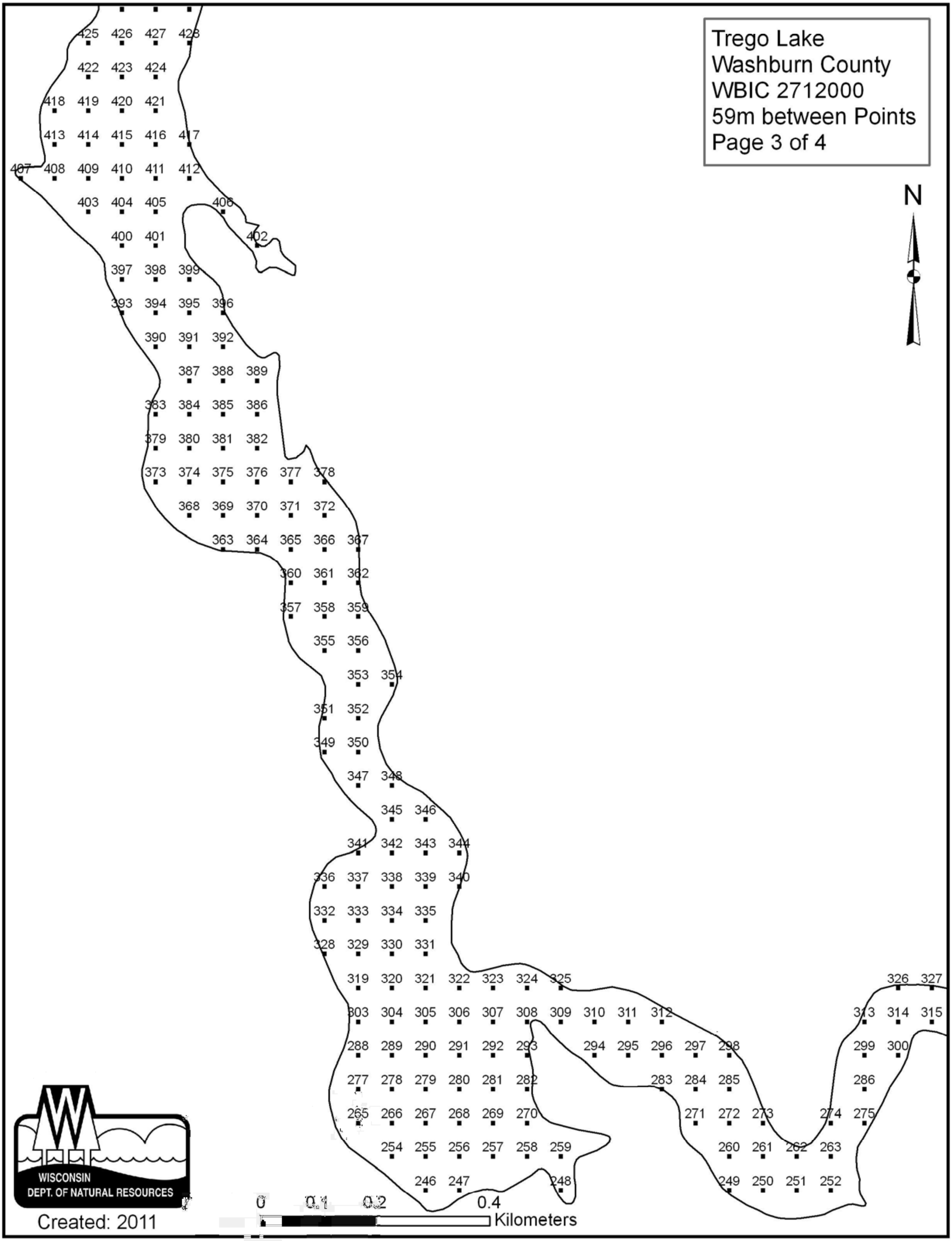
132 133 134
122 123
113
WISCONSIN
DEPT. OF NATURAL RESOURCES
Created: 2011
0 0.1 0.2 0.4
Kilometers



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
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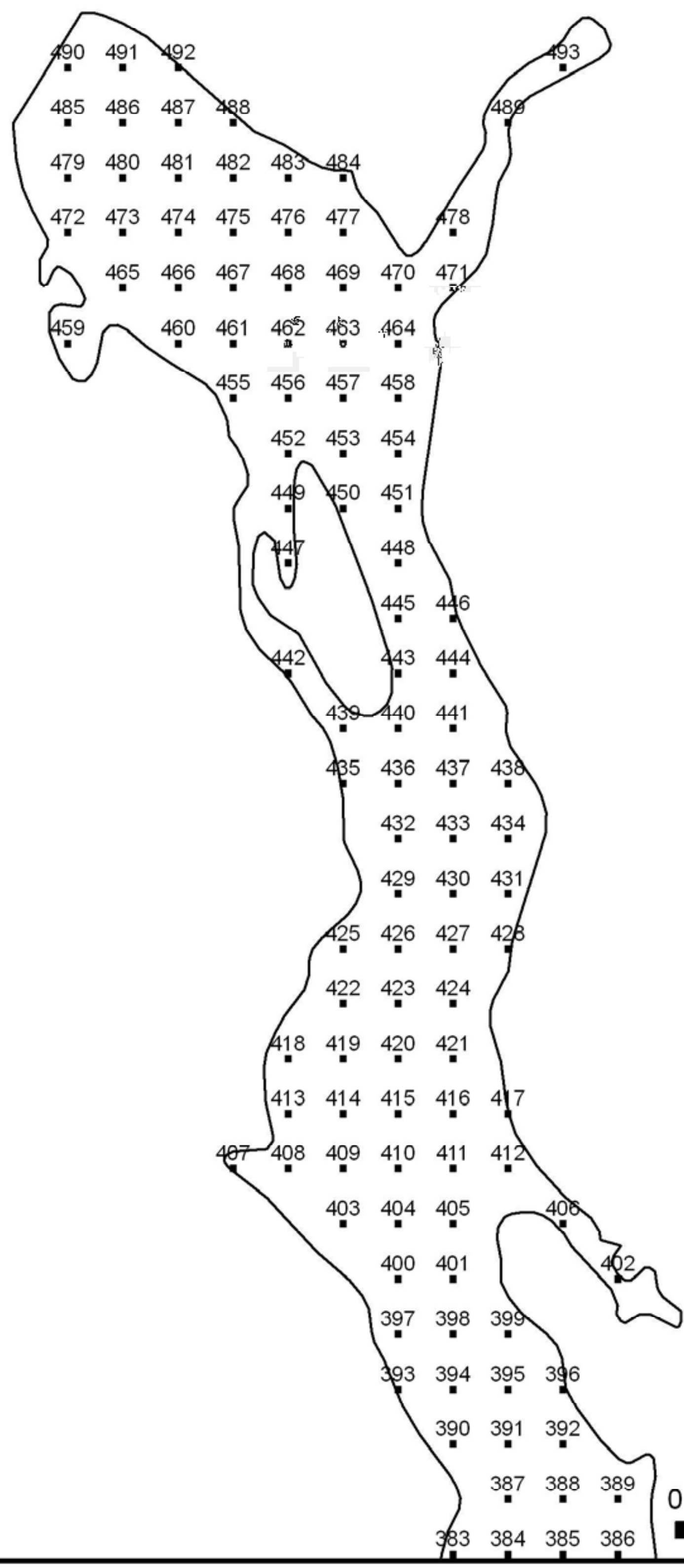
246 247 248 249 250 251 252
WISCONSIN
DEPT. OF NATURAL RESOURCES
0 0.1 0.2 0.4
Kilometers
Created: 2011

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

N



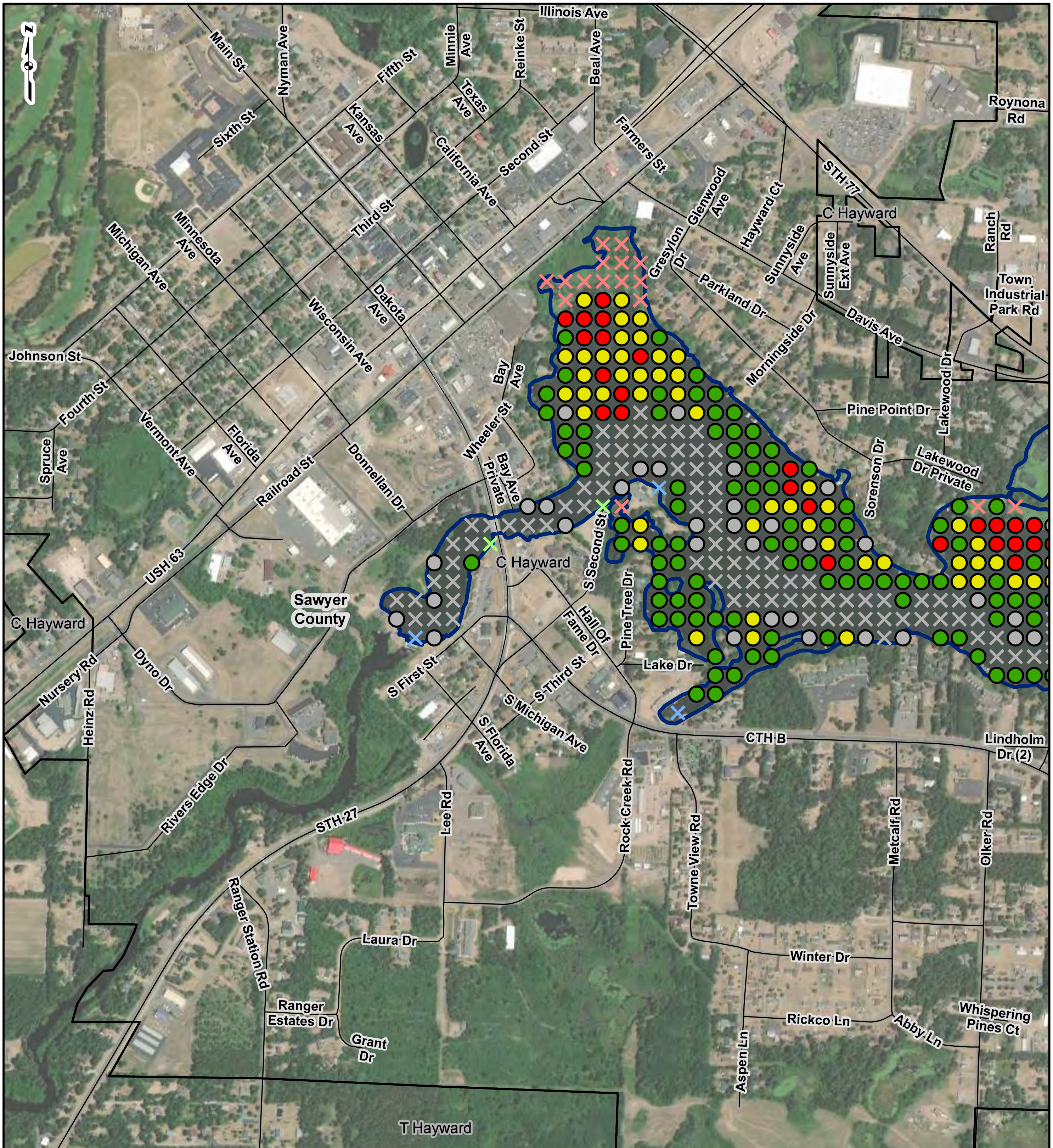
0 0.1 0.2 0.4 Kilometers

WISCONSIN
DEPT. OF NATURAL RESOURCES

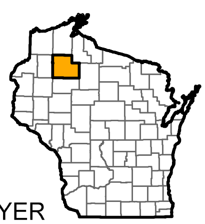
Created: 2011

FIGURE 5
Hayward June Point-Intercept Survey

gai consultants
transforming ideas into reality



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

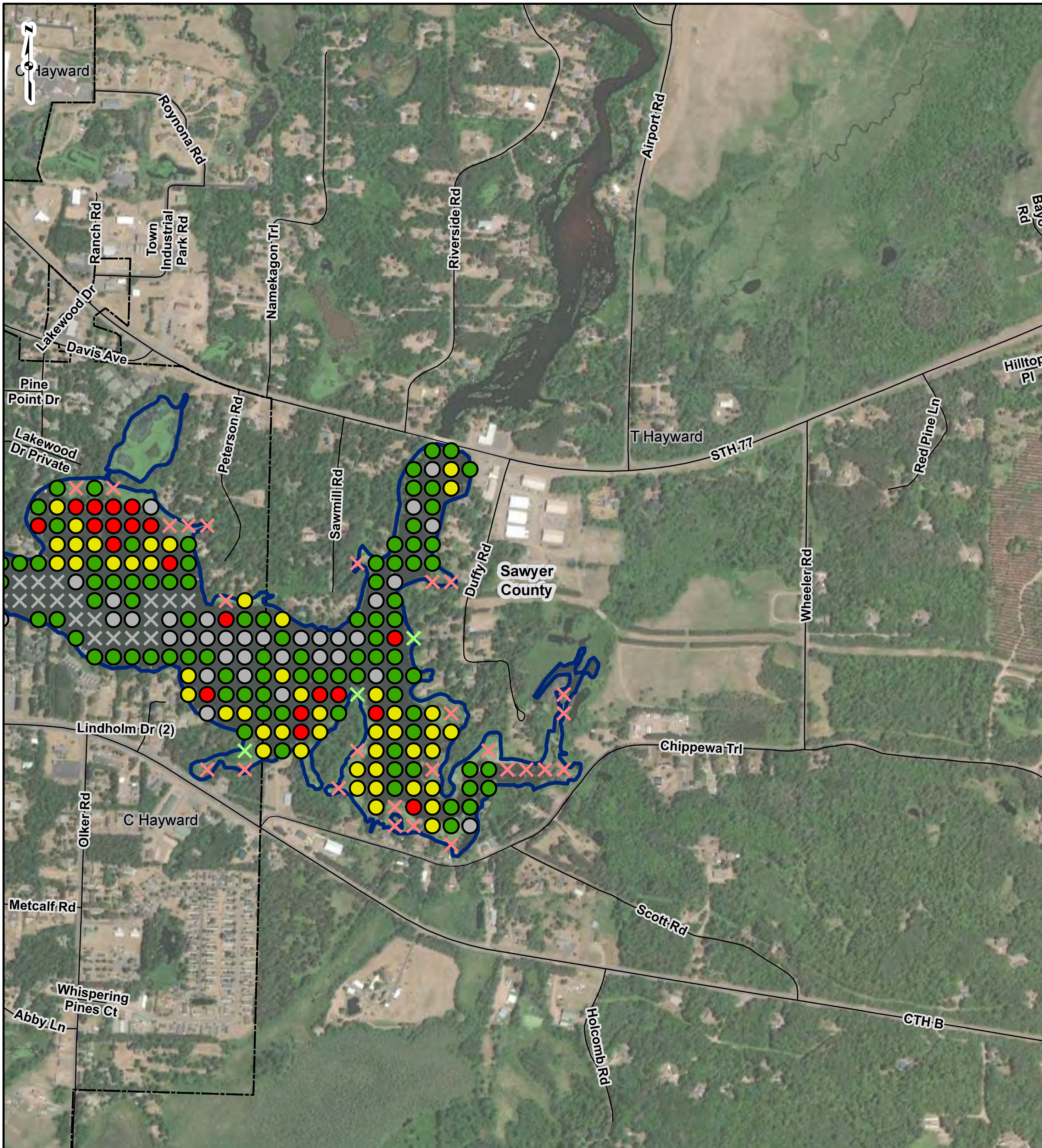
Hayward Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

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



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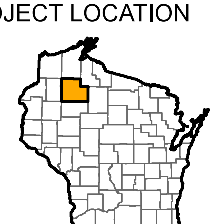

SAWYER COUNTY, WISCONSIN

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
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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

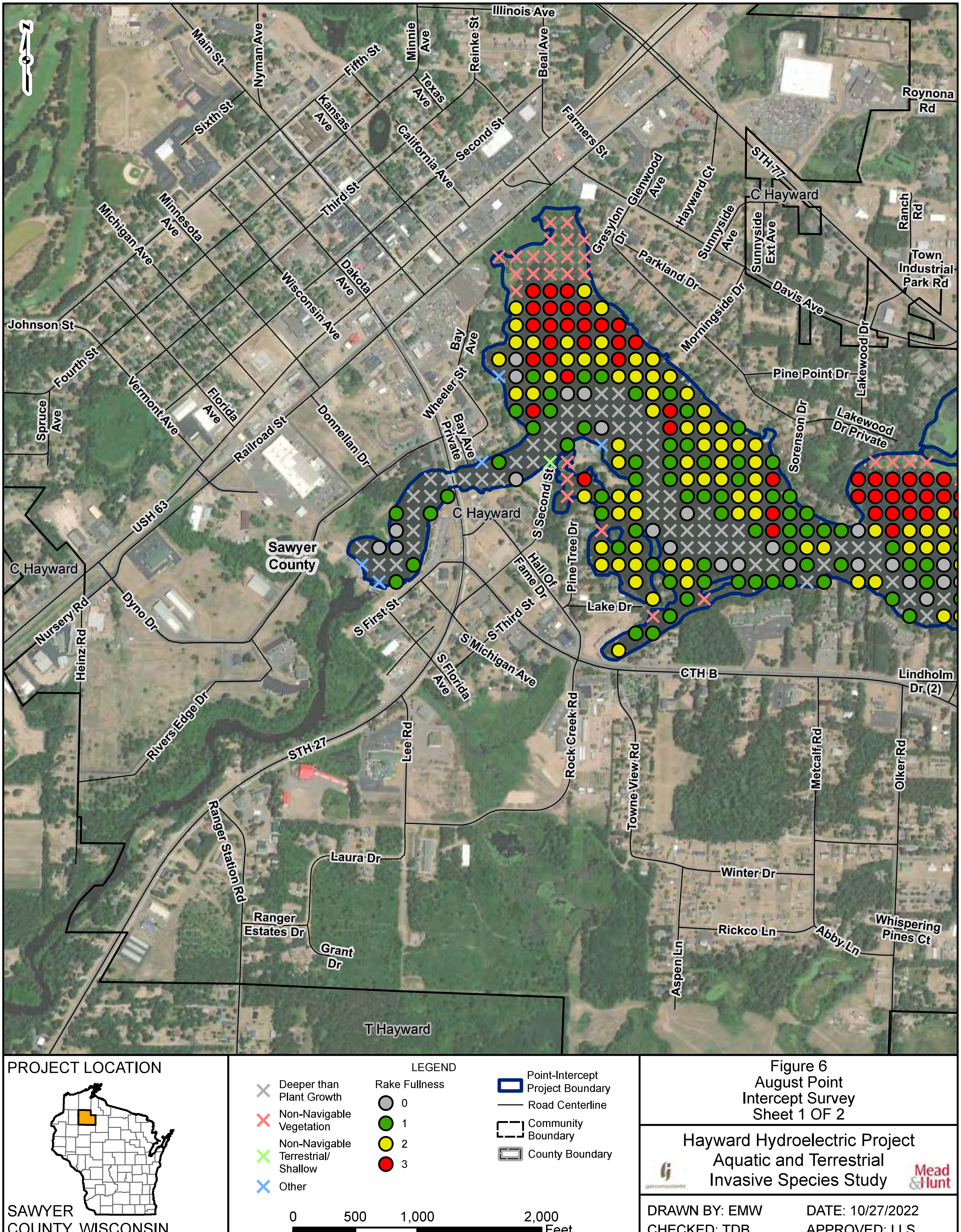

Figure 6
August Point Intercept Survey
Sheet 1 OF 2

Hayward Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

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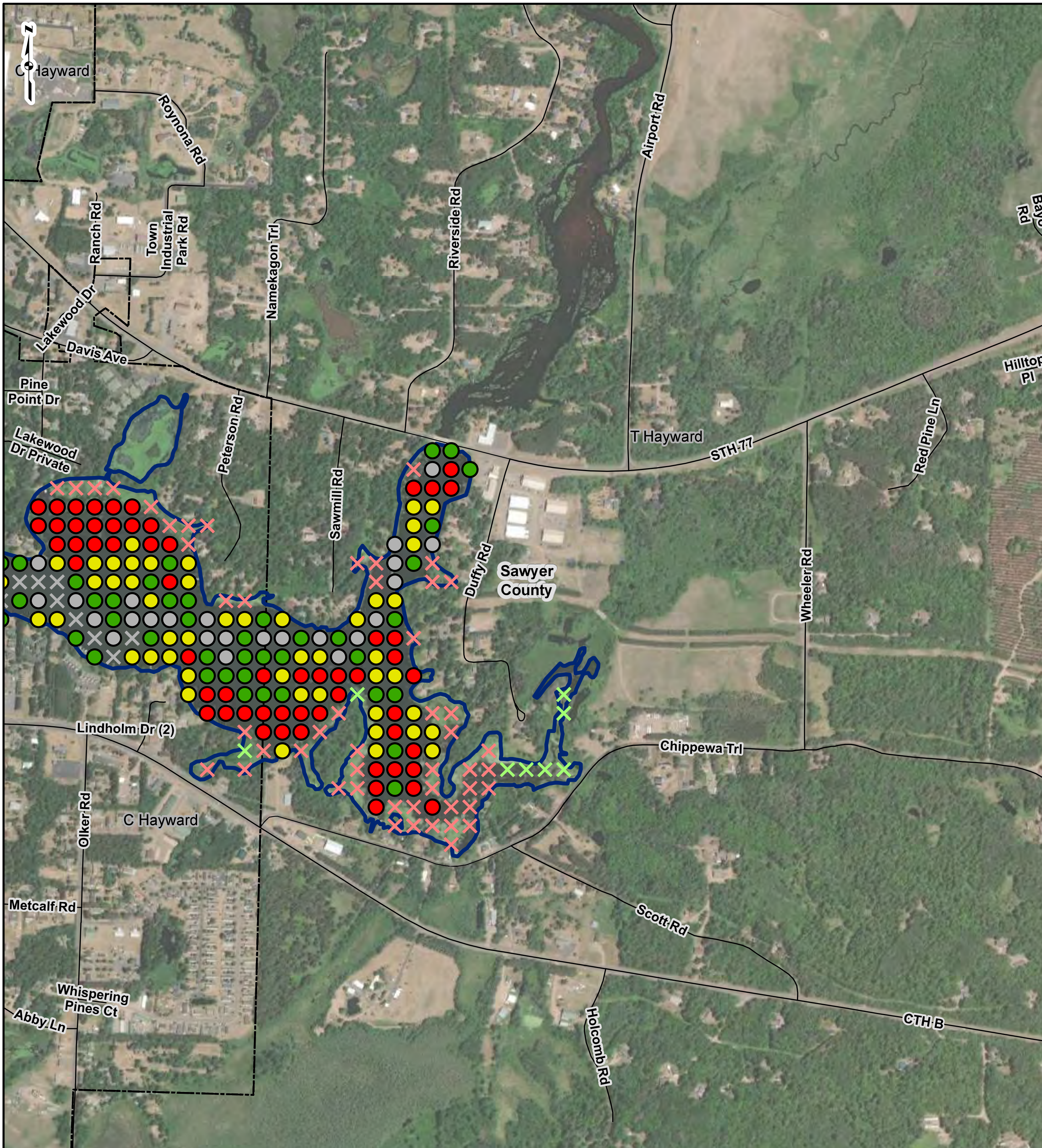

PROJECT LOCATION

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

Mead & Hunt

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DATE: 10/27/2022
CHECKED: TDB
APPROVED: LLS

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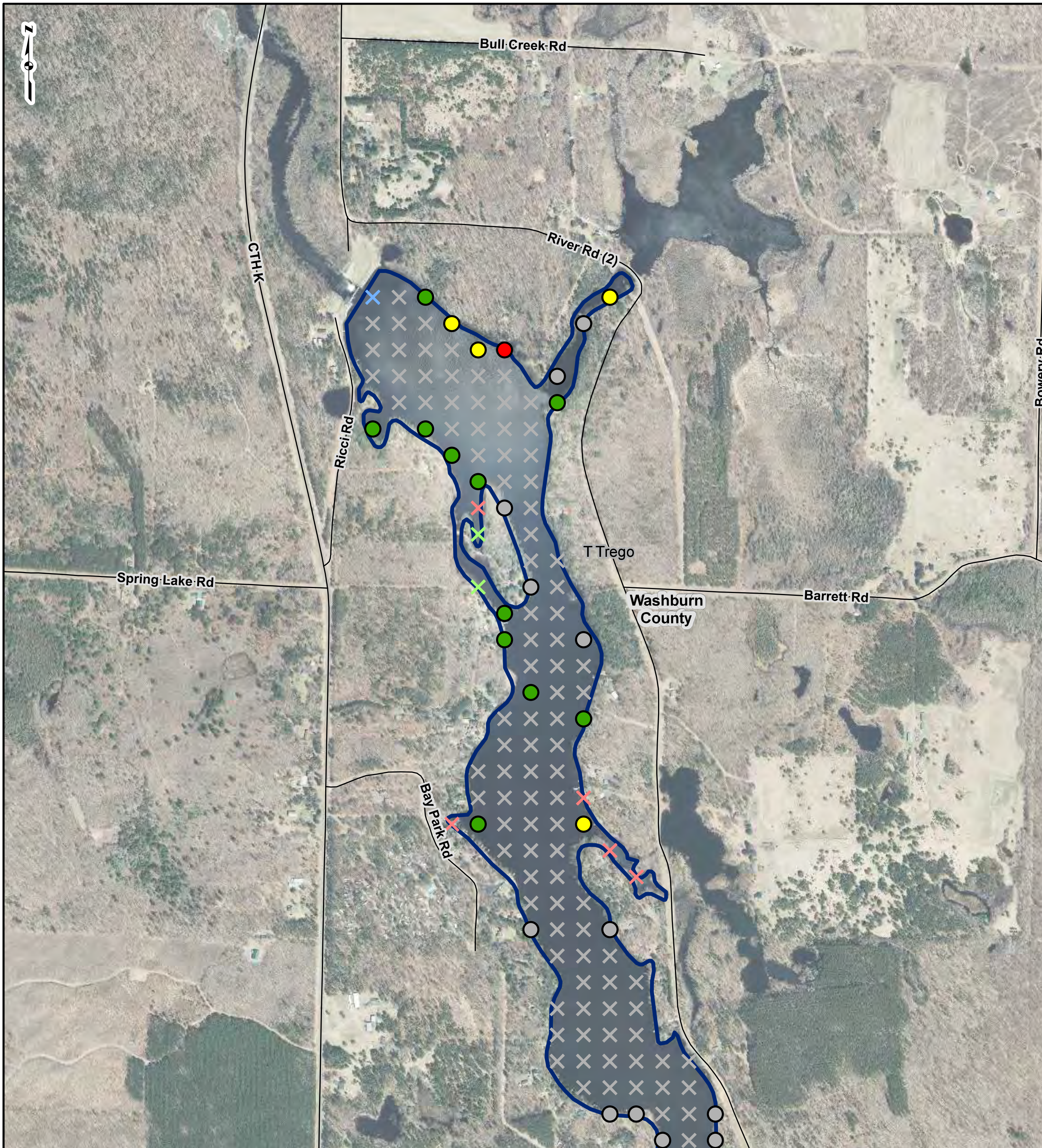
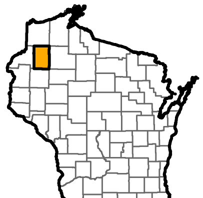
FIGURE 7
Trego June Point-Intercept Survey



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

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 Centerlines, 2021.

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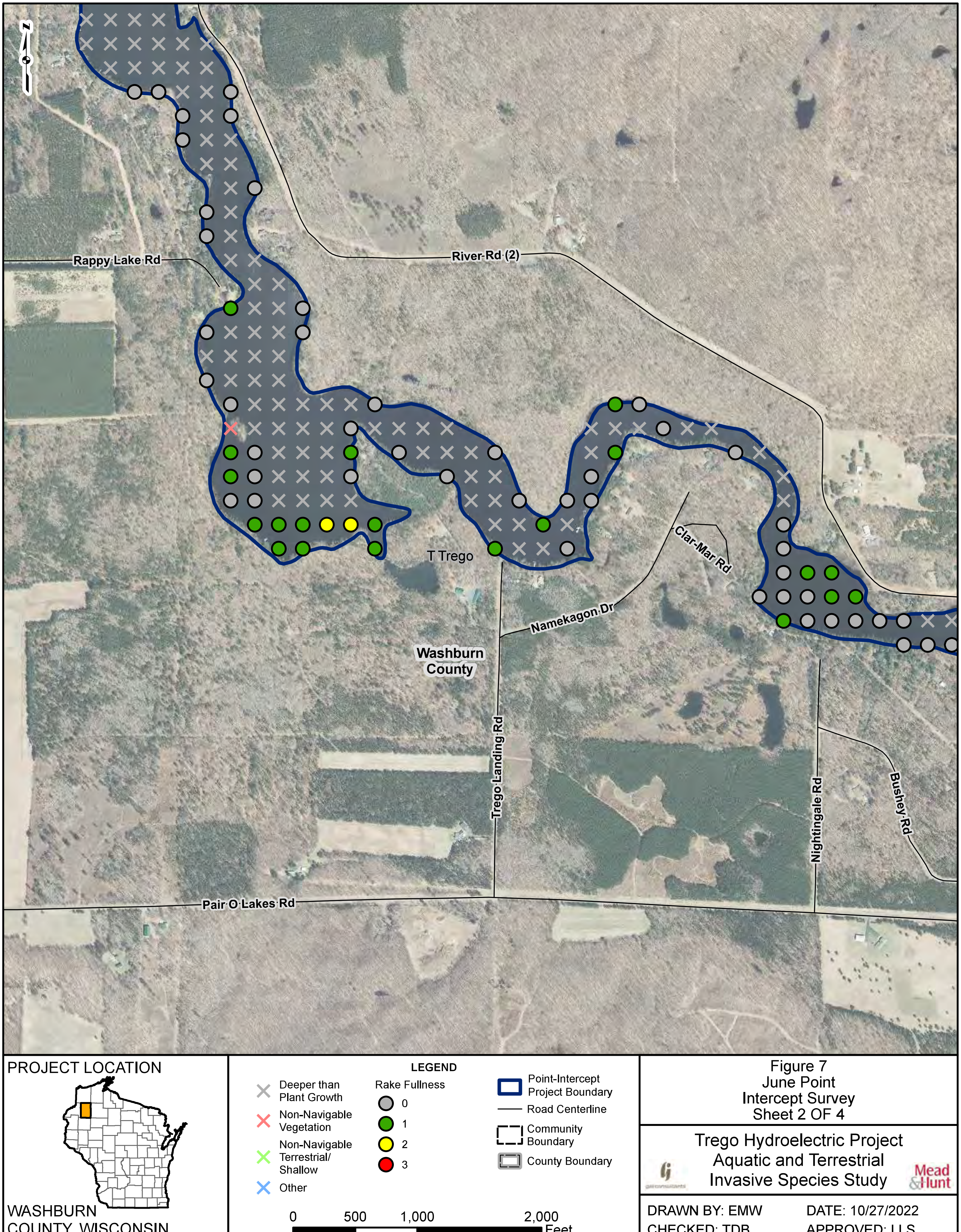

Figure 7
June Point Intercept Survey
Sheet 2 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

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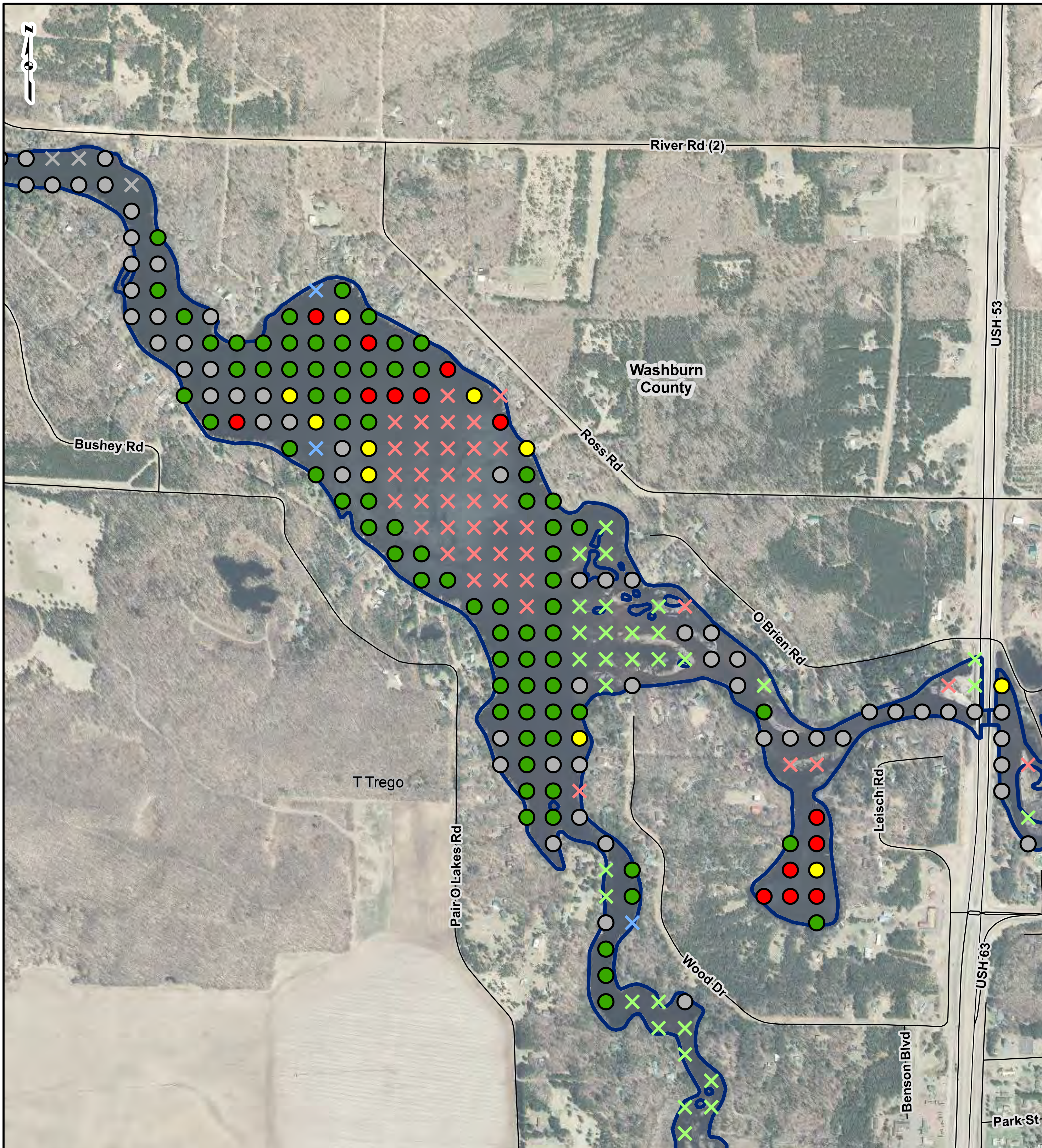

PROJECT LOCATION

WASHBURN COUNTY, WISCONSIN

LEGEND

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

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

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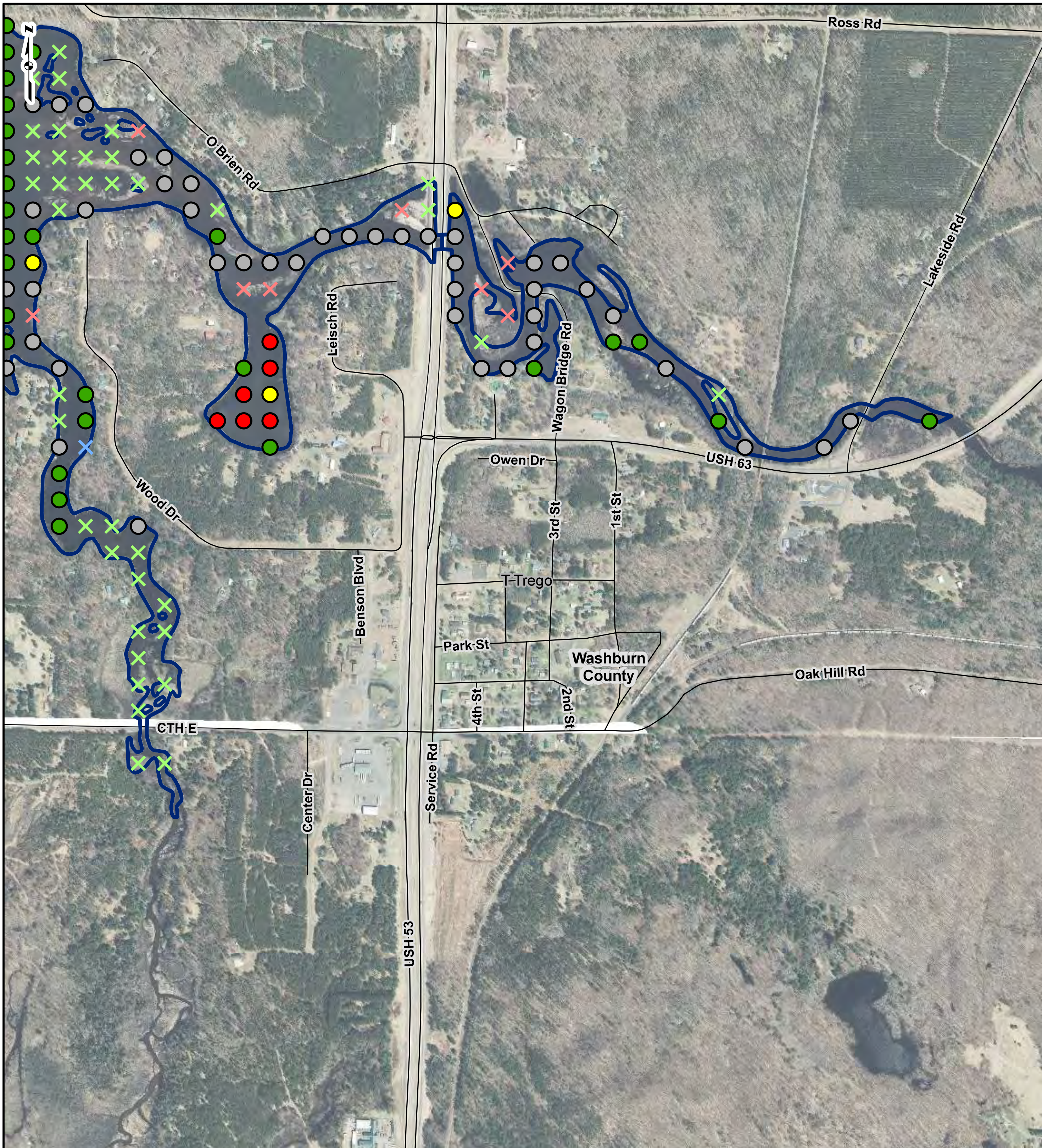
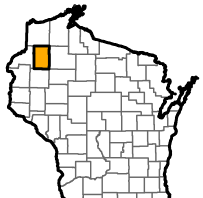


PROJECT LOCATION



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

Mead & Hunt

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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 Centerlines, 2021.

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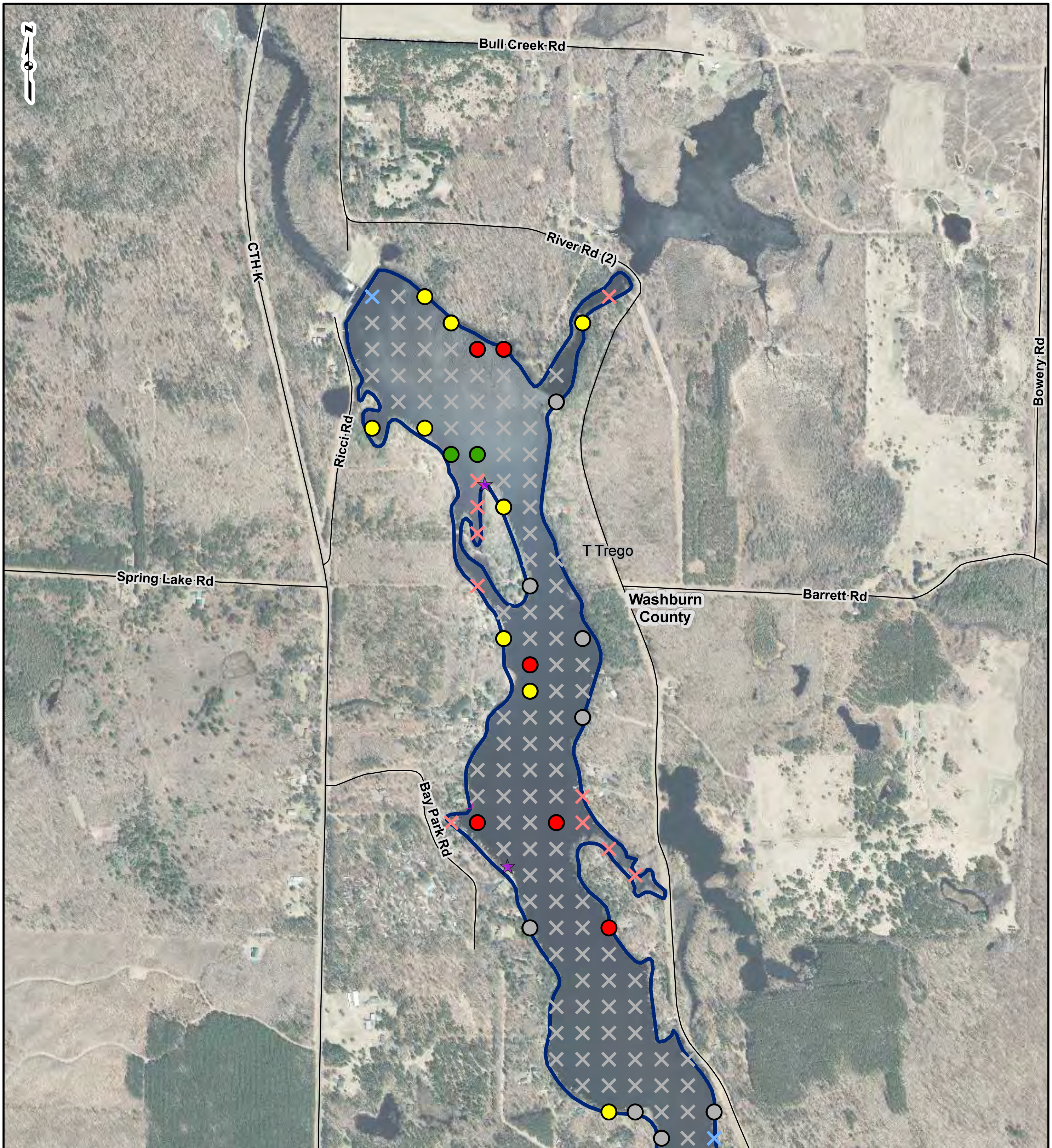
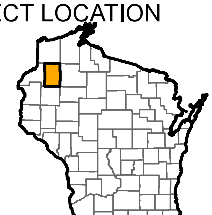
FIGURE 8
Trego July/Aug Point-Intercept Survey



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

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DATE: 10/27/2022
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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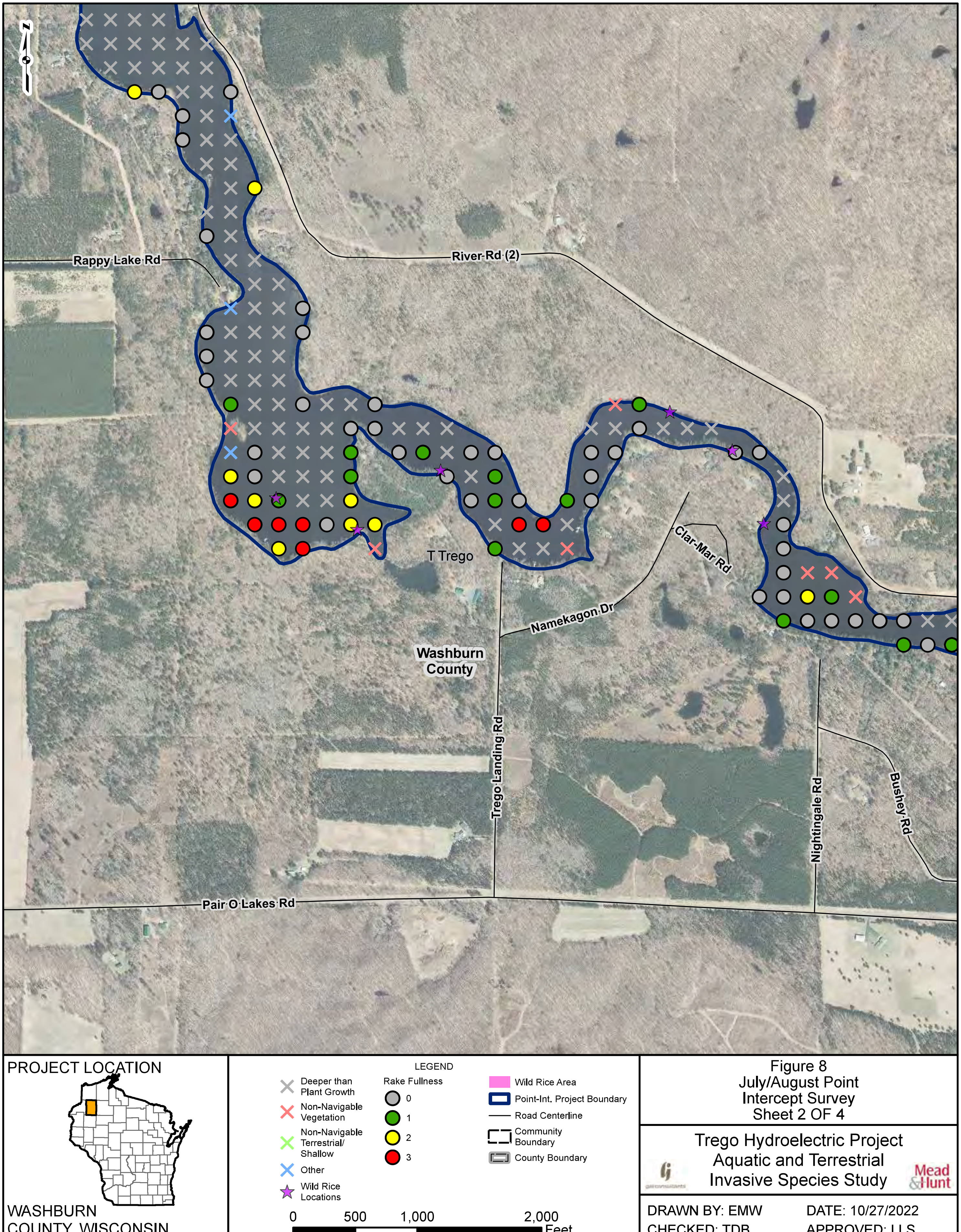

Figure 8
July/August Point Intercept Survey
Sheet 2 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

Mead & Hunt

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

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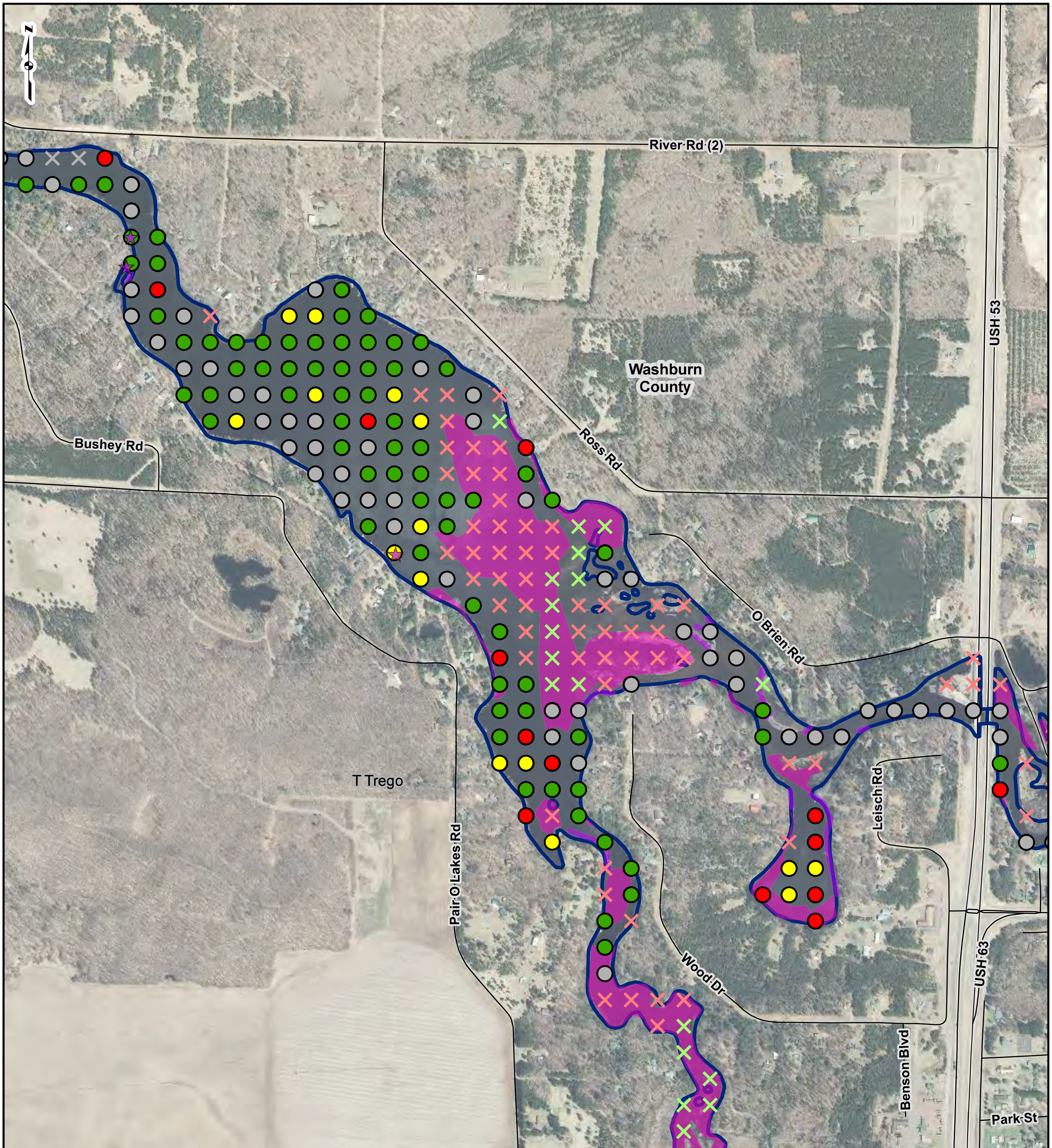

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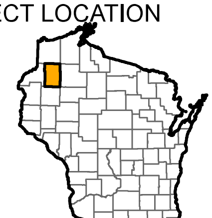

WASHBURN COUNTY, WISCONSIN

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

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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 Cen

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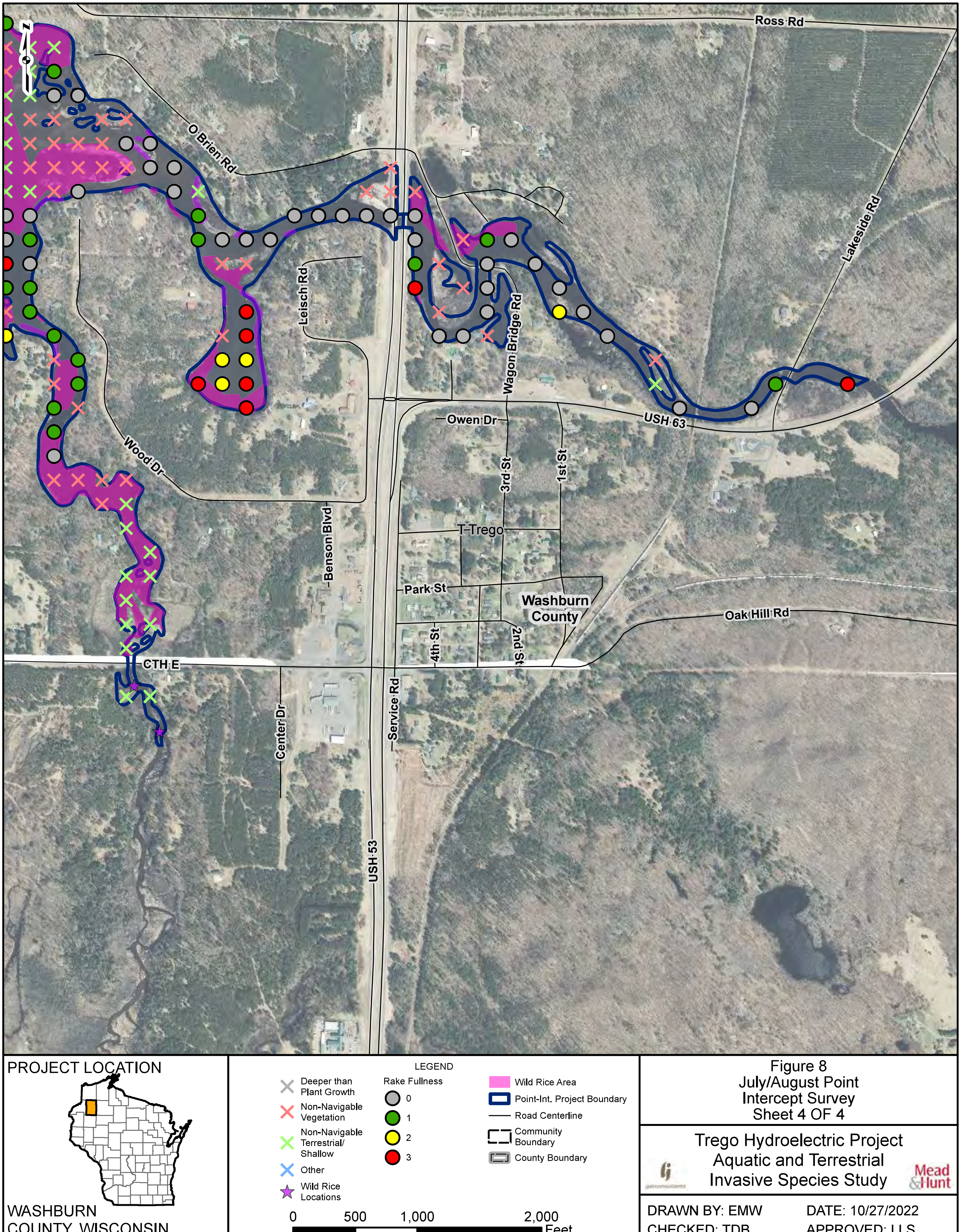

Figure 8
July/August Point Intercept Survey
Sheet 4 OF 4

Trego Hydroelectric Project Aquatic and Terrestrial Invasive Species Study

Mead & Hunt

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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 Cen

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

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

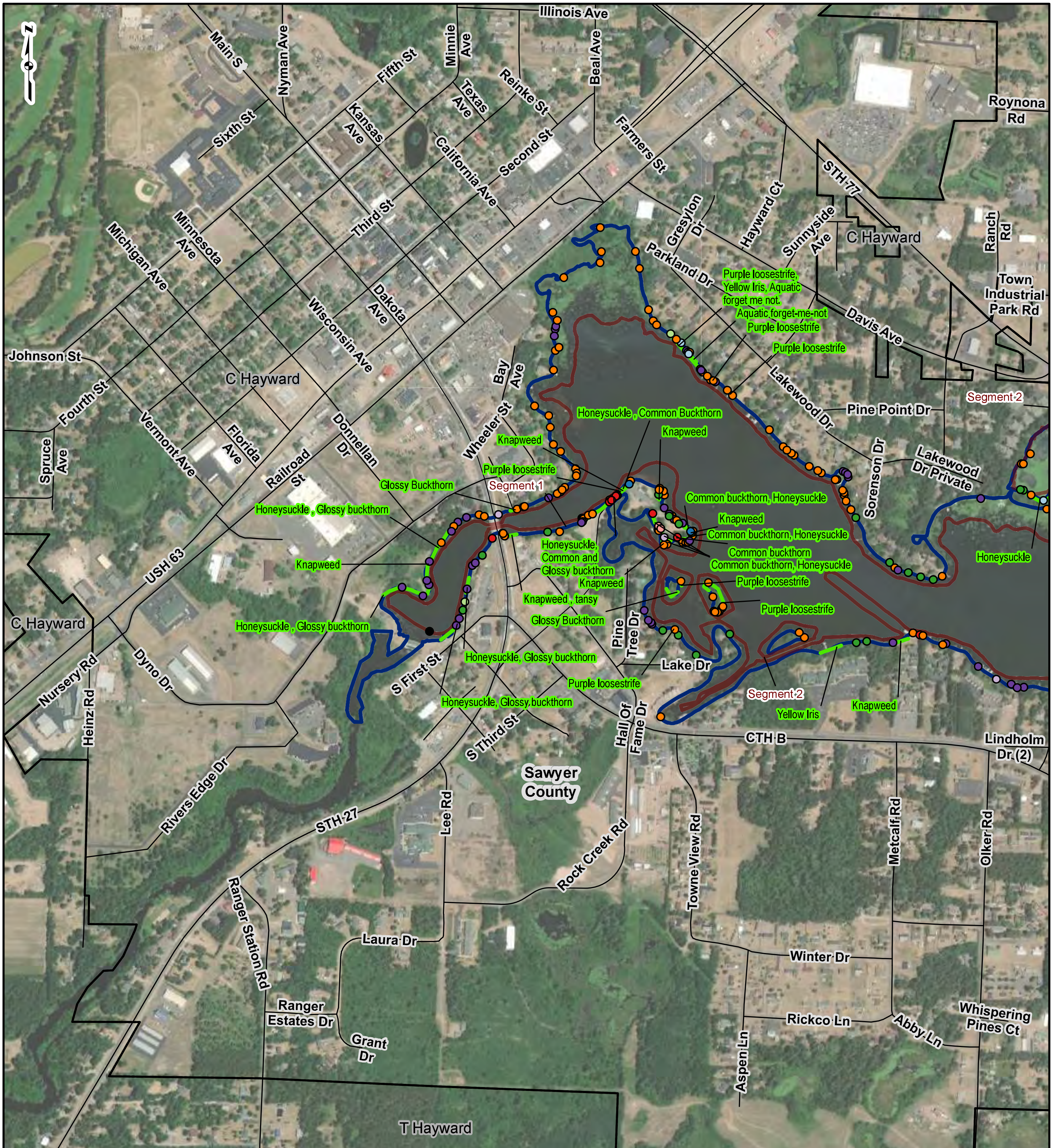
Sediment Sampling Equipment

Figure 10. Sediment sampling equipment.

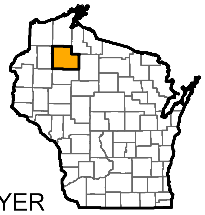
10-inch Tetra Pond Planter Basket, with 1/32-inch mesh, and garden trowel

FIGURE 11A

Hayward Shoreline Terrestrial Invasive Species



PROJECT LOCATION



SAWYER COUNTY, WISCONSIN

LEGEND

Common Name

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

Mead & Hunt

DRAWN BY: EMW
CHECKED: TDB
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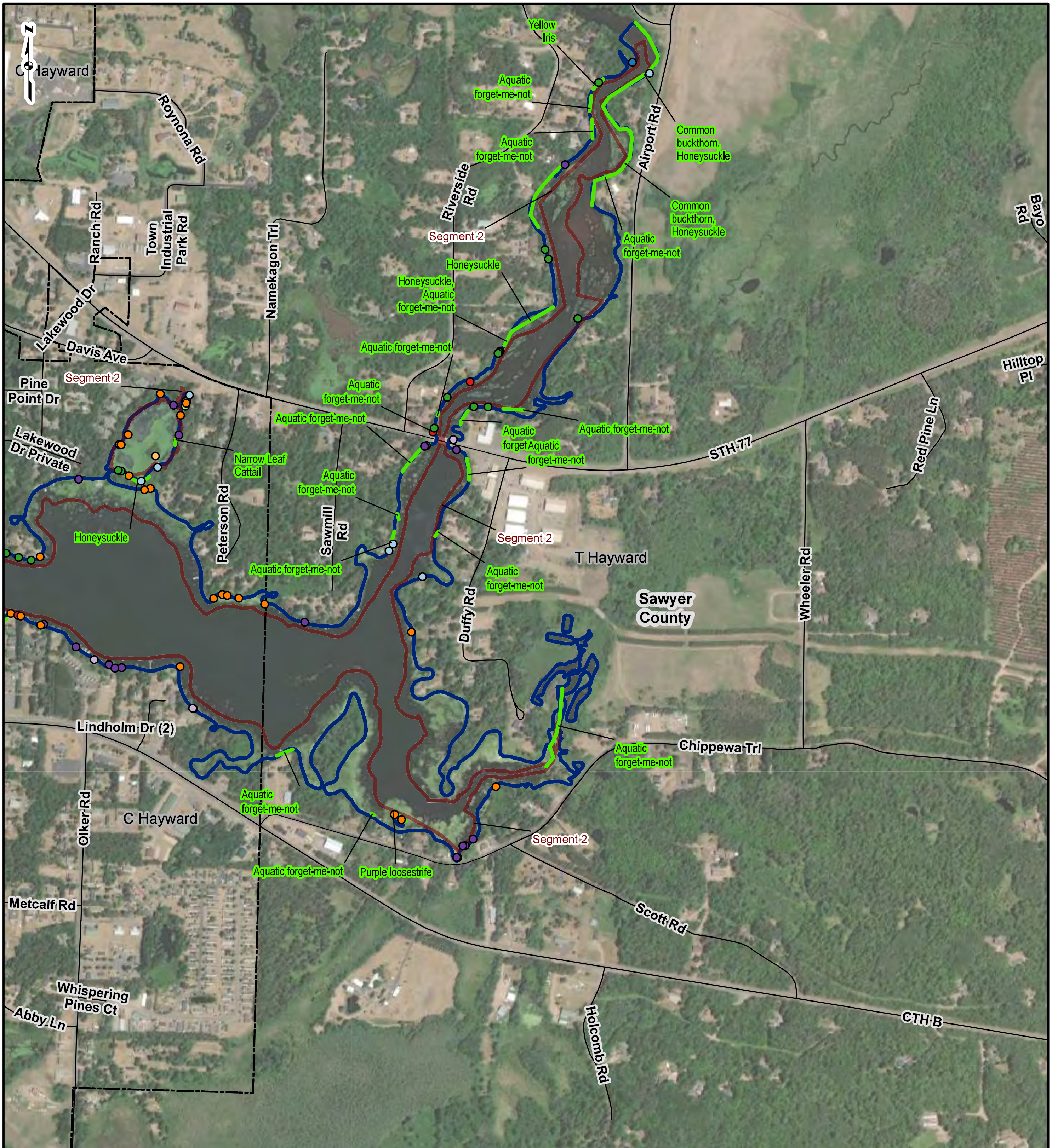
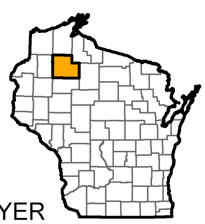


PROJECT LOCATION



SAWYER COUNTY, WISCONSIN

LEGEND

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

Mead & Hunt

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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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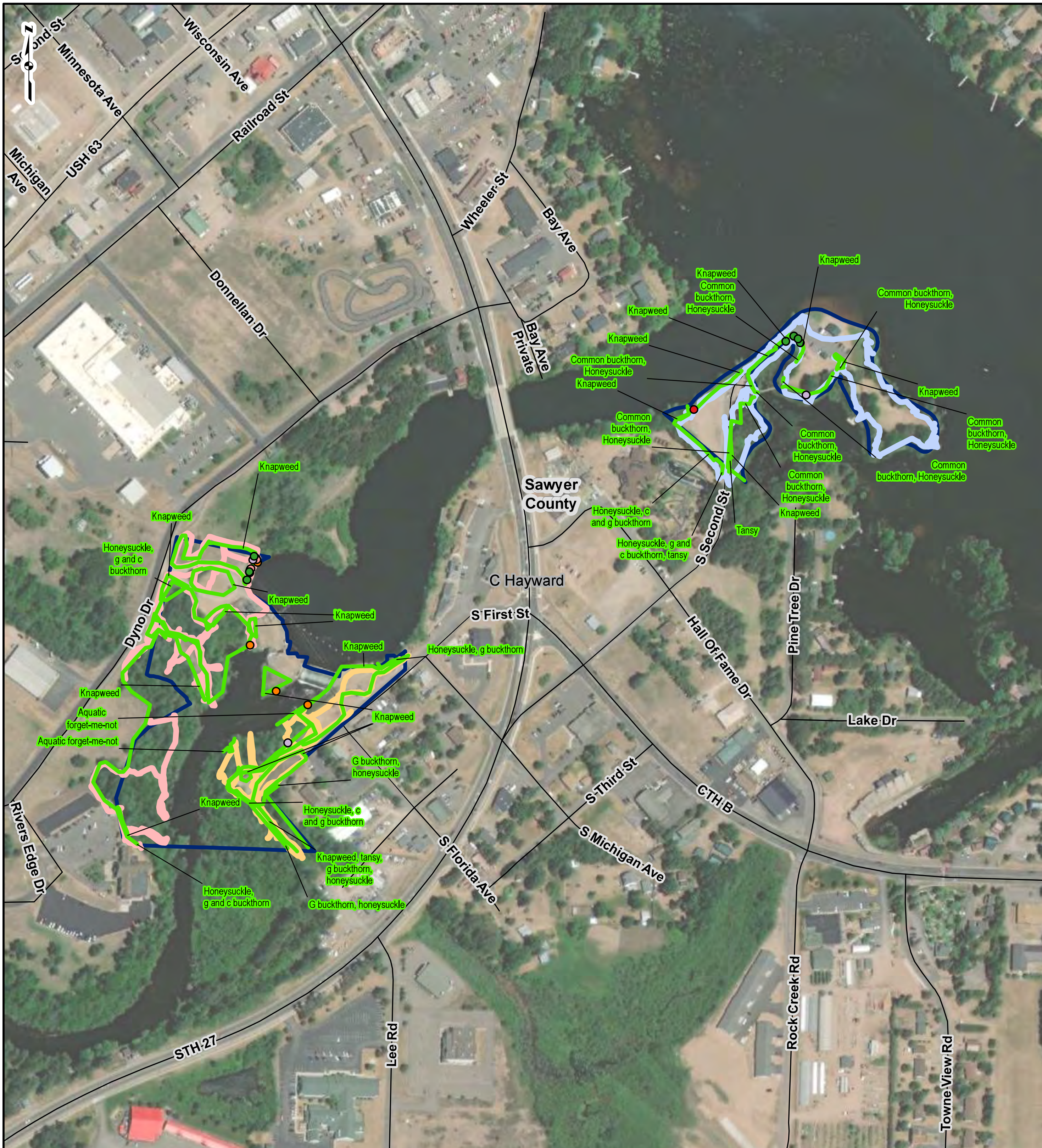
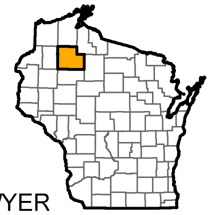
FIGURE 11B

Hayward Upland Terrestrial Meanders and Invasive Species





LEGEND

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

0 225 450 900 Feet

Figure 11B
Upland Terrestrial Meanders and Invasive Species

Hayward Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

Mead & Hunt

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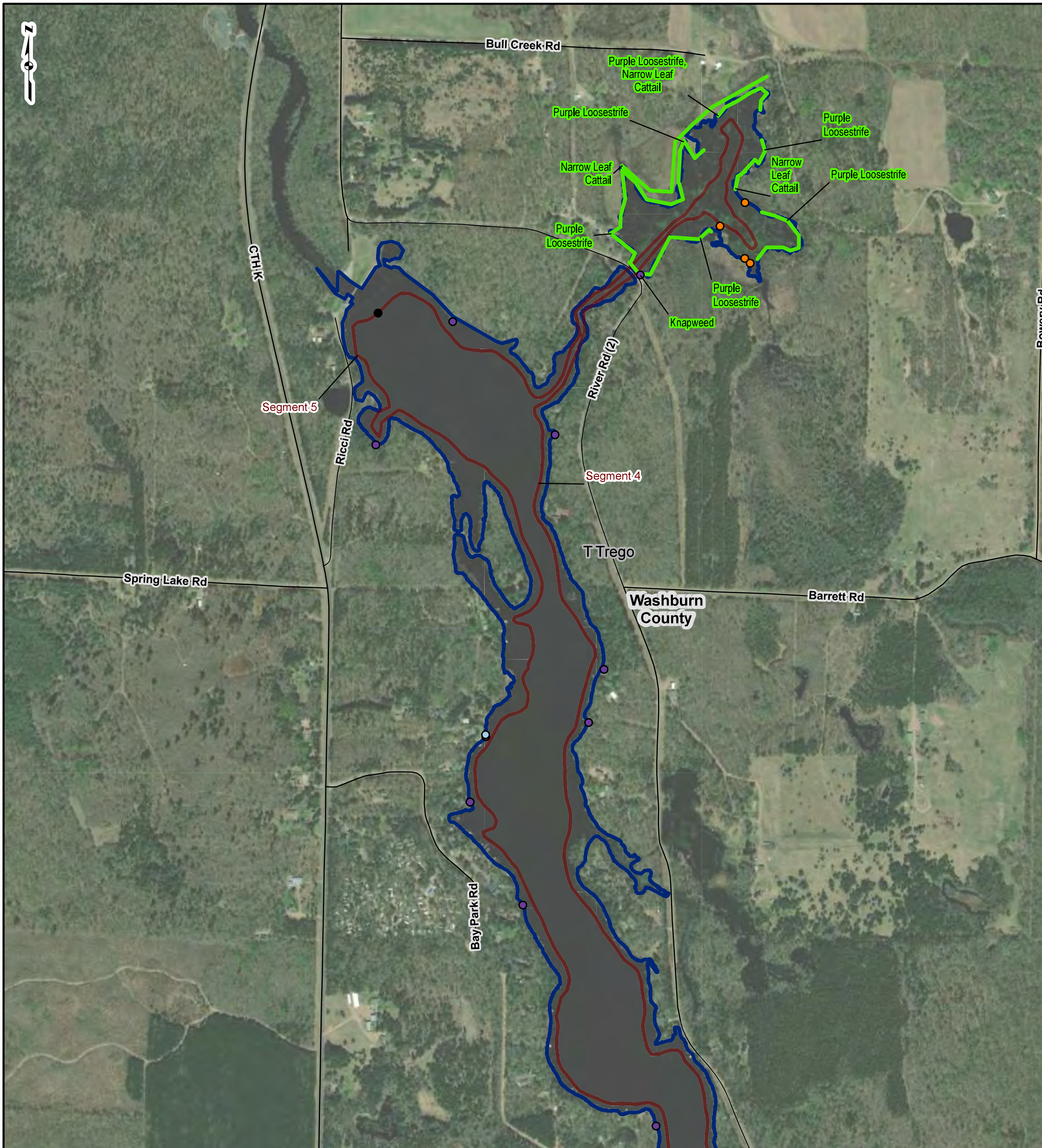
APPROVED: LLS

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

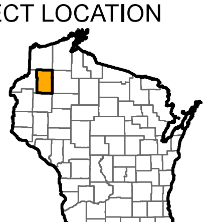
G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Hayward\R220323_00_Hayward_Invasive_Mapping\R220323_00_Hayward_Invasive_Mapping.aprx

FIGURE 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

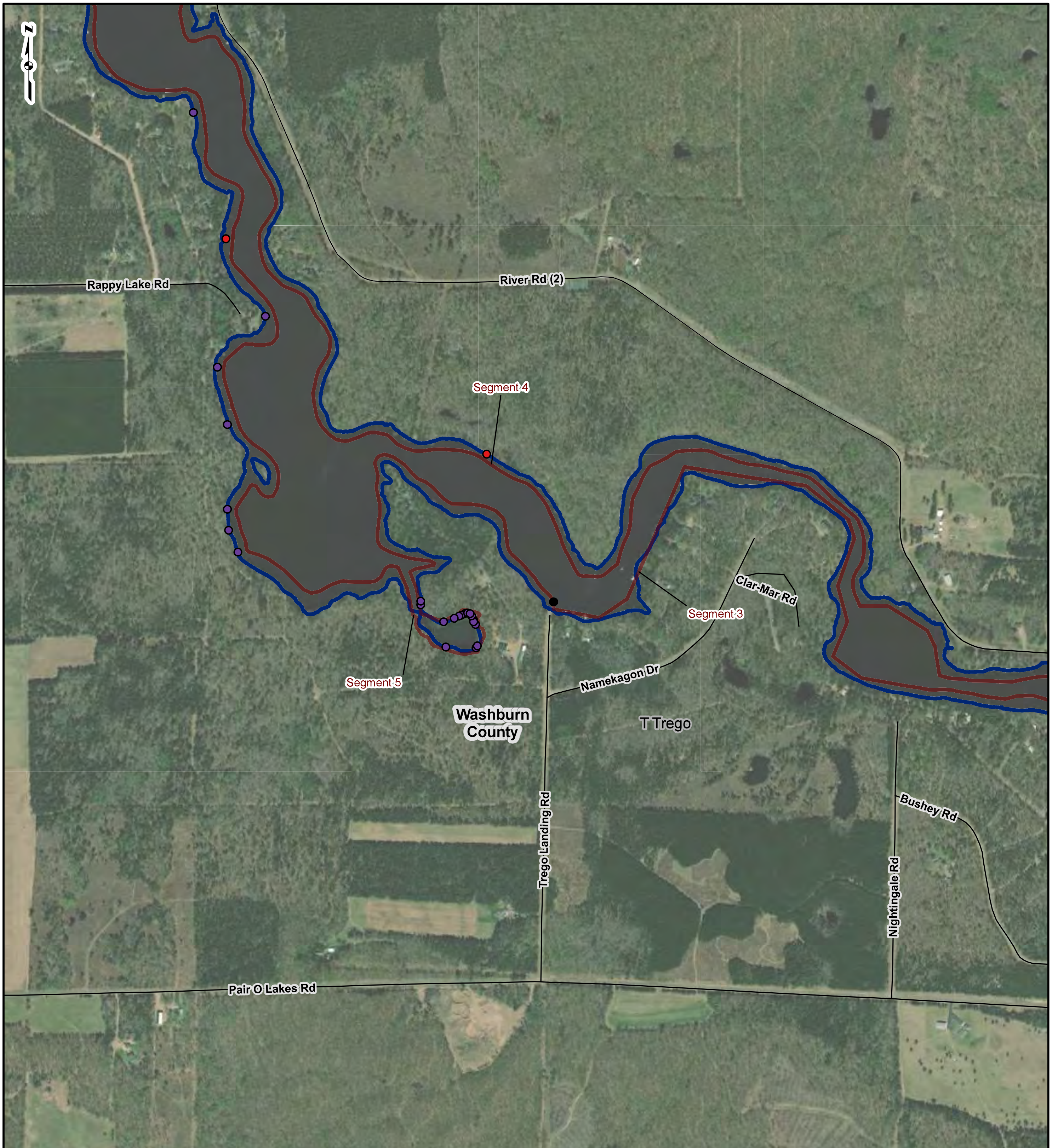
Trego Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

Mead & Hunt

DRAWN BY: EMW
CHECKED: TDB
DATE: 10/26/22
APPROVED: LLS

REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/26/2022. 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

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

Mead & Hunt

DRAWN BY: EMW
CHECKED: TDB
DATE: 10/26/22
APPROVED: LLS

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

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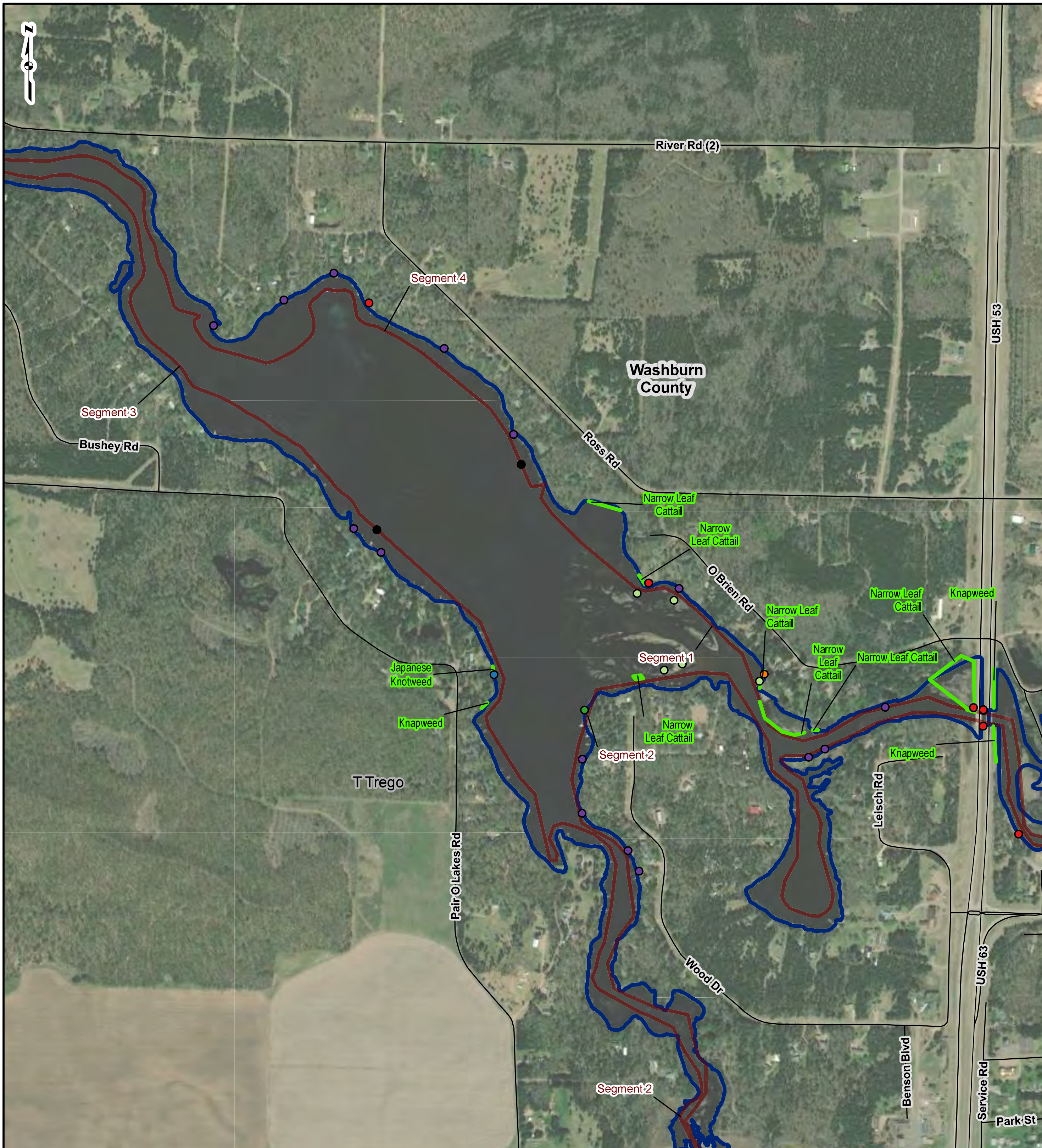

PROJECT LOCATION

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 3 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

DRAWN BY: EMW
CHECKED: TDB
DATE: 10/26/22
APPROVED: LLS

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

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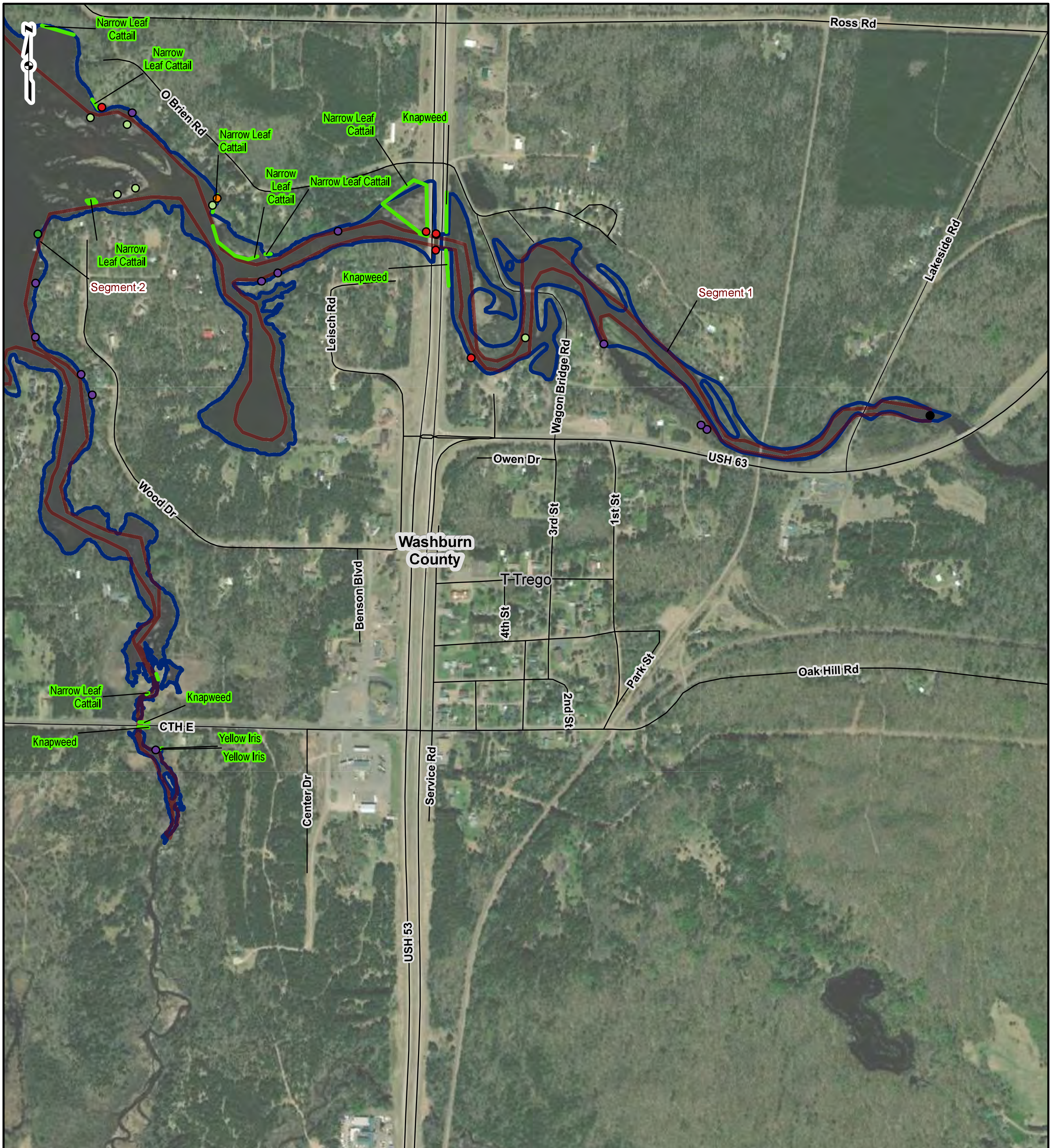
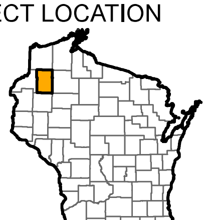


PROJECT LOCATION



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 4 OF 4

Trego Hydroelectric Project Aquatic and Terrestrial Invasive Species Study

Mead & Hunt

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DATE: 10/26/2022
APPROVED: LLS

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

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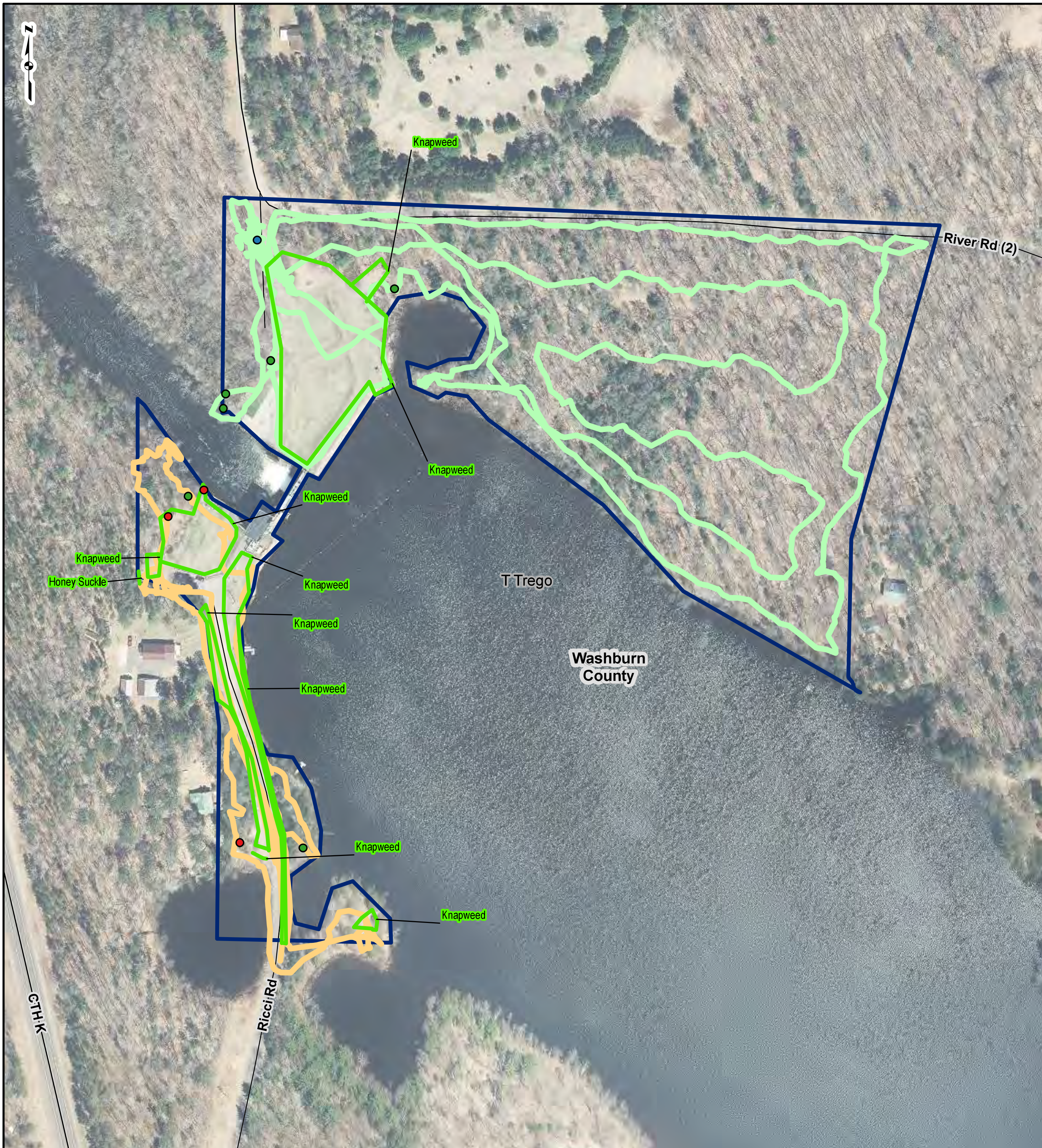
FIGURE 12B

Trego Upland Terrestrial Meanders and Invasive Species



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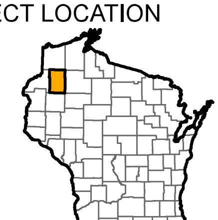

WASHBURN COUNTY, WISCONSIN

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

Mead & Hunt

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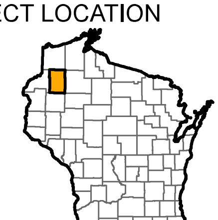
APPROVED: LLS

REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/26/2022. 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

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

Mead & Hunt

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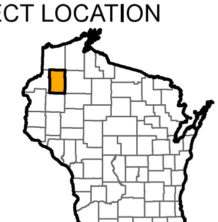
PROJECT LOCATION



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

Mead & Hunt

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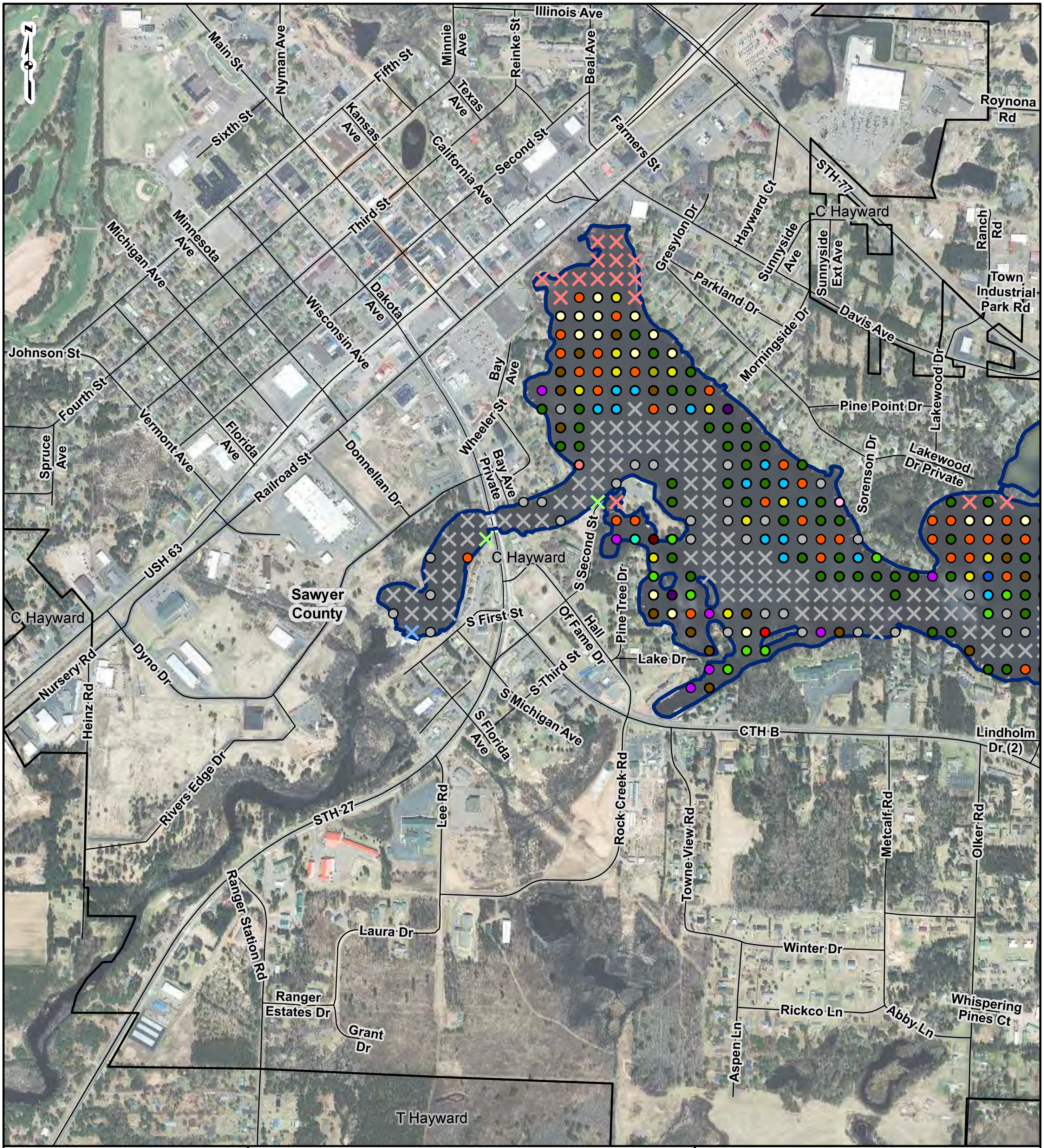
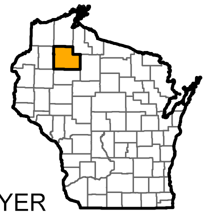
G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Trego\R220323_00_Trego_Inv_Mapping\R220323_00_Trego_Inv_Mapping.aprx

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

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

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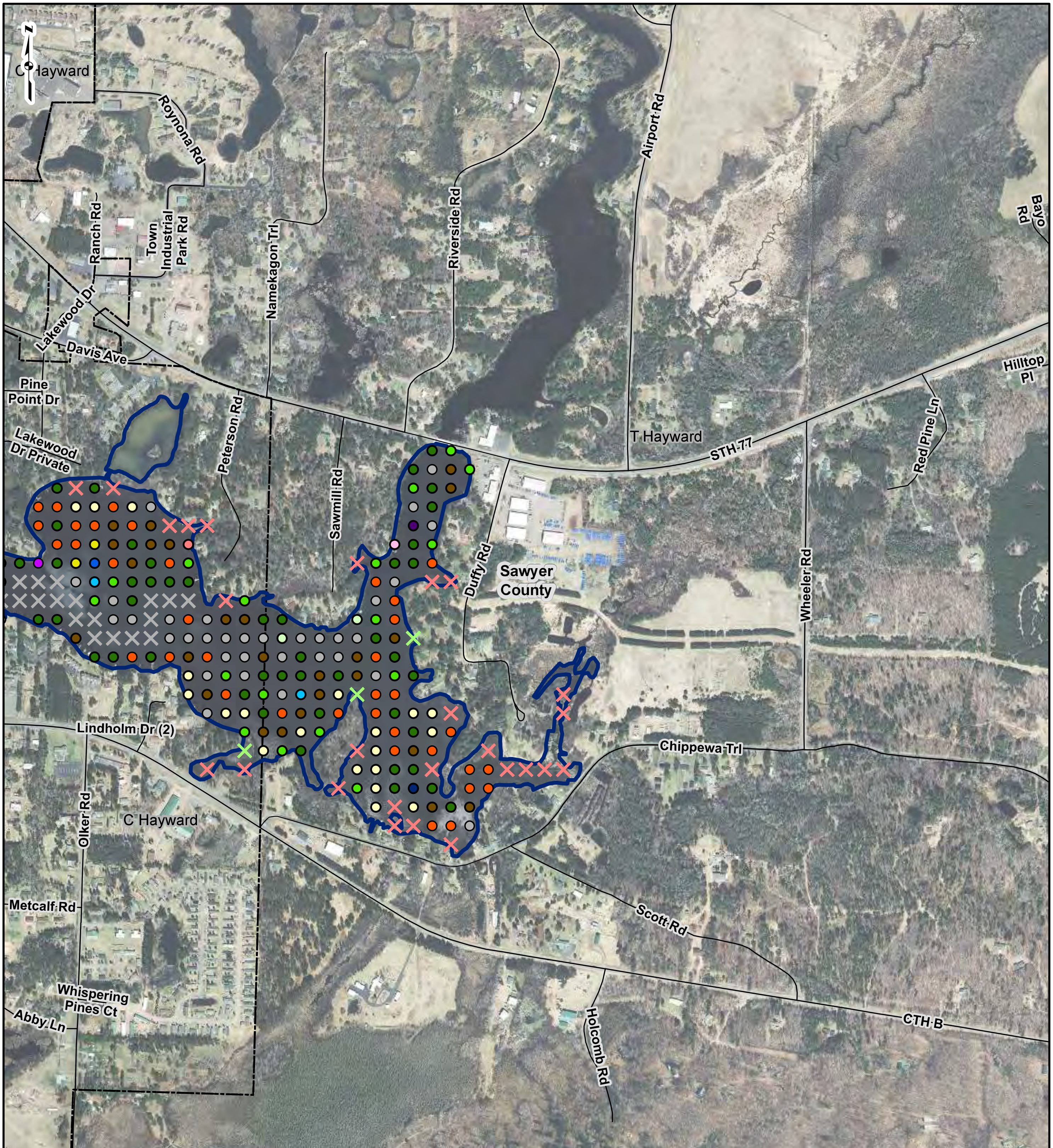
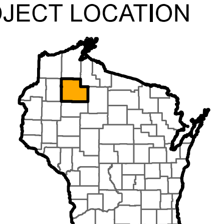


PROJECT LOCATION



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

Mead & Hunt

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

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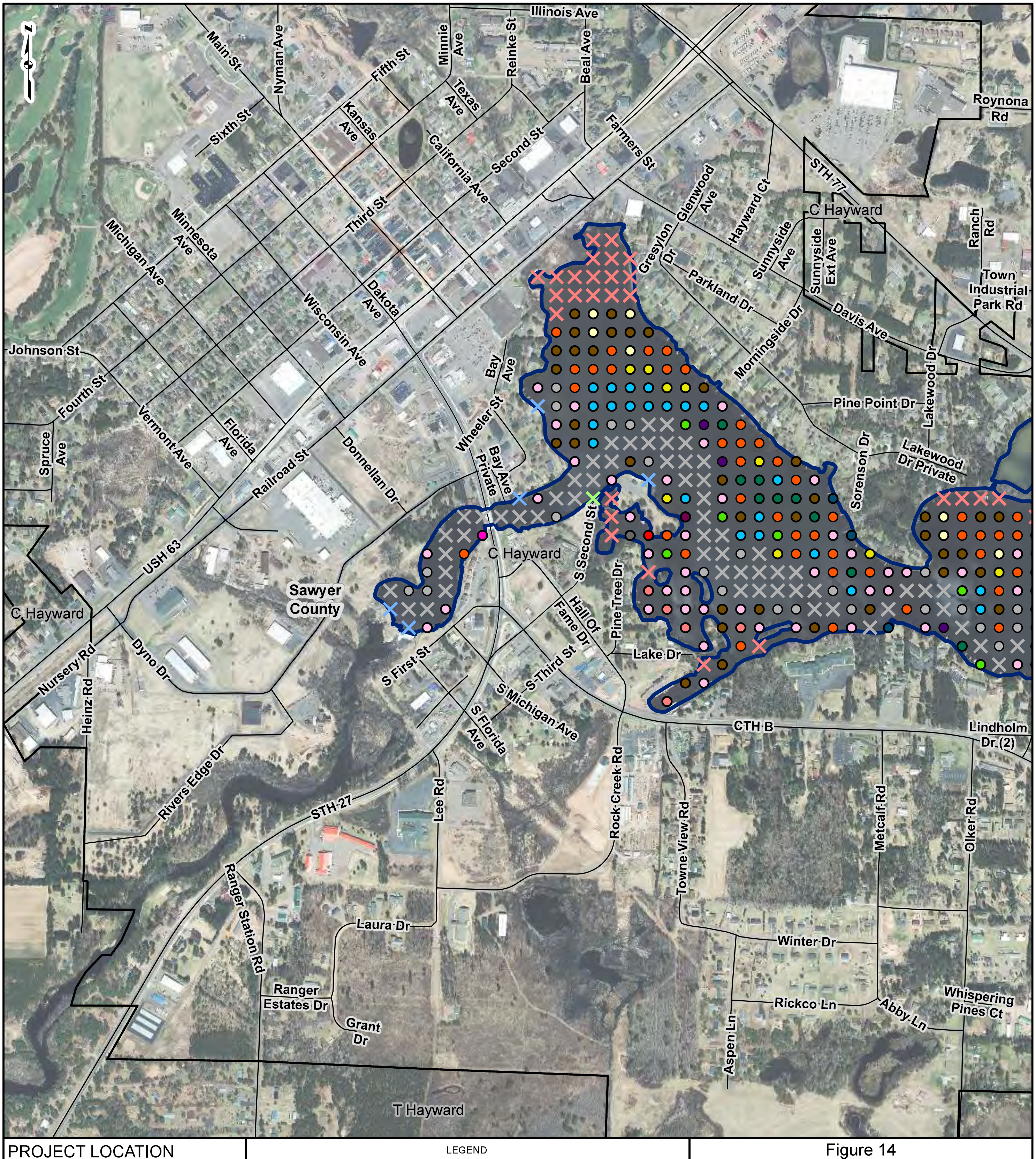
FIGURE 14
Hayward August Predominant Species



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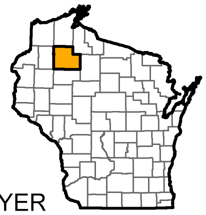

SAWYER COUNTY, WISCONSIN

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 1 OF 2

Hayward Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

Mead & Hunt

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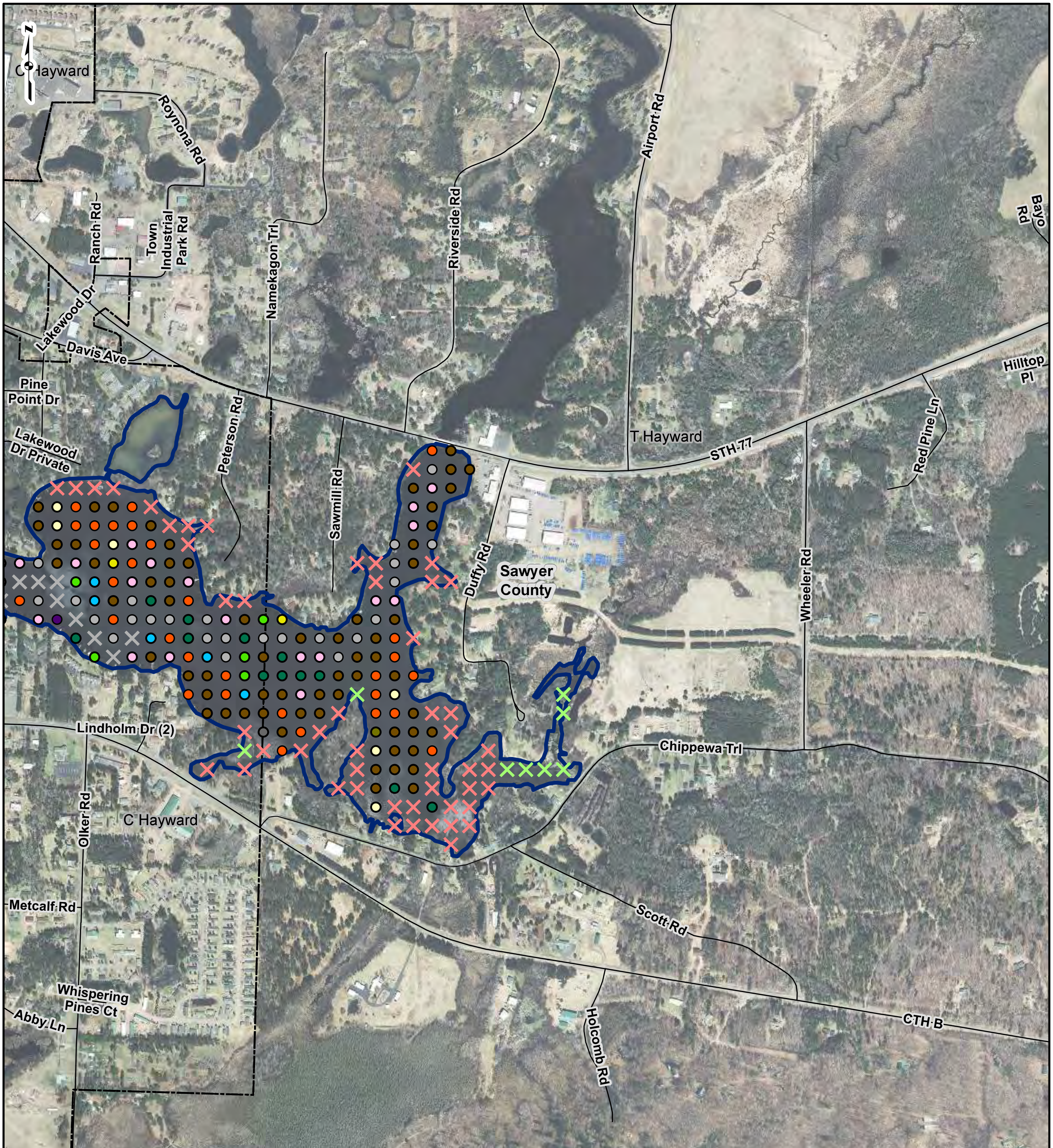
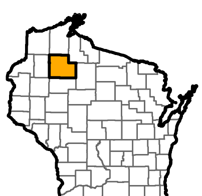


PROJECT LOCATION



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 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

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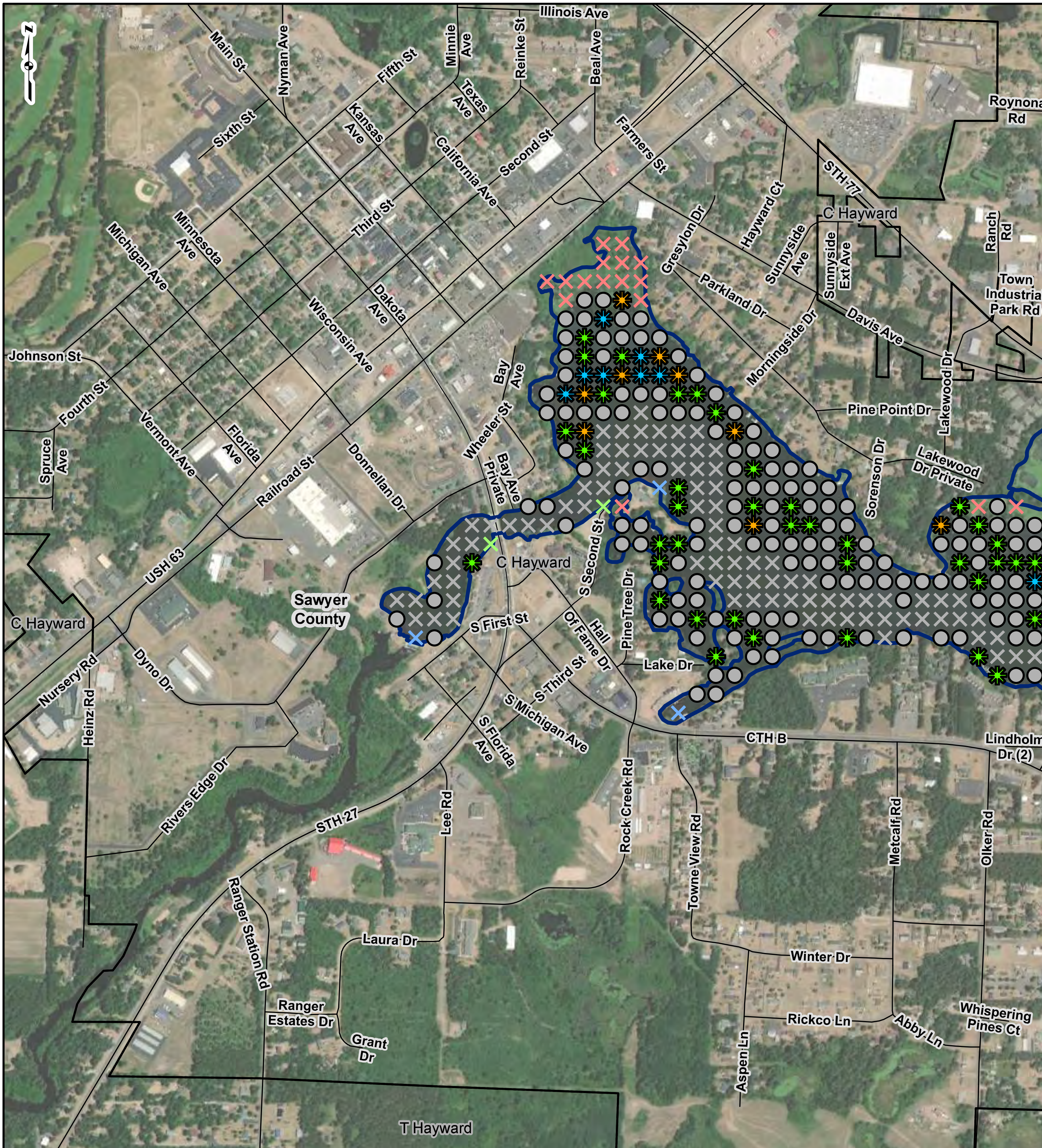
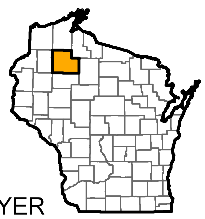
G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Hayward\R220323_00_Hayward_Invasive_Mapping\R220323_00_Hayward_Invasive_Mapping.aprx

FIGURE 15
Hayward June Aquatic Invasive Species



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 1 OF 2

Hayward Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

Mead & Hunt

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DATE: 10/27/2022
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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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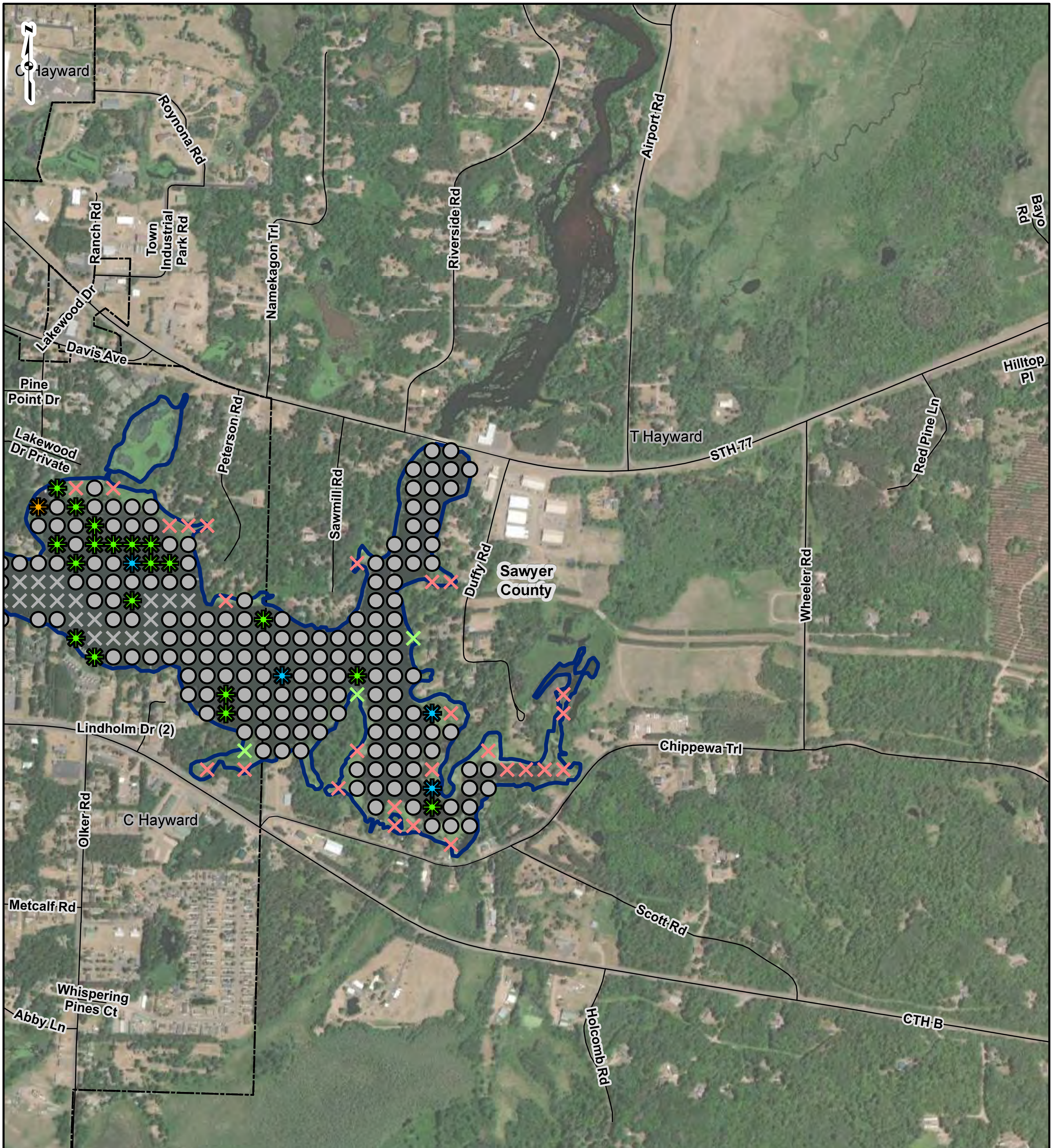
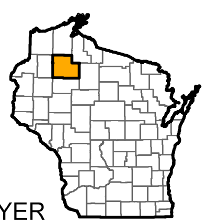


PROJECT LOCATION



SAWYER COUNTY, WISCONSIN

LEGEND

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

Mead & Hunt

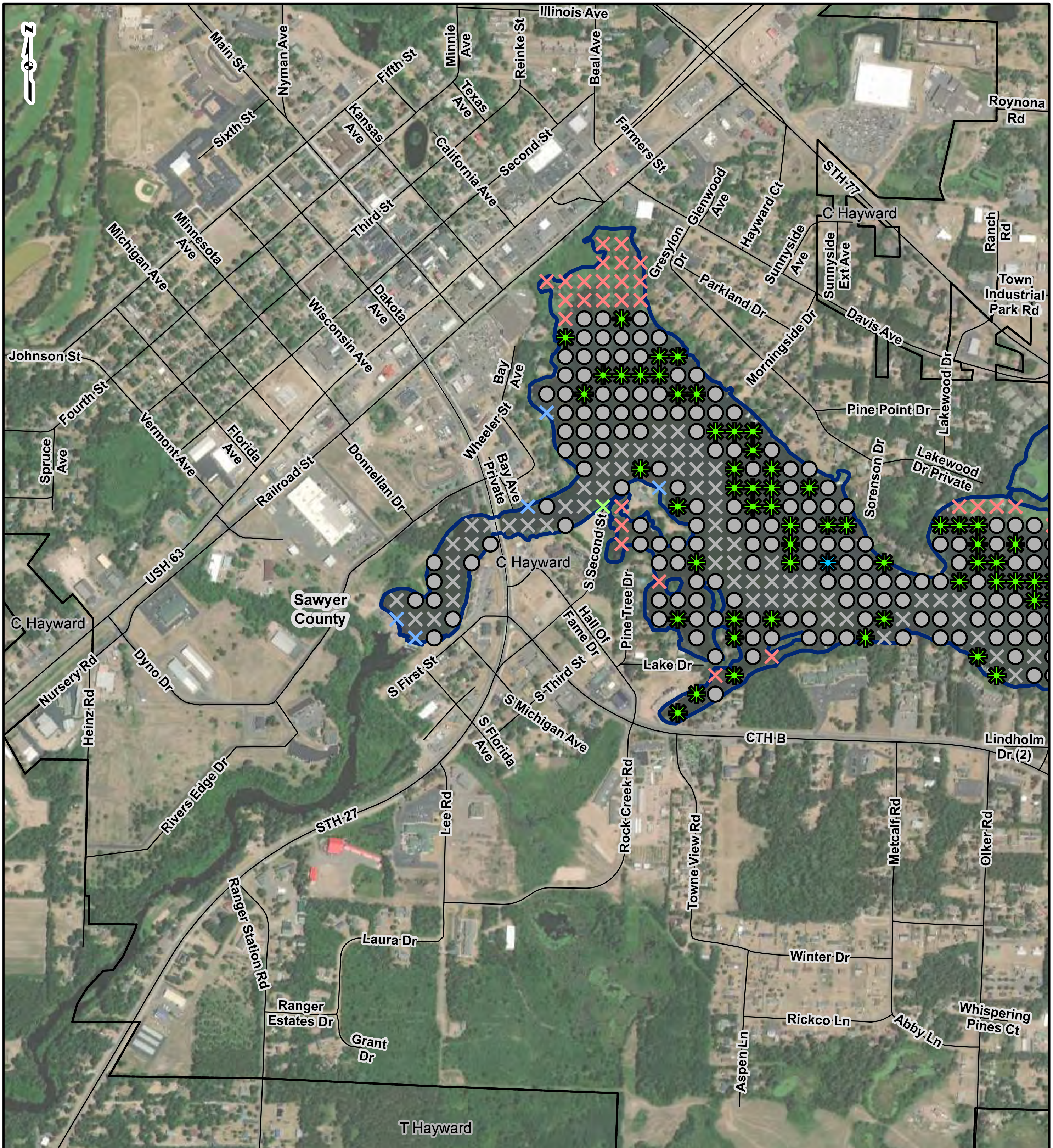
DRAWN BY: EMW
DATE: 10/27/2022
CHECKED: TDB
APPROVED: LLS

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 16

Hayward August Aquatic Invasive Species



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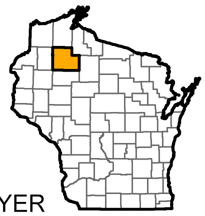

SAWYER COUNTY, WISCONSIN

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

Mead & Hunt

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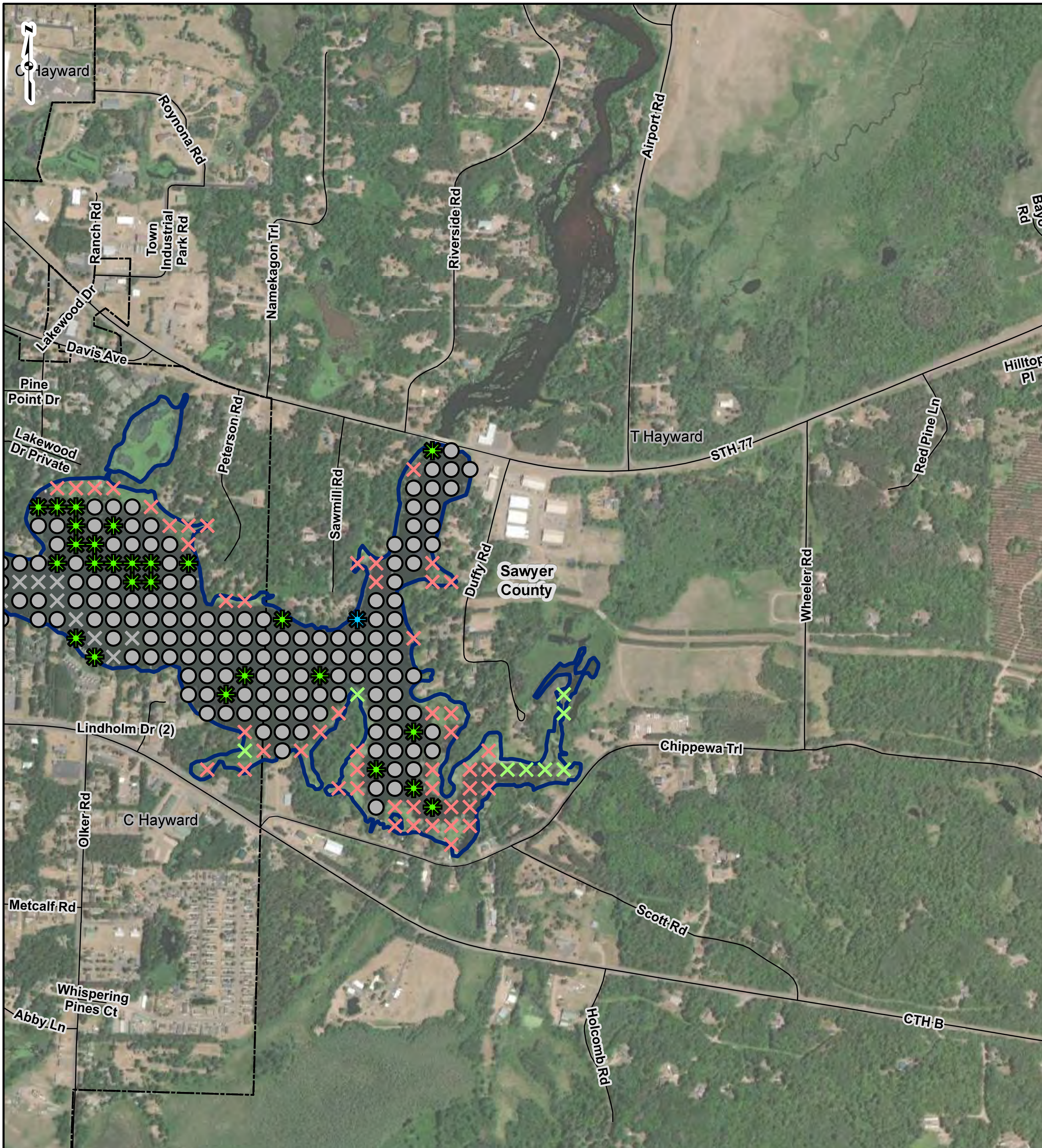

PROJECT LOCATION

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

Mead & Hunt

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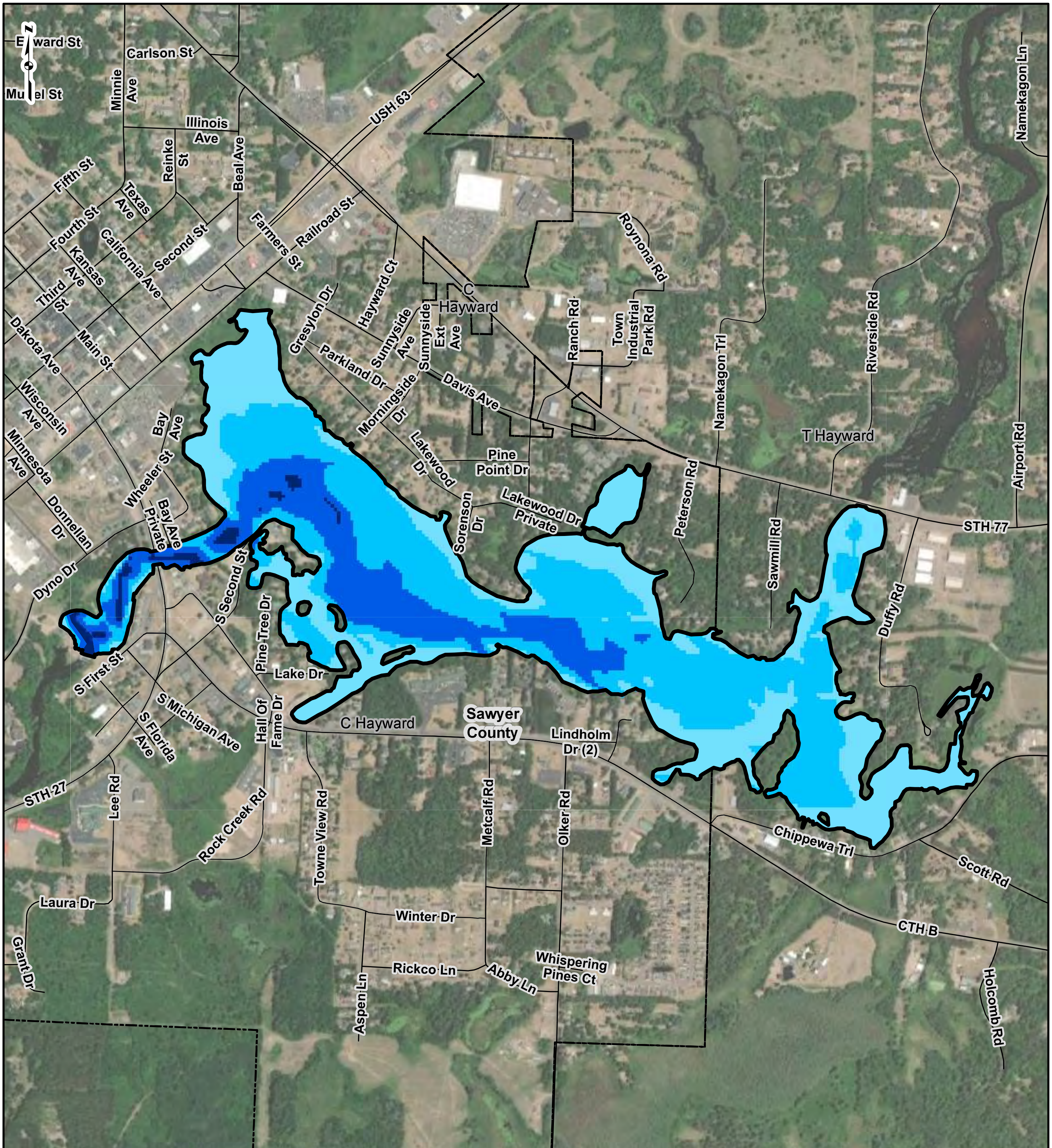
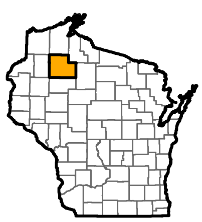
G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Hayward\R220323_00_Hayward_Invasive_Mapping\R220323_00_Hayward_Invasive_Mapping.aprx

FIGURE 17
Hayward Bathymetric Map



PROJECT LOCATION



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

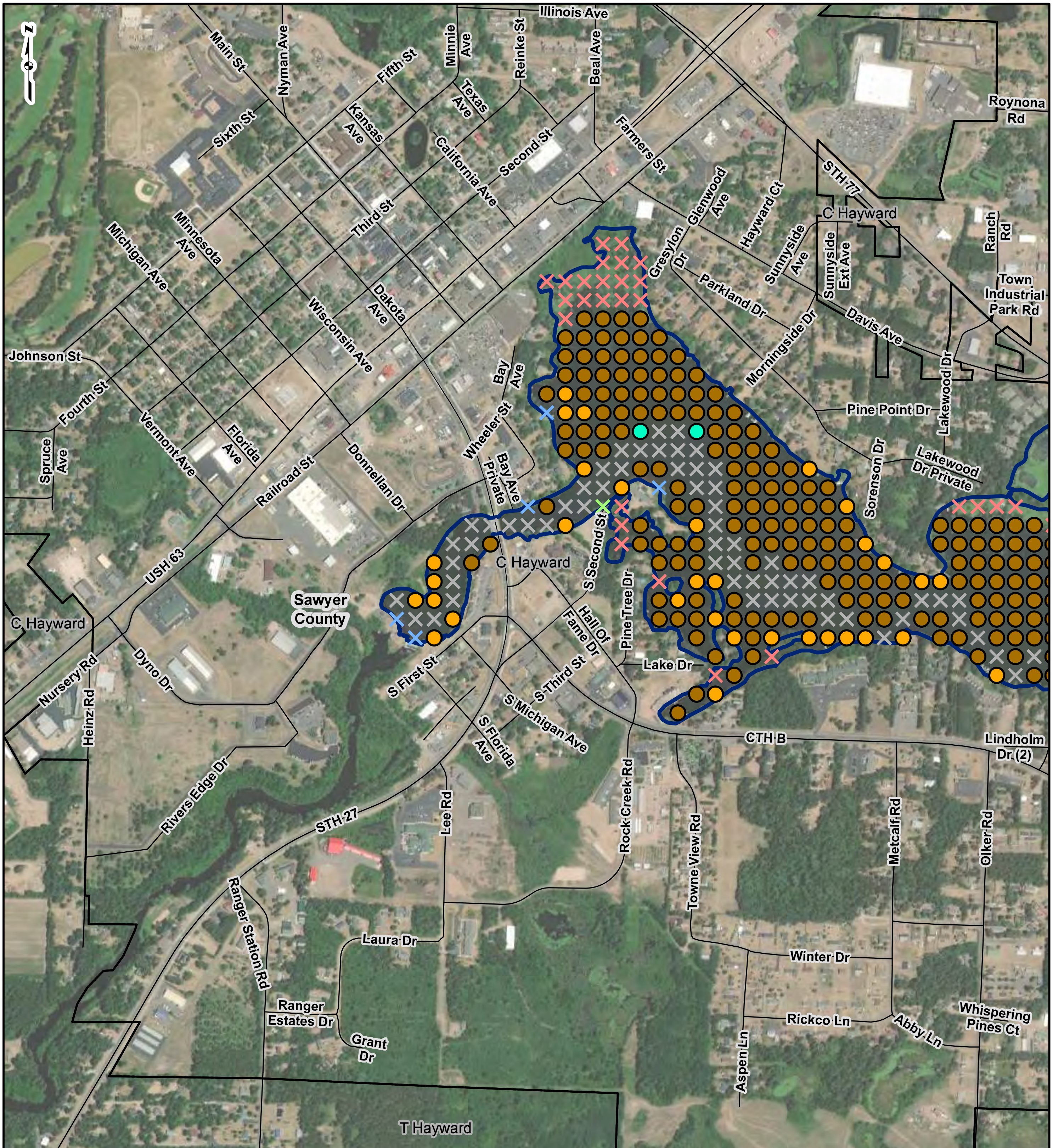
Mead & Hunt

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

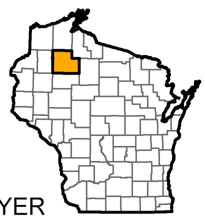
REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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

FIGURE 18
Hayward Substrate Types



PROJECT LOCATION



SAWYER COUNTY, WISCONSIN

LEGEND

	Dominant Substrate	
Deeper than Plant Growth	Gravel	Point-Intercept Project Boundary
Non-Navigable Vegetation	Organic	Road Centerline
Non-Navigable Terrestrial/ Shallow	Sand	Community Boundary
Other	Wood	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

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.

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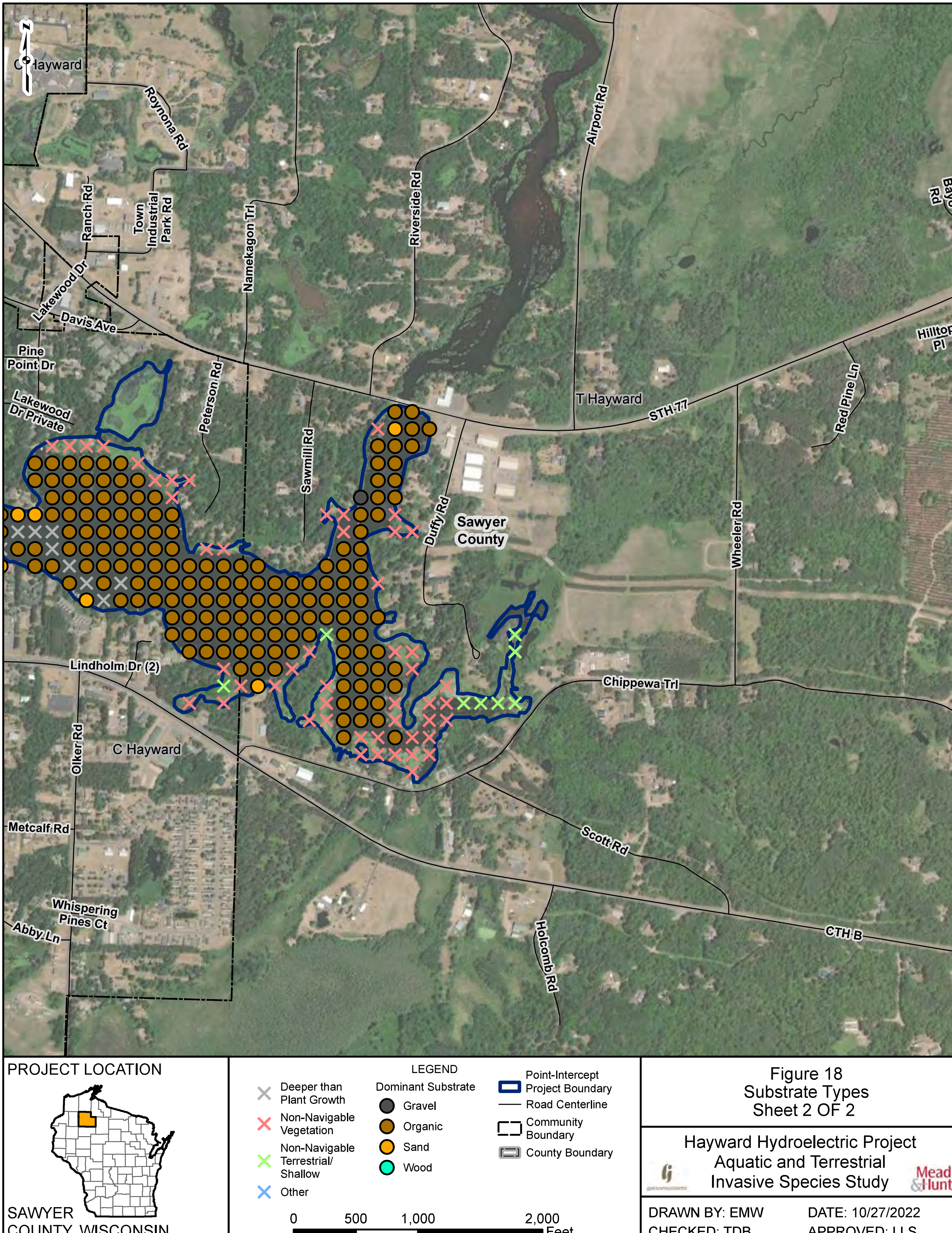

Figure 18
Substrate Types
Sheet 2 OF 2

Hayward Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

Mead & Hunt

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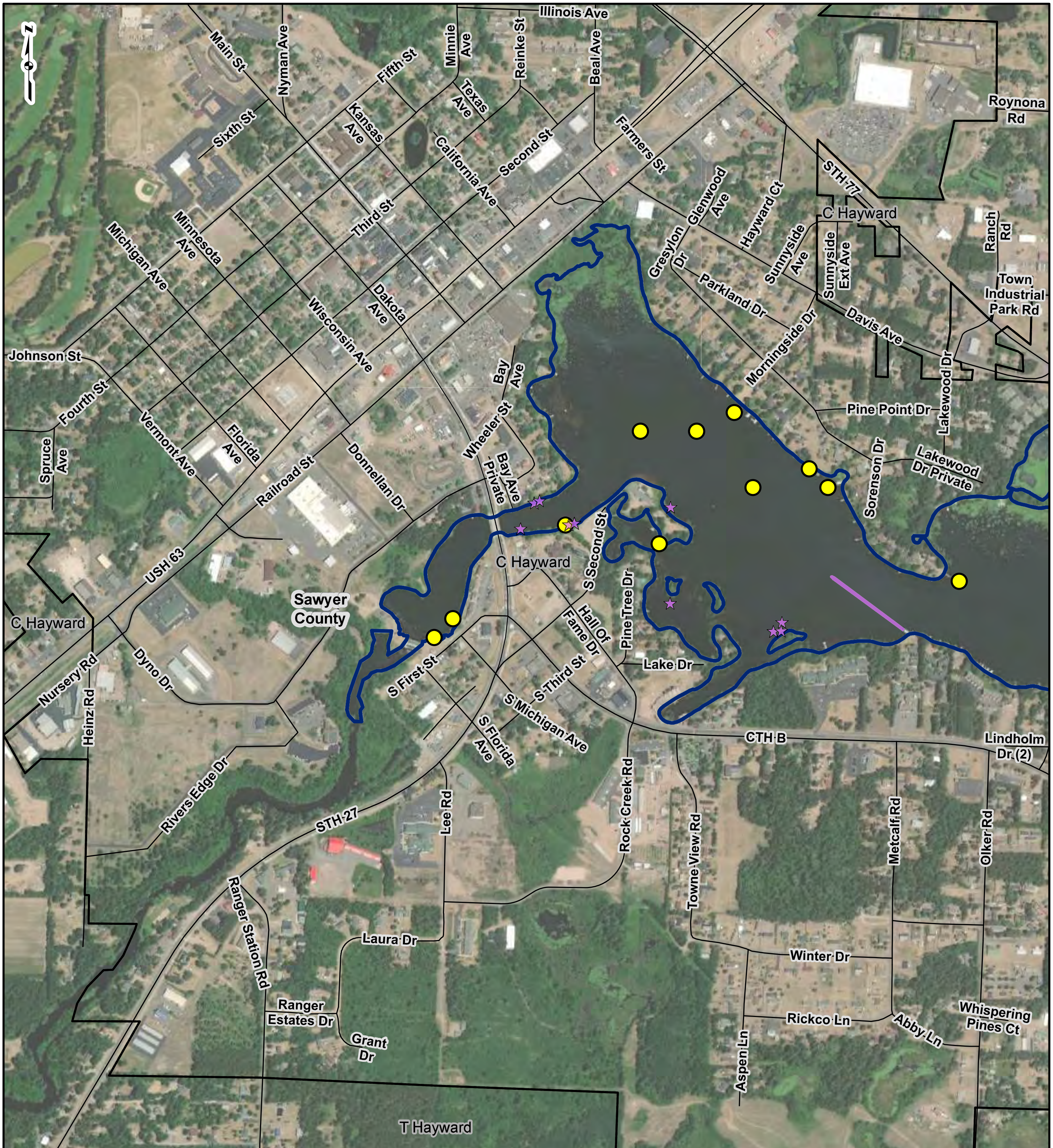
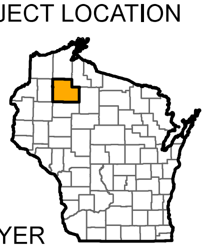
REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

G:_2022\R220323.00 - GIS\AGP\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

Mead & Hunt

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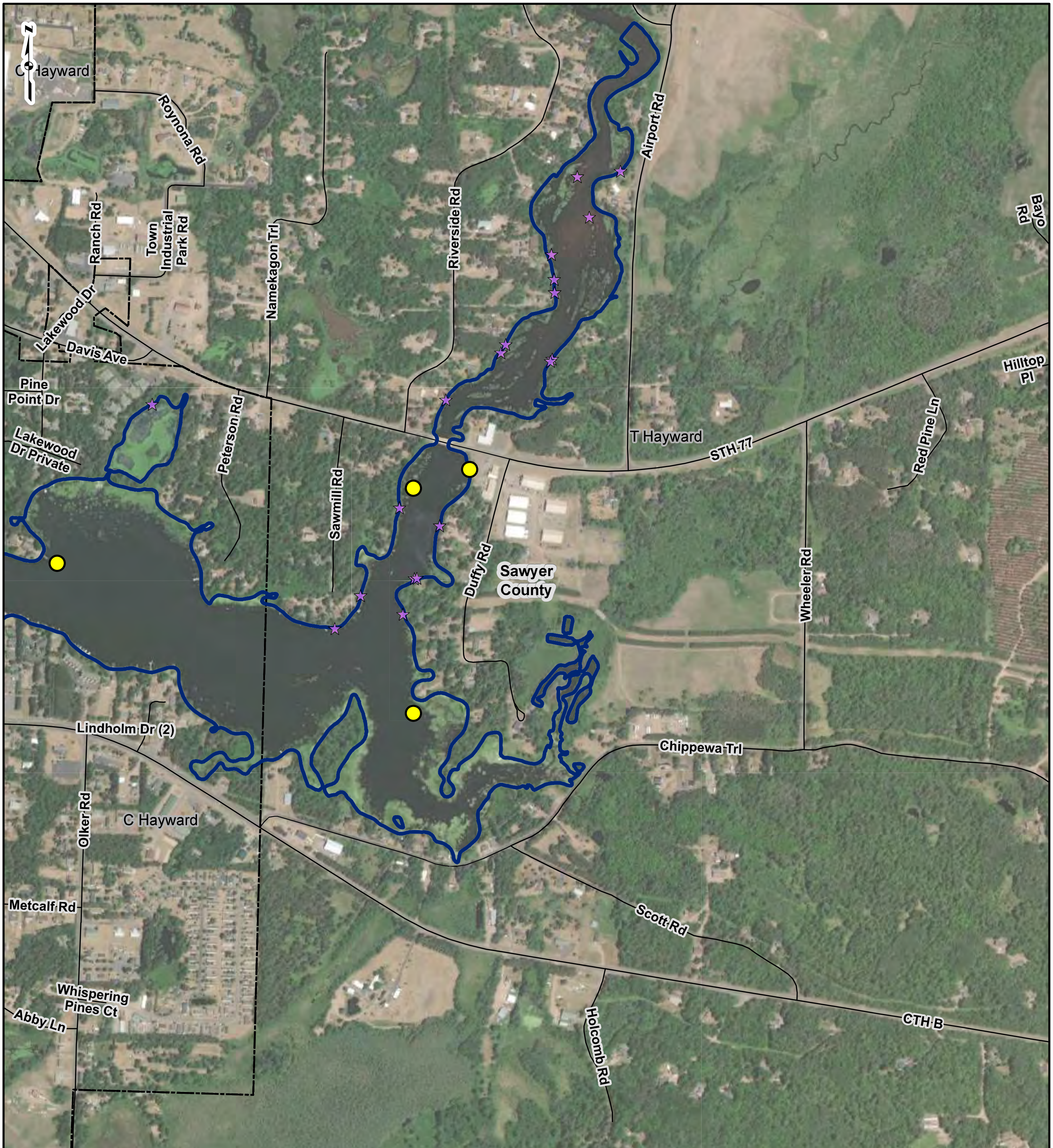
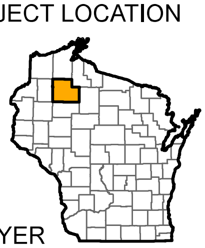


PROJECT LOCATION



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 2 OF 2

Hayward Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

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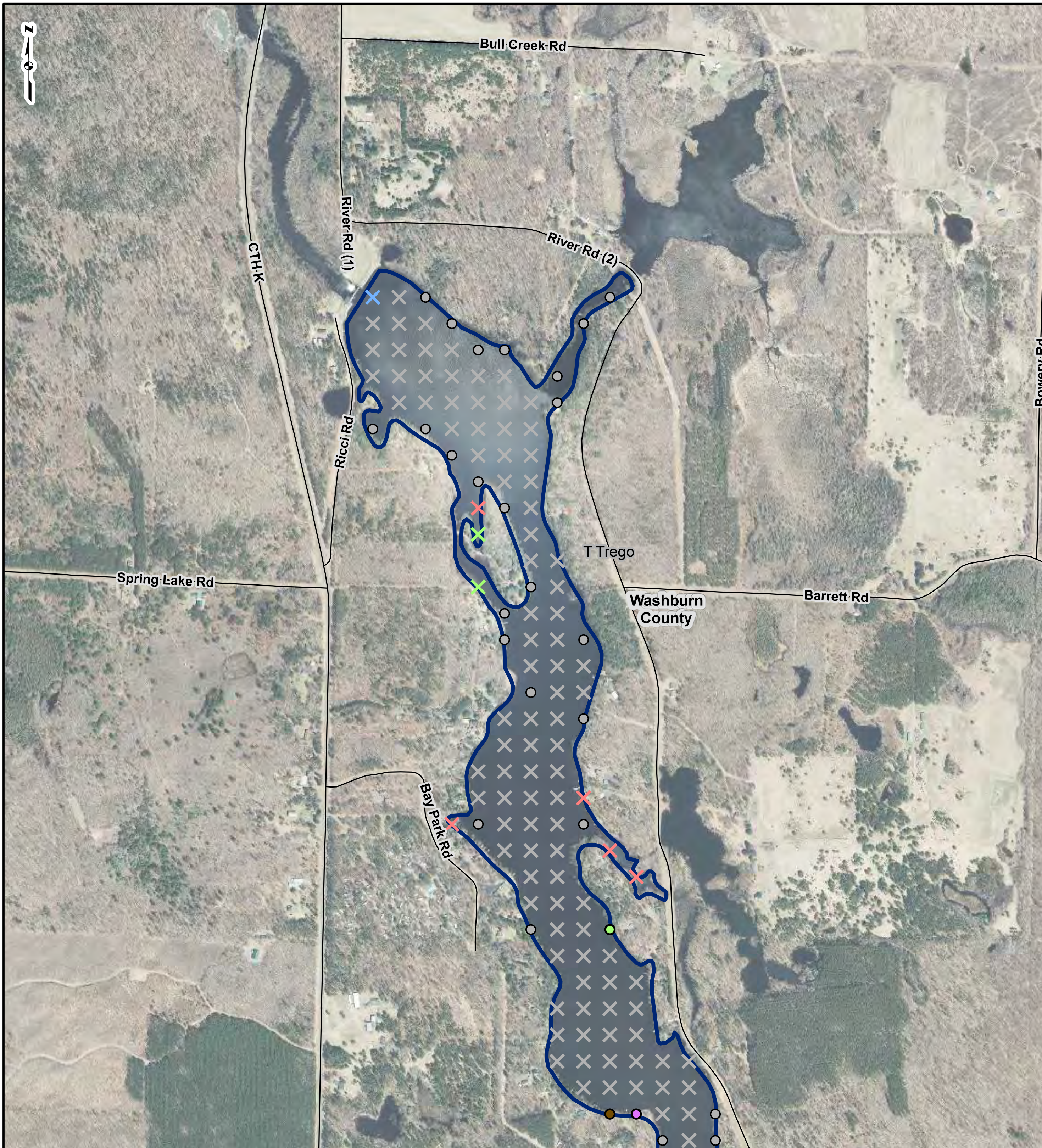
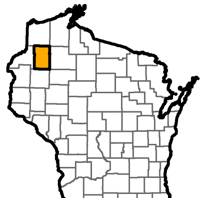
FIGURE 20
Trego June Predominant Species



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

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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.

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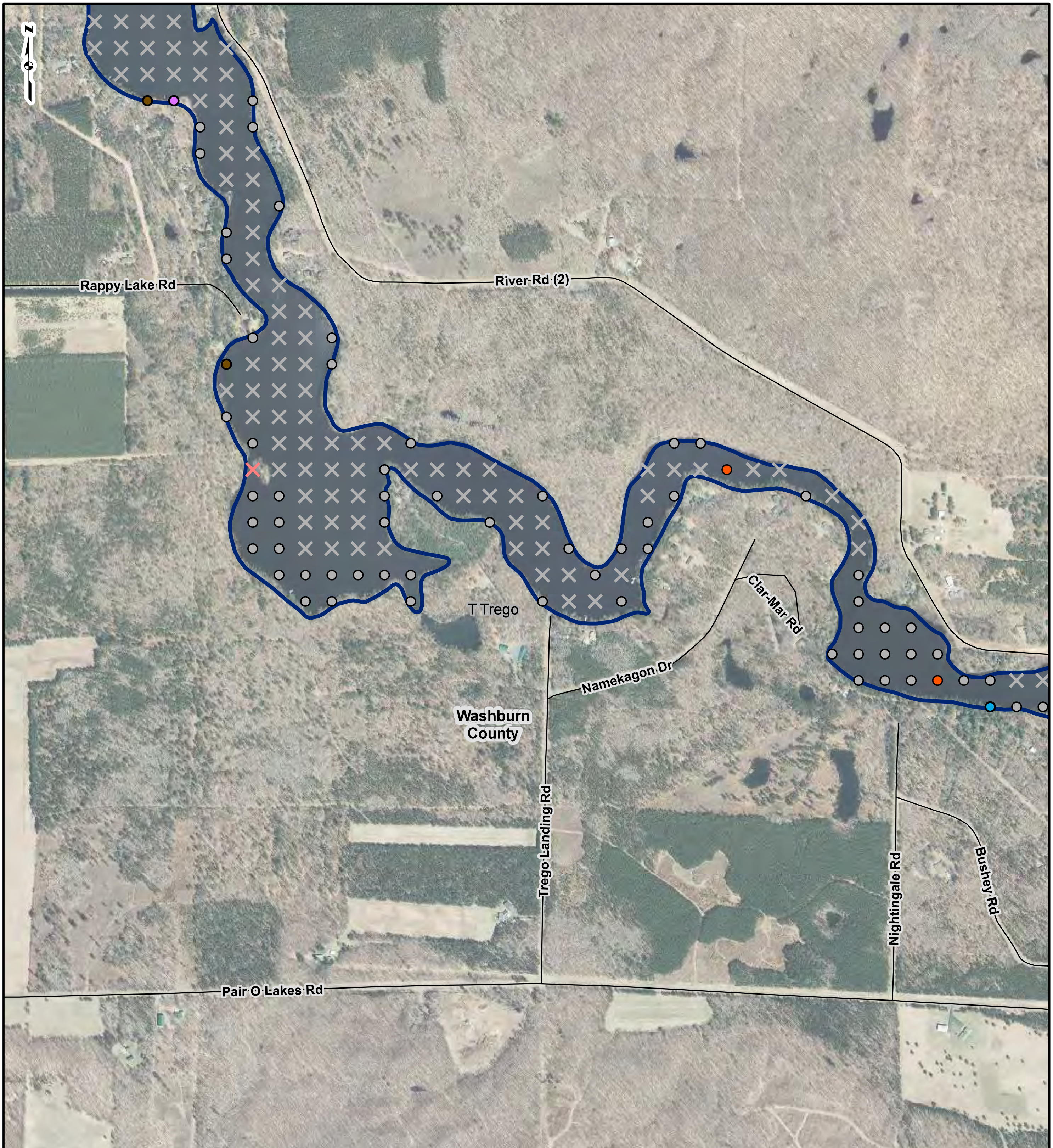

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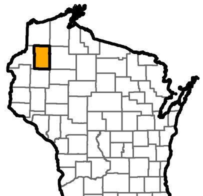

WASHBURN COUNTY, WISCONSIN

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 2 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial Invasive Species Study

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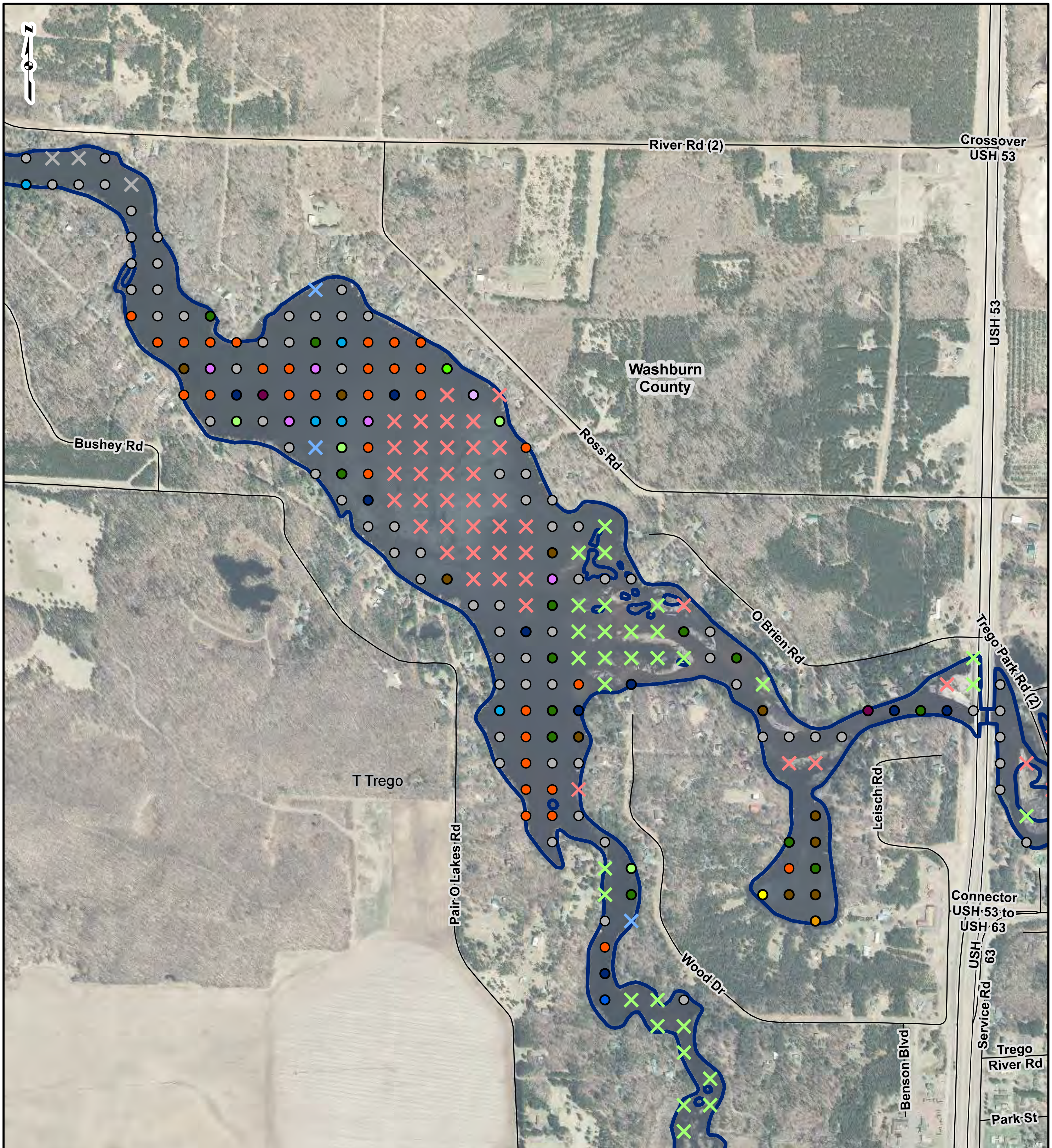
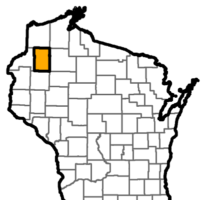


PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

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

Predominant Species

- None
- Common 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

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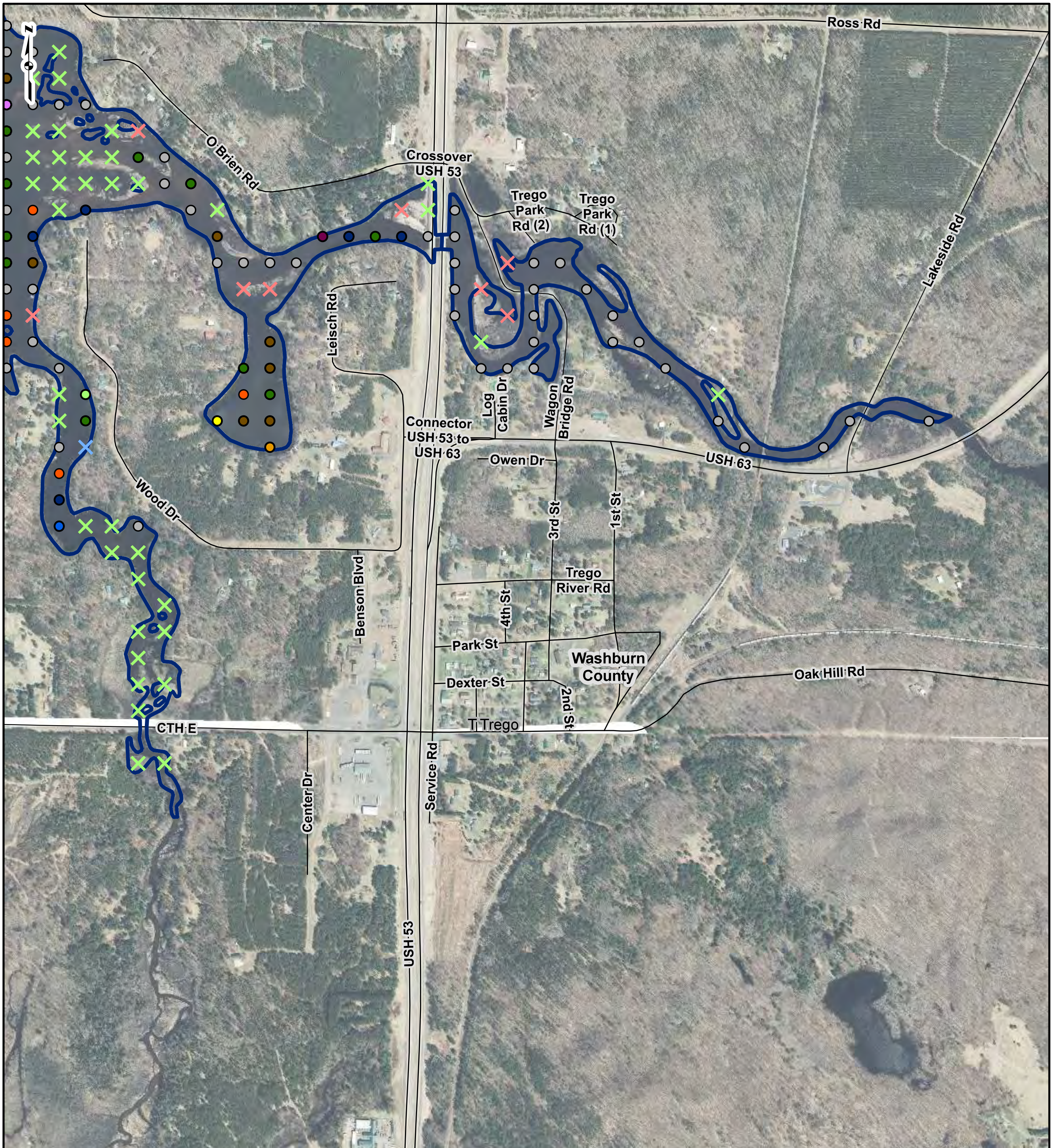

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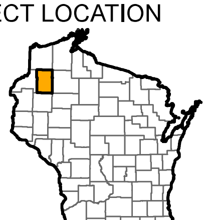

WASHBURN COUNTY, WISCONSIN

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

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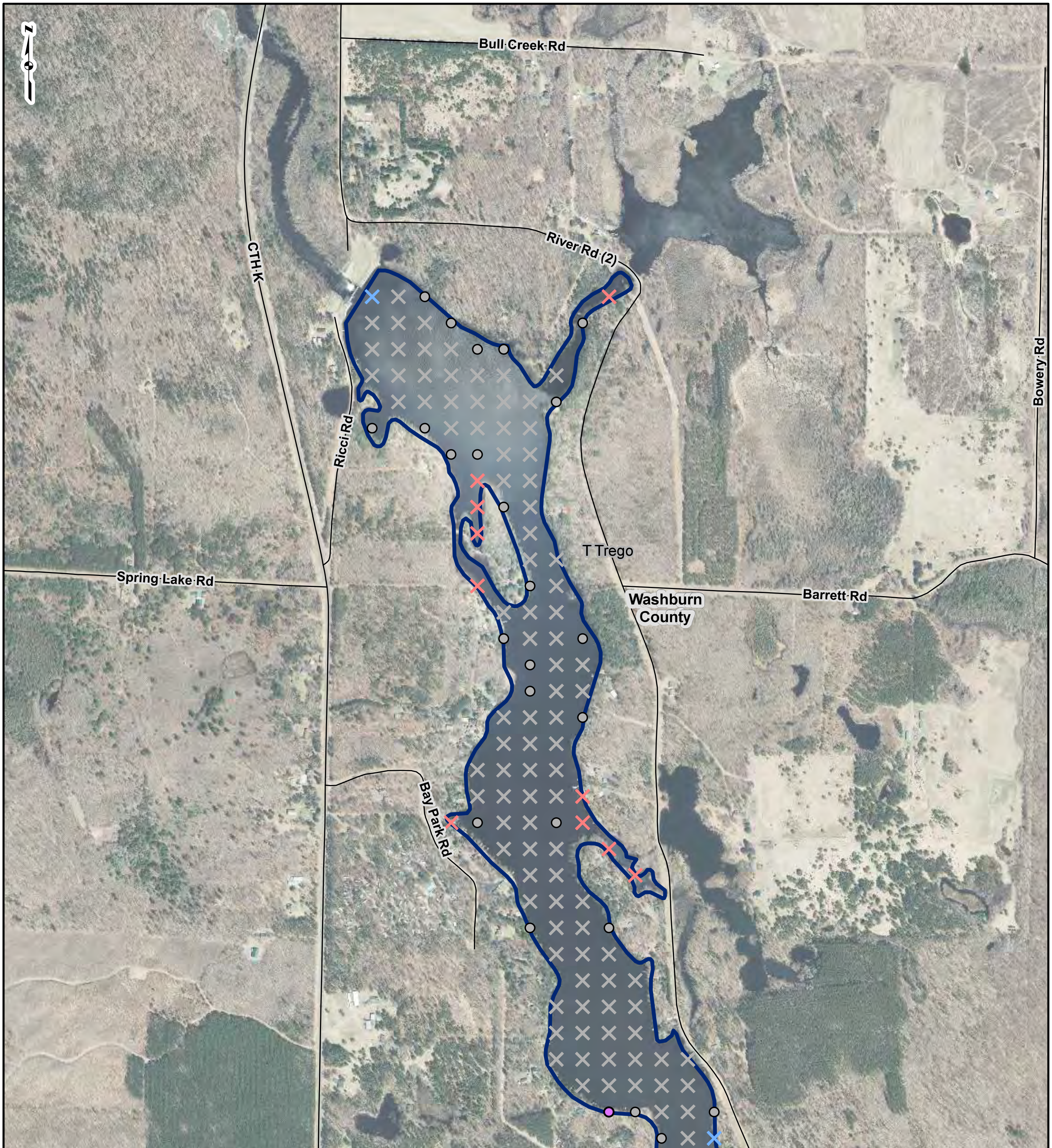
FIGURE 21
Trego July/Aug Predominant Species



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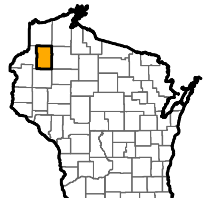

WASHBURN COUNTY, WISCONSIN

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

Mead & Hunt

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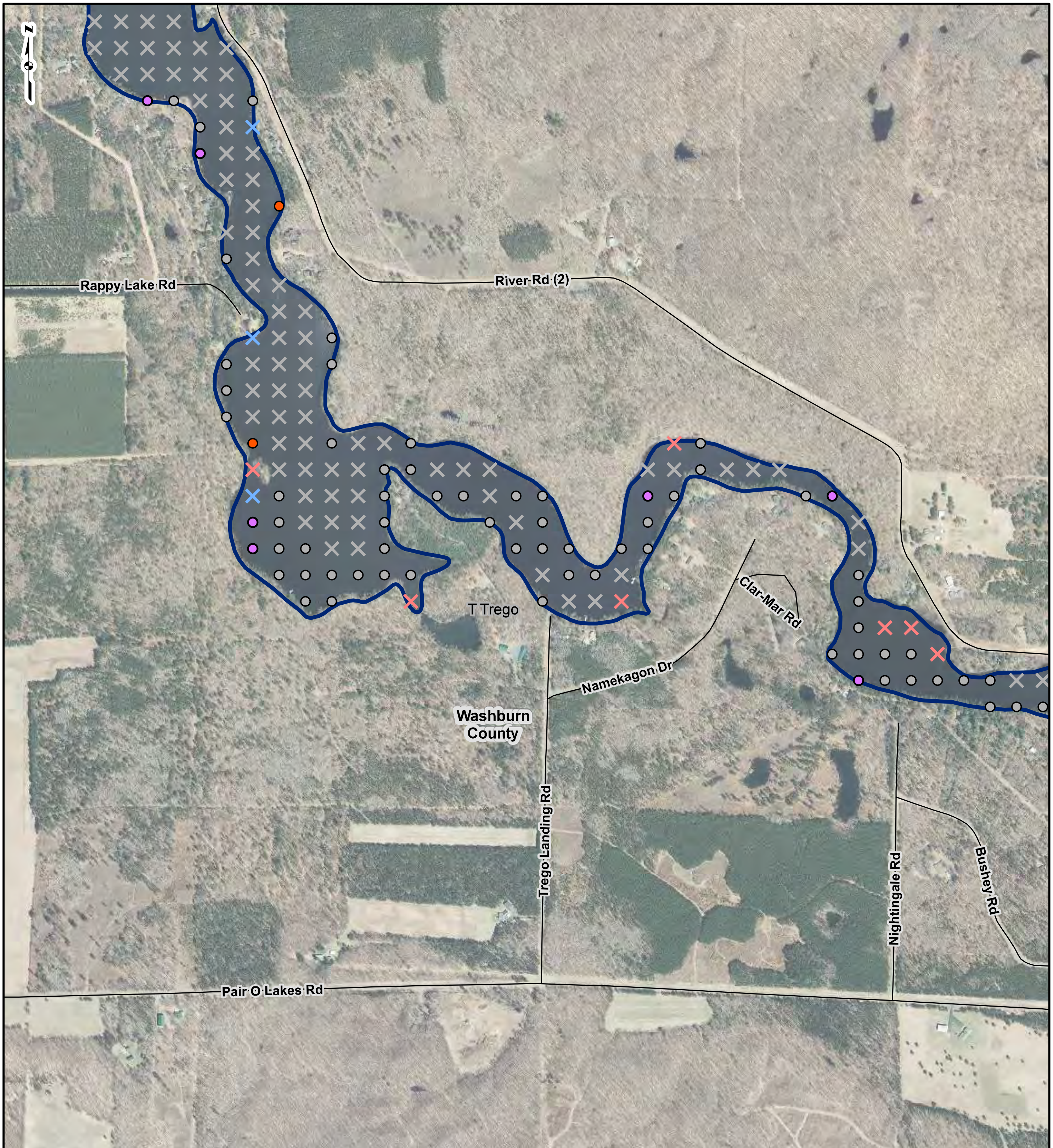
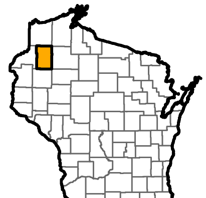


PROJECT LOCATION



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

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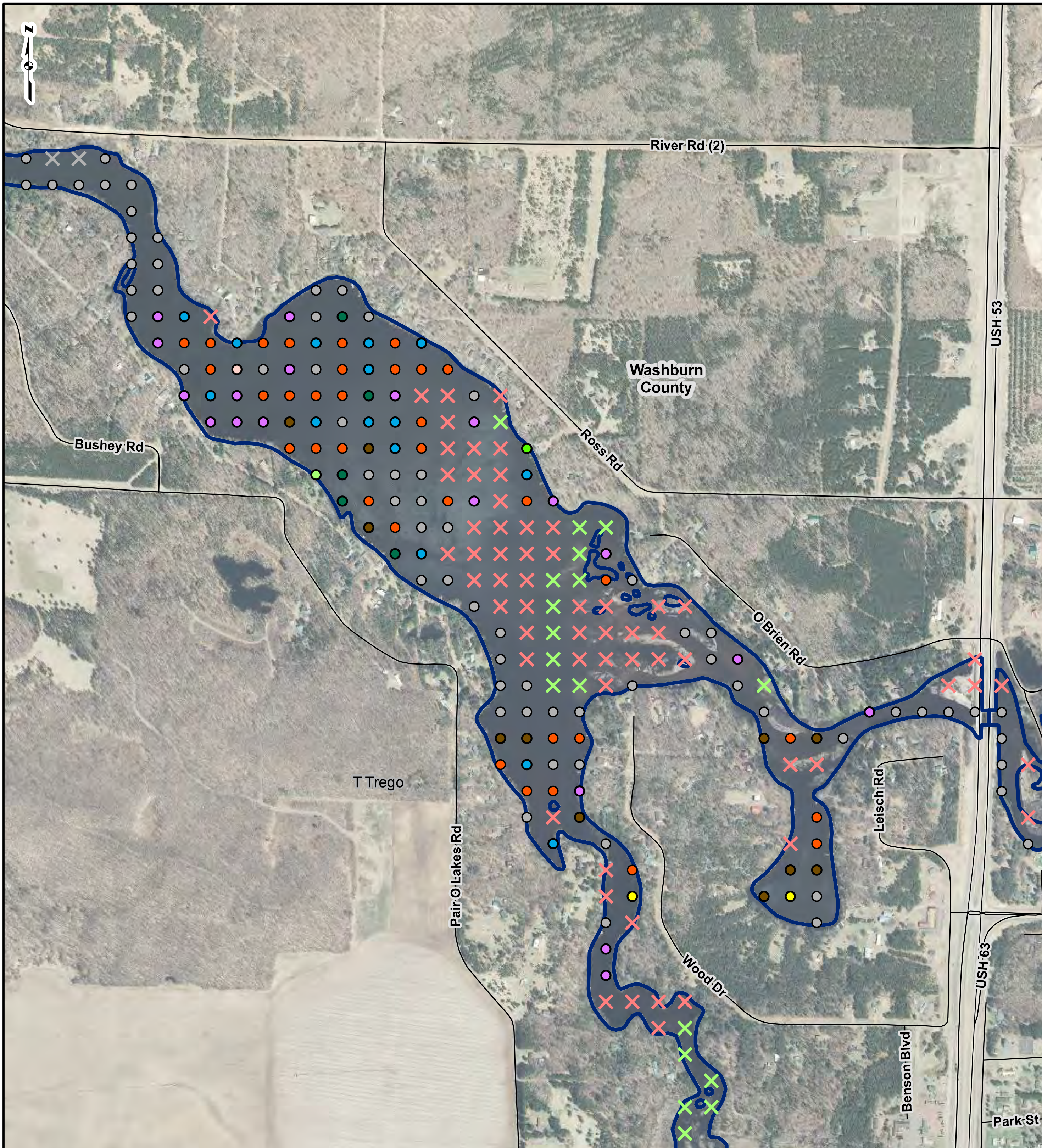

PROJECT LOCATION

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 3 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

Mead & Hunt

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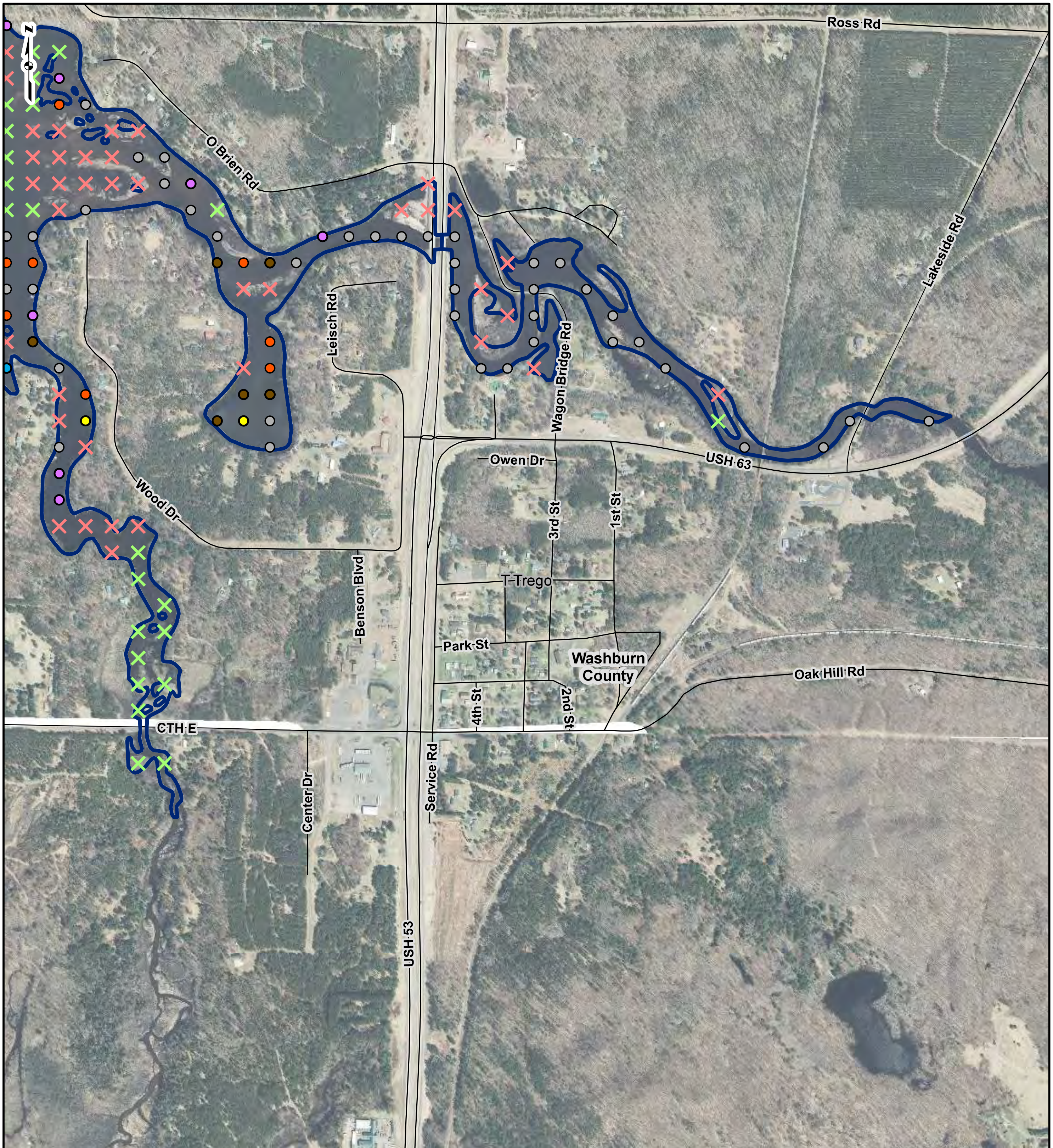
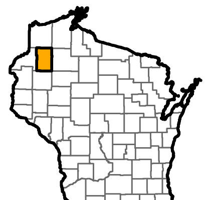


PROJECT LOCATION



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 4 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

Mead & Hunt

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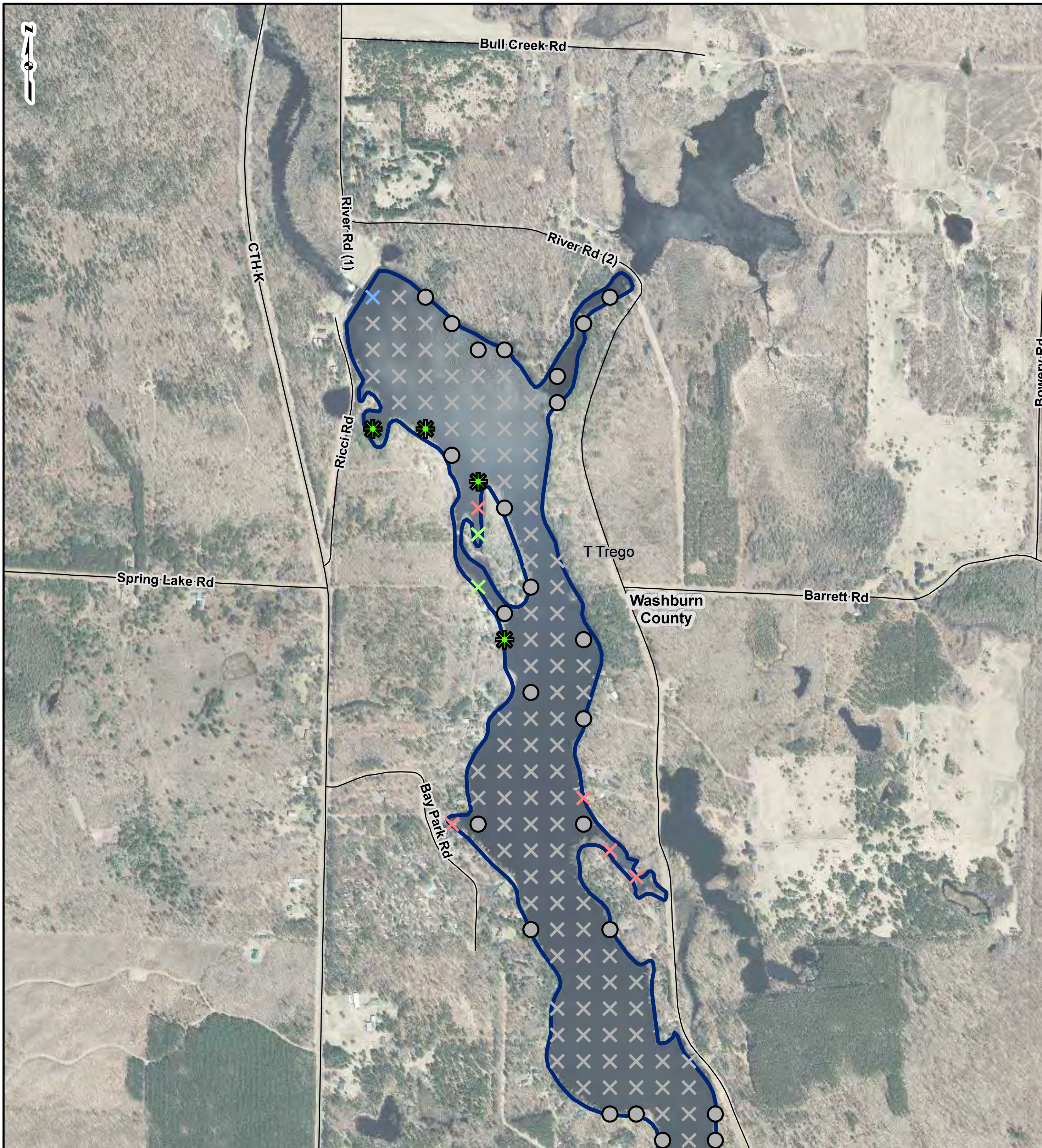
FIGURE 22

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

Mead & Hunt

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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 Centerlines, 2021.

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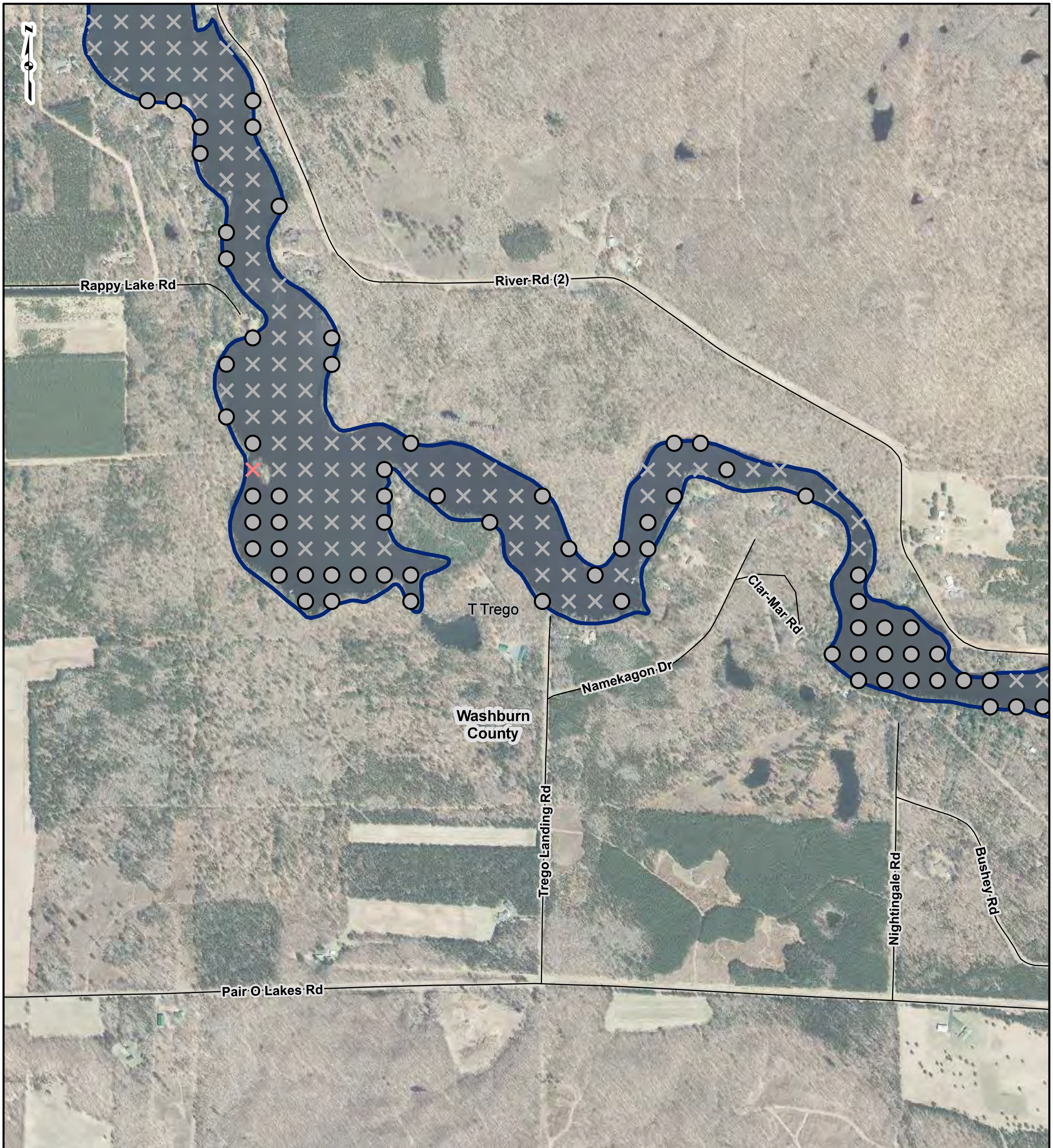

PROJECT LOCATION

WASHBURN COUNTY, WISCONSIN

LEGEND

- Deeper than Plant Growth
- Non-Navigable Vegetation
- Non-Navigable Terrestrial/ Shallow
- Other
- No Invasives Present
- Curly-leaf pondweed
- Eurasian watermilfoil
- 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

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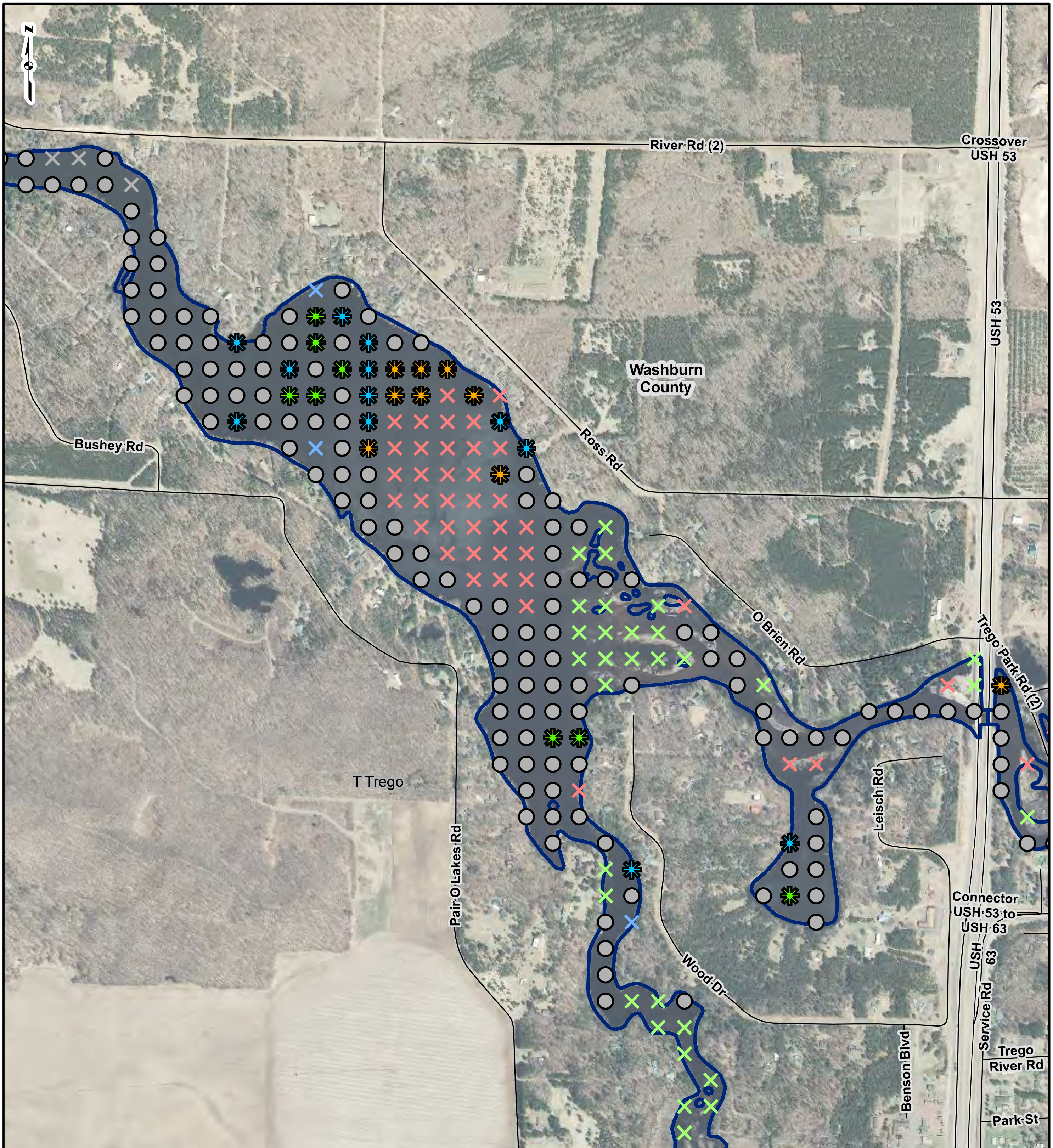

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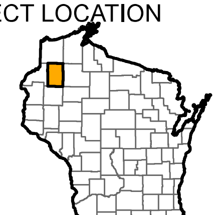

WASHBURN COUNTY, WISCONSIN

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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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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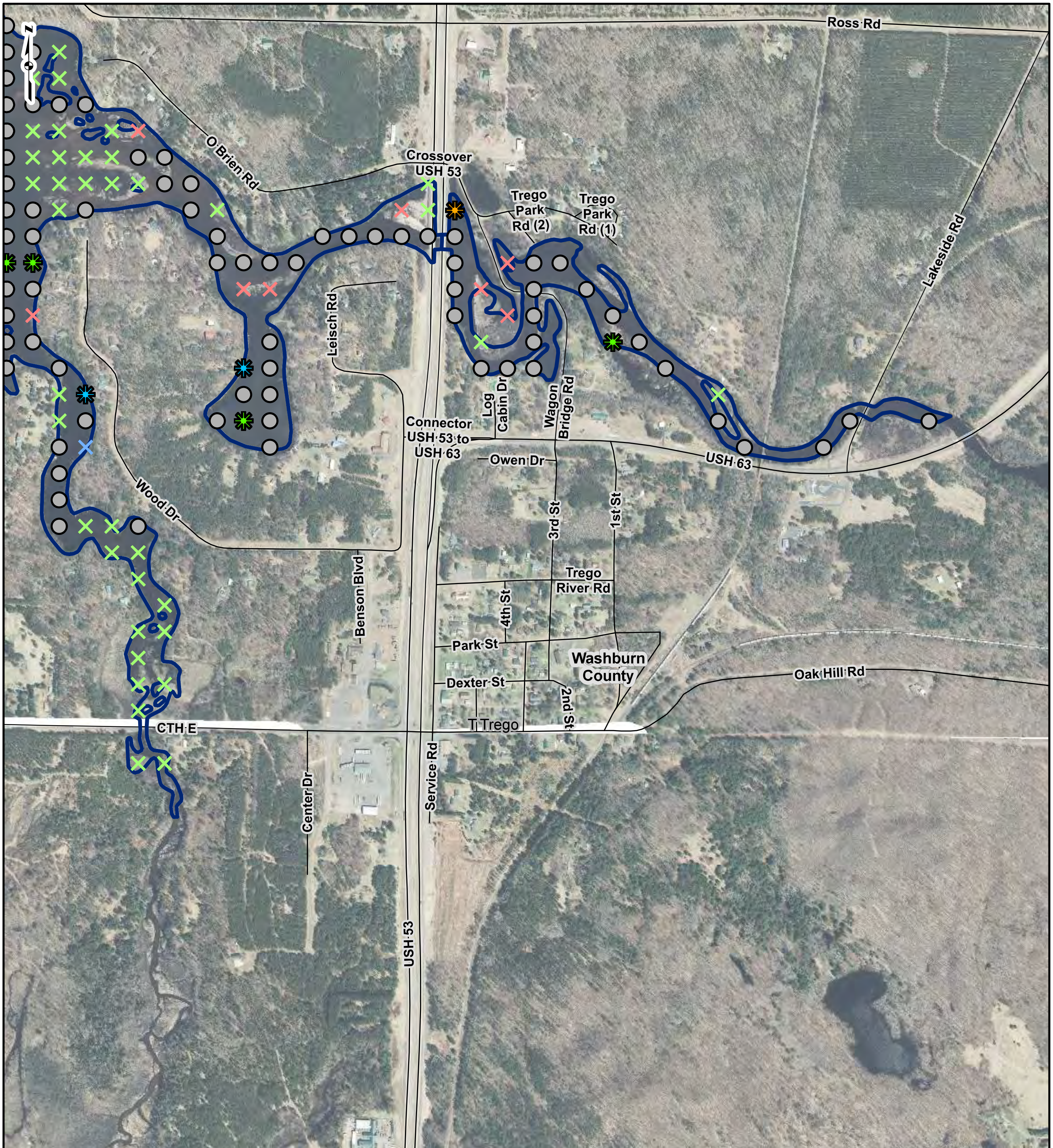
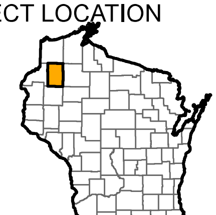


PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

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

Mead & Hunt

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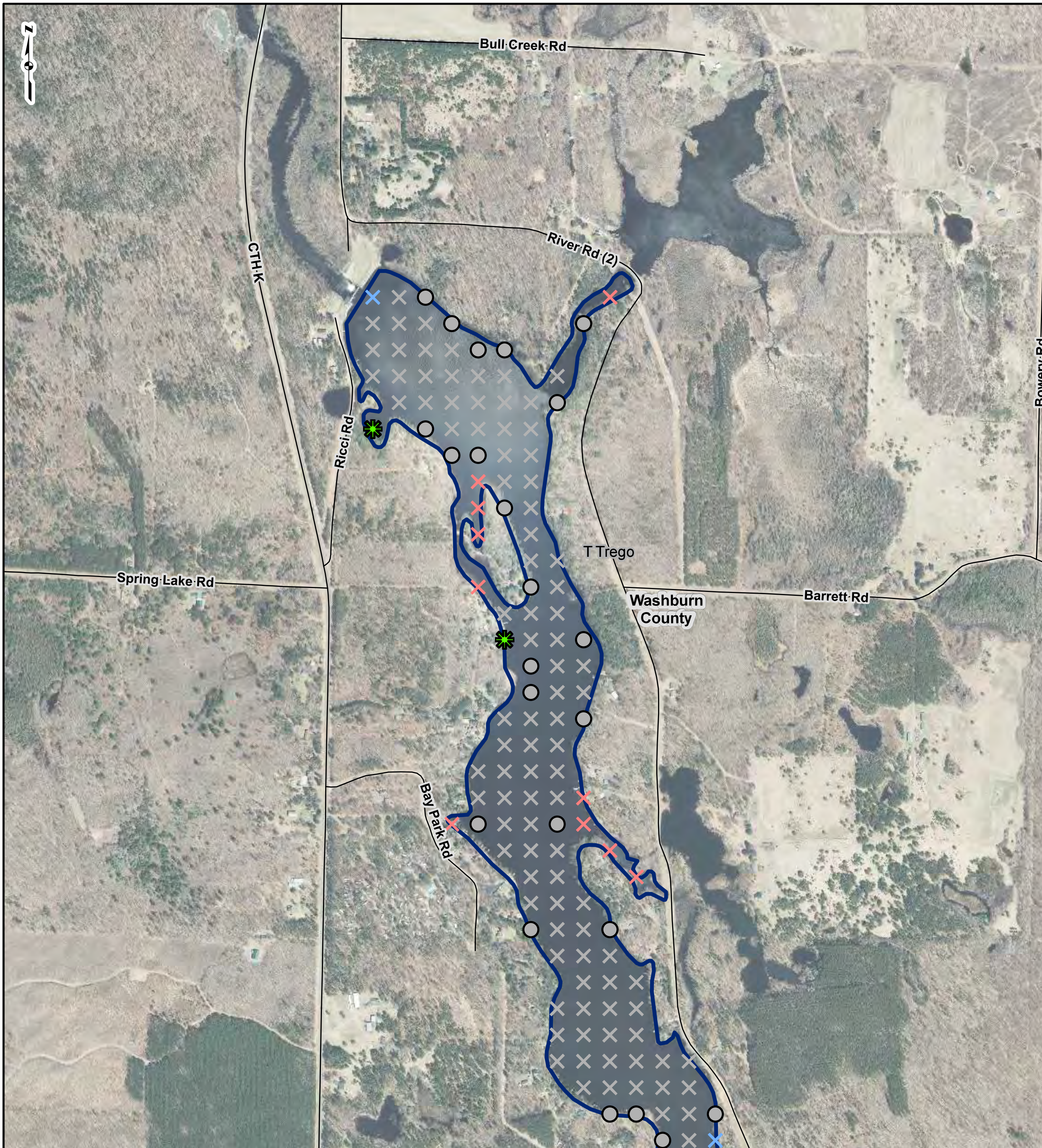
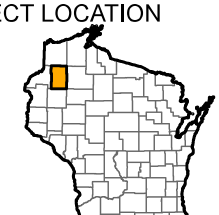
G:_2022\R220323.00 - GIS\AGP\Invasive_Mapping\Trego\R220323_00_Trego_Inv_Mapping\R220323_00_Trego_Inv_Mapping.aprx

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

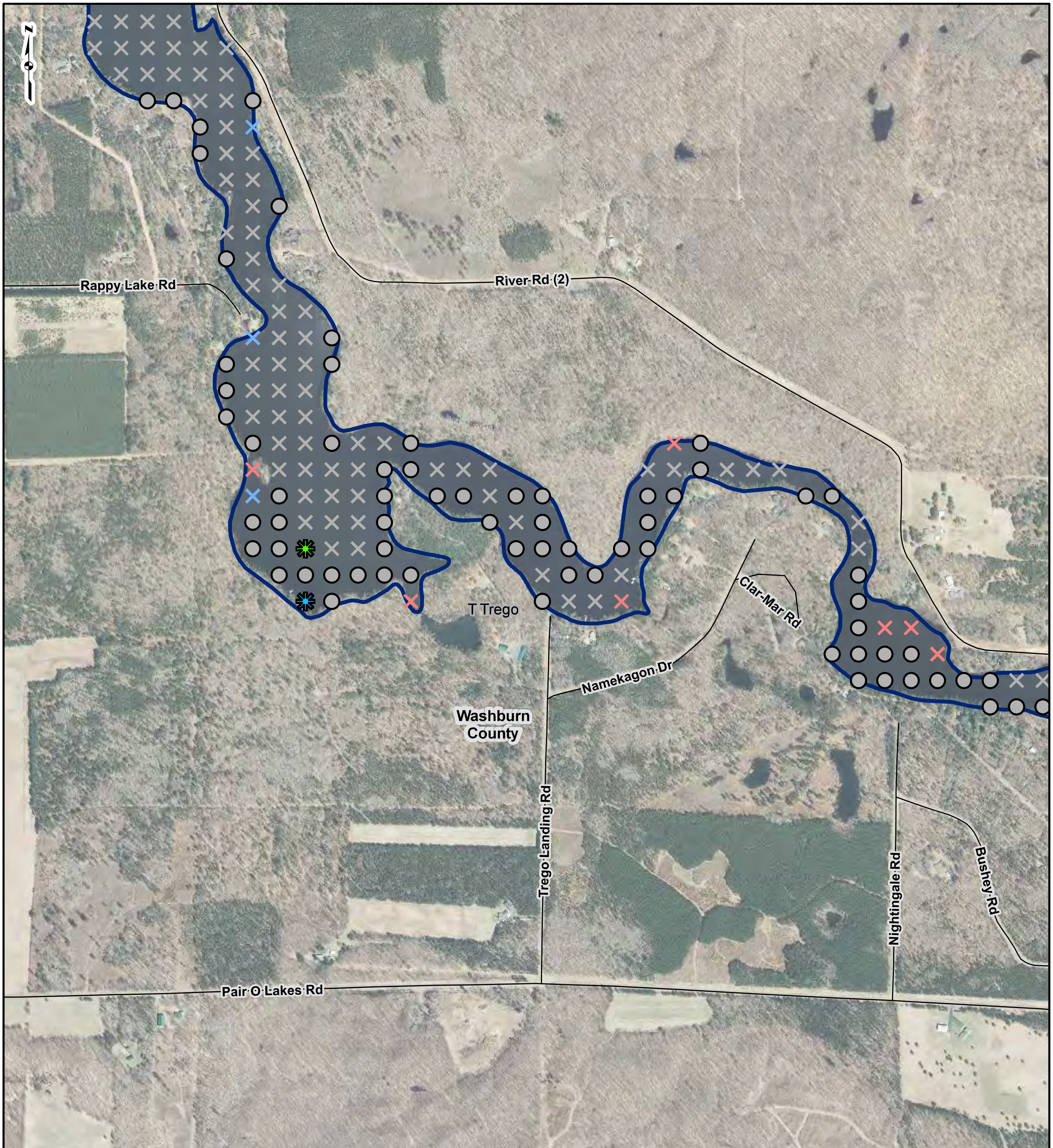
Figure 23
July/August
Aquatic Invasive Species
Sheet 1 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

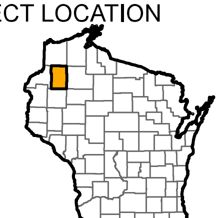
DRAWN BY: EMW DATE: 10/27/2022
CHECKED: TDB APPROVED: LLS

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
- 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 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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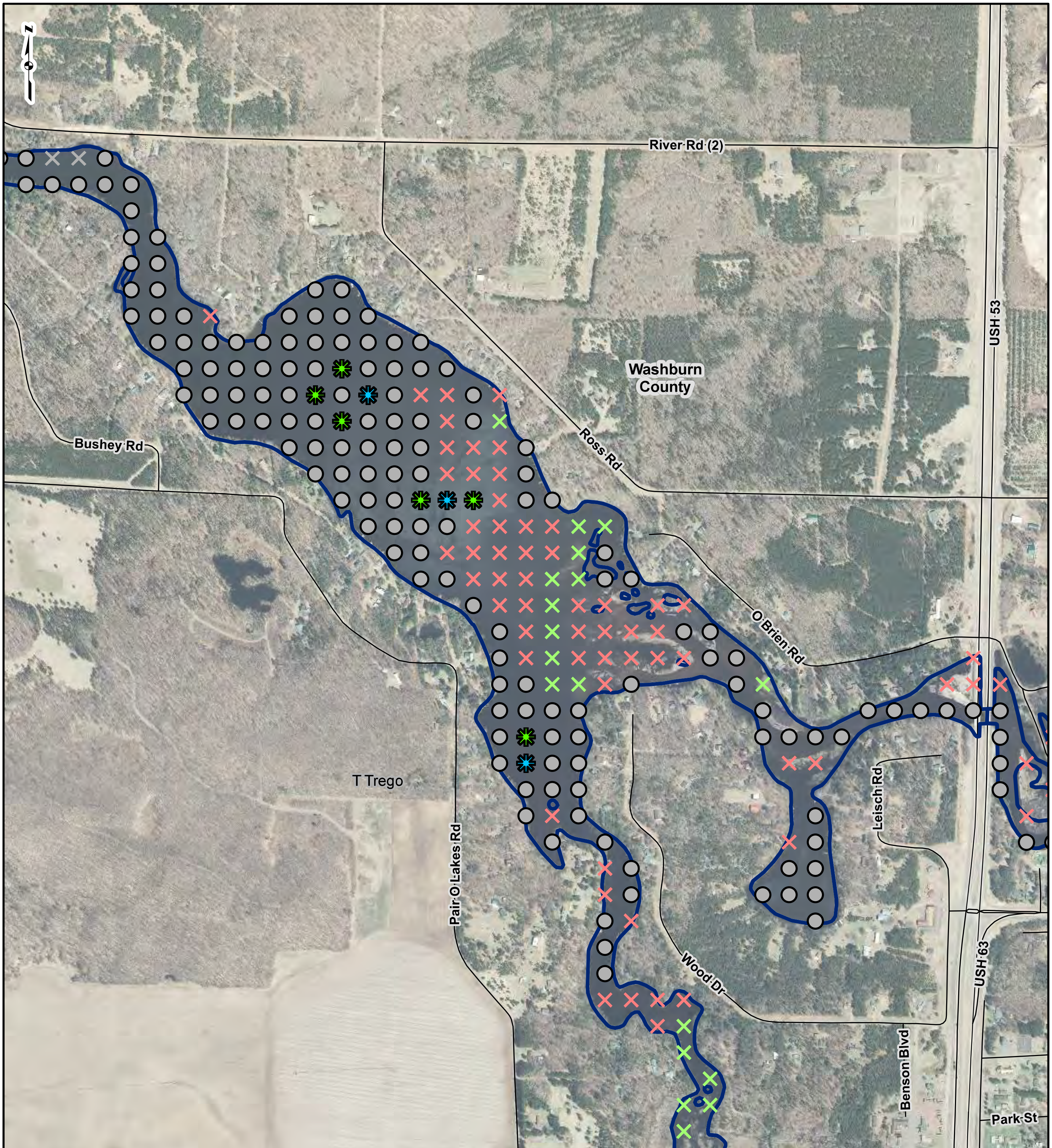
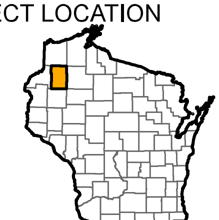


PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

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

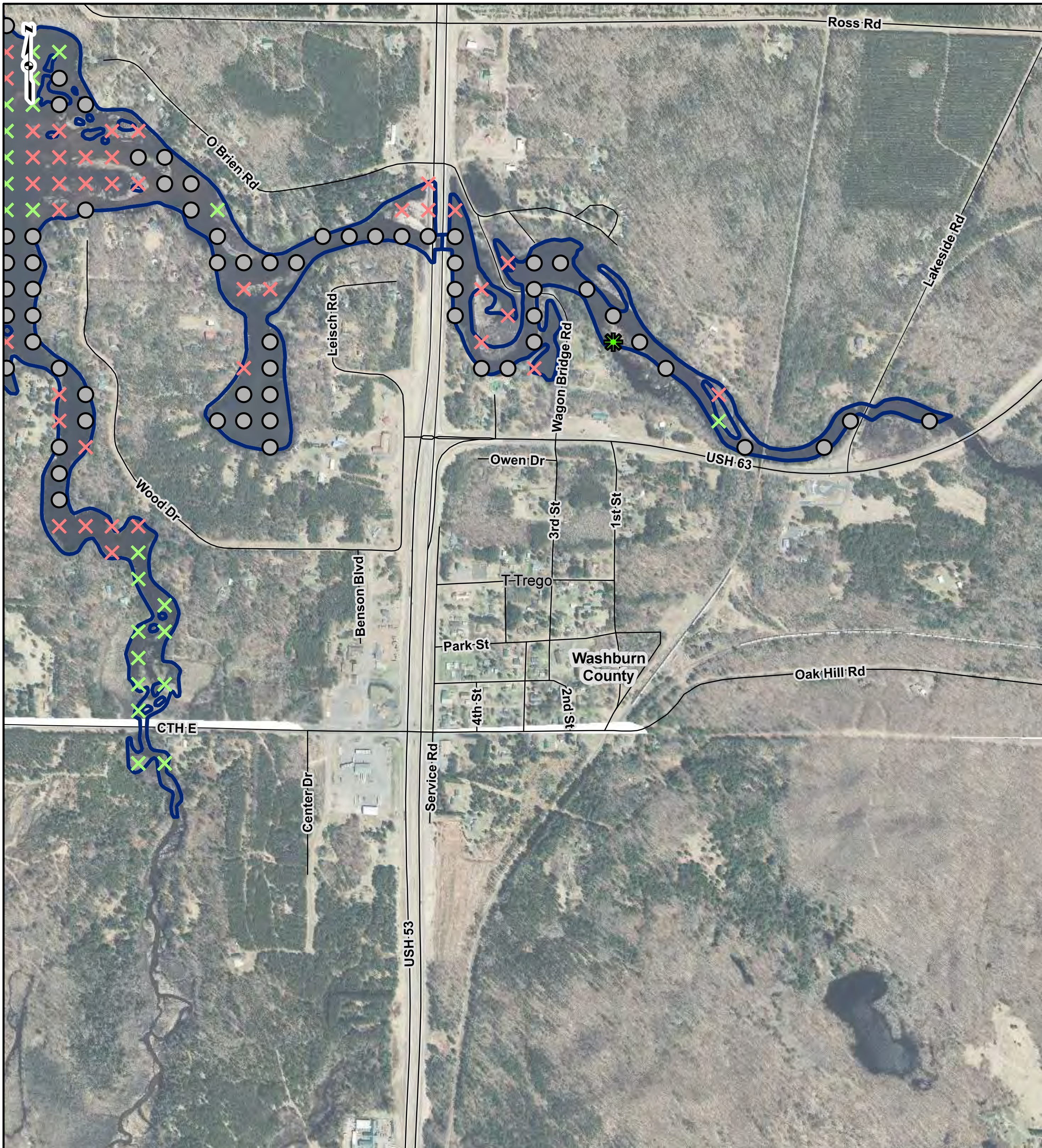
Figure 23
July/August
Aquatic Invasive Species
Sheet 3 OF 4

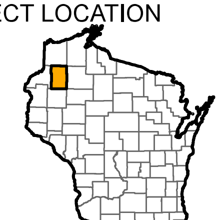
Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

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





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

Mead & Hunt

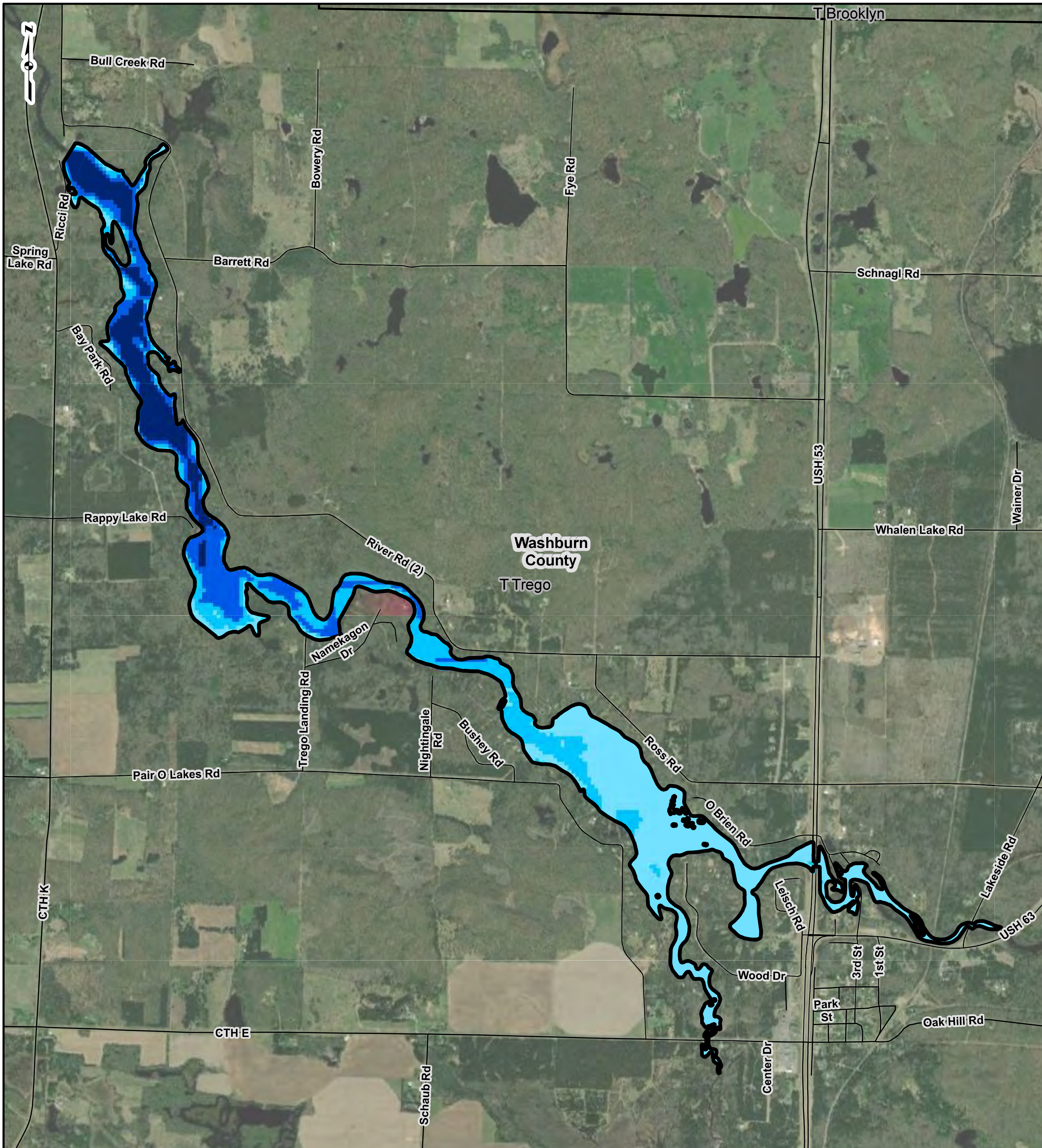
DRAWN BY: EMW | DATE: 10/27/2022
CHECKED: TDB | APPROVED: LLS

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

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

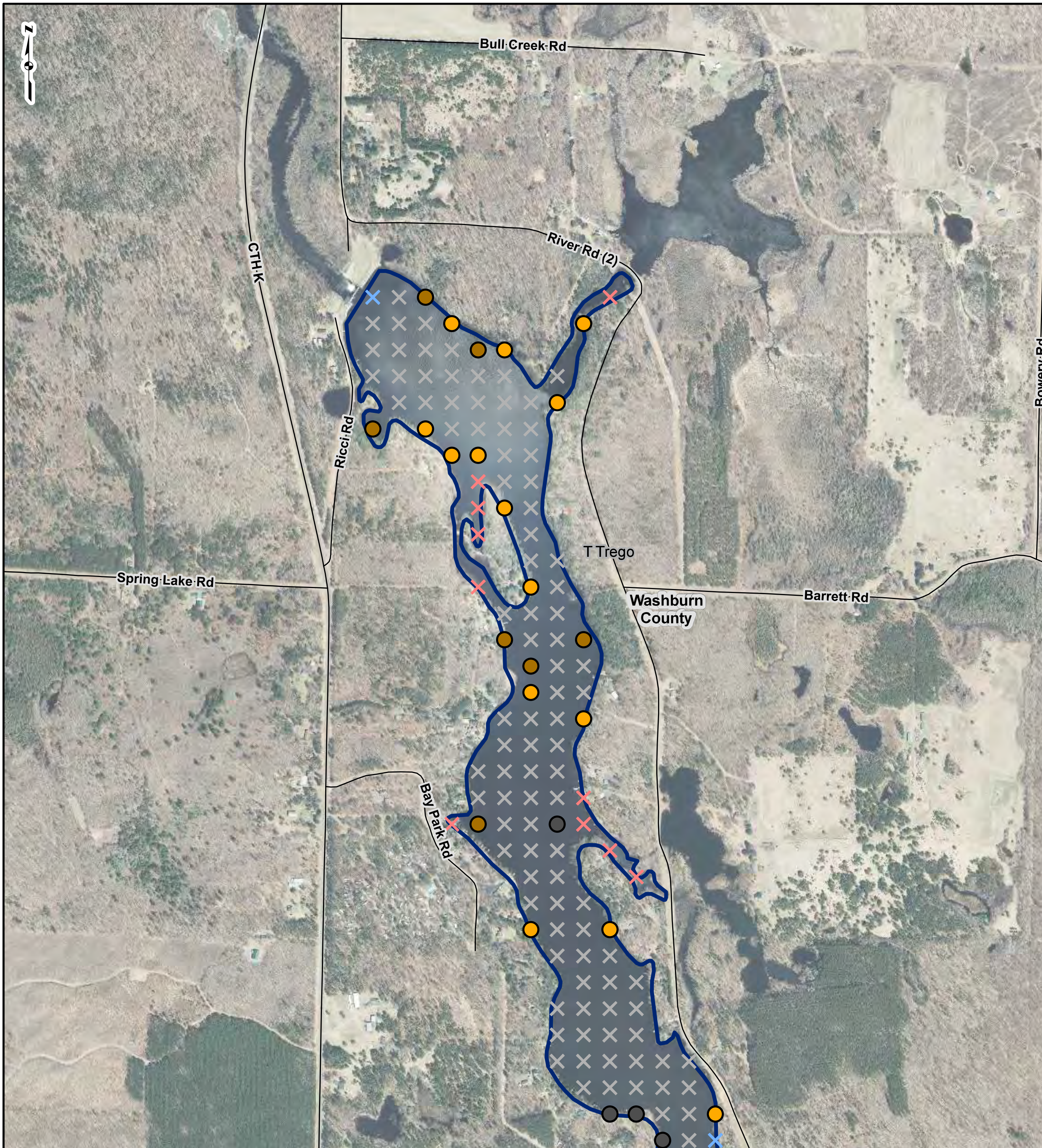
Mead & Hunt

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

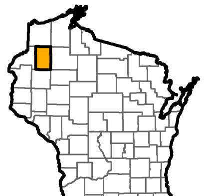
REFERENCE: ESRI WORLD IMAGERY 2021, Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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.

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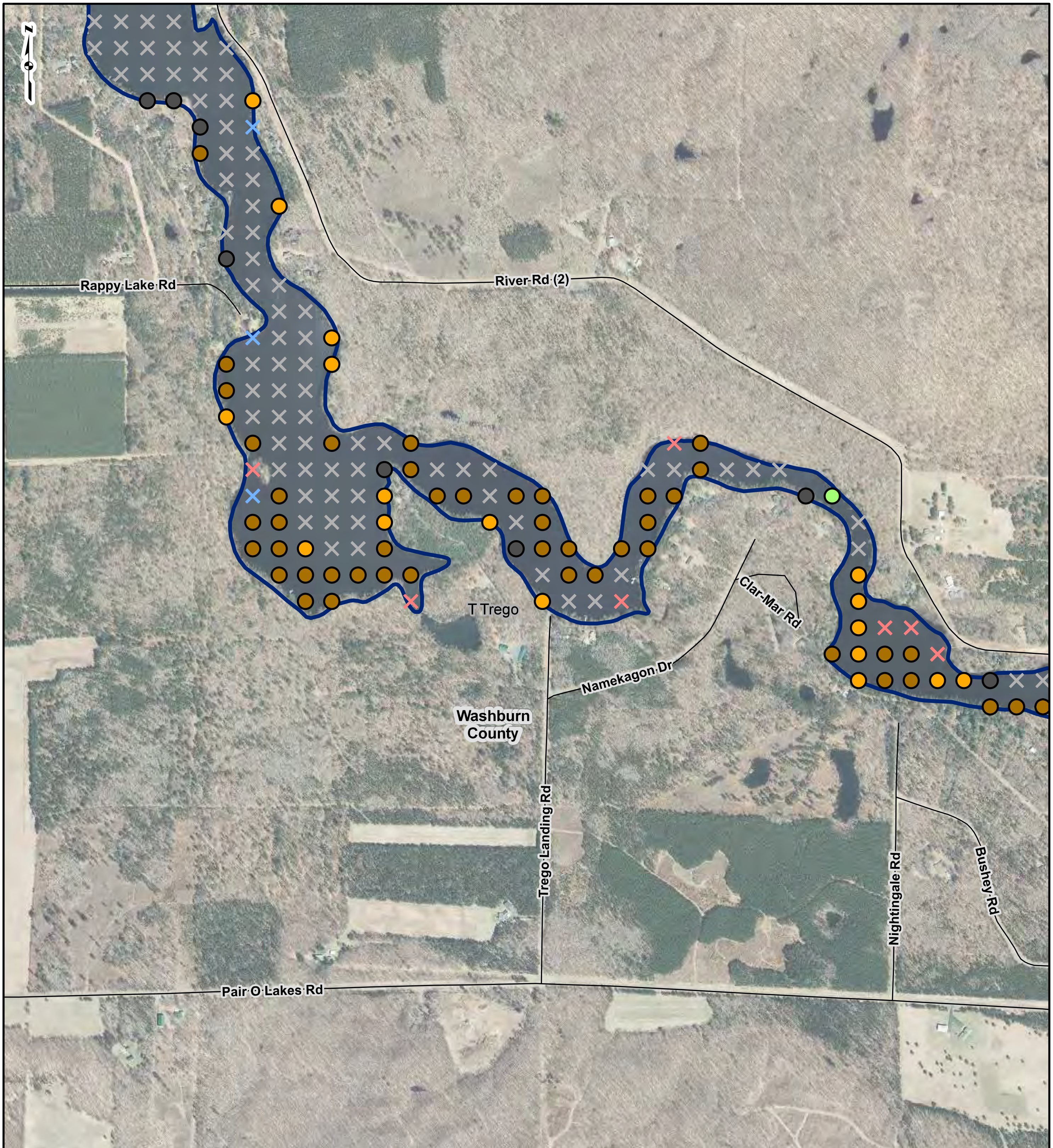

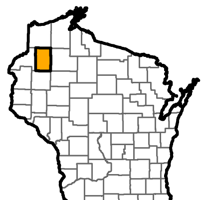

LEGEND

- 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

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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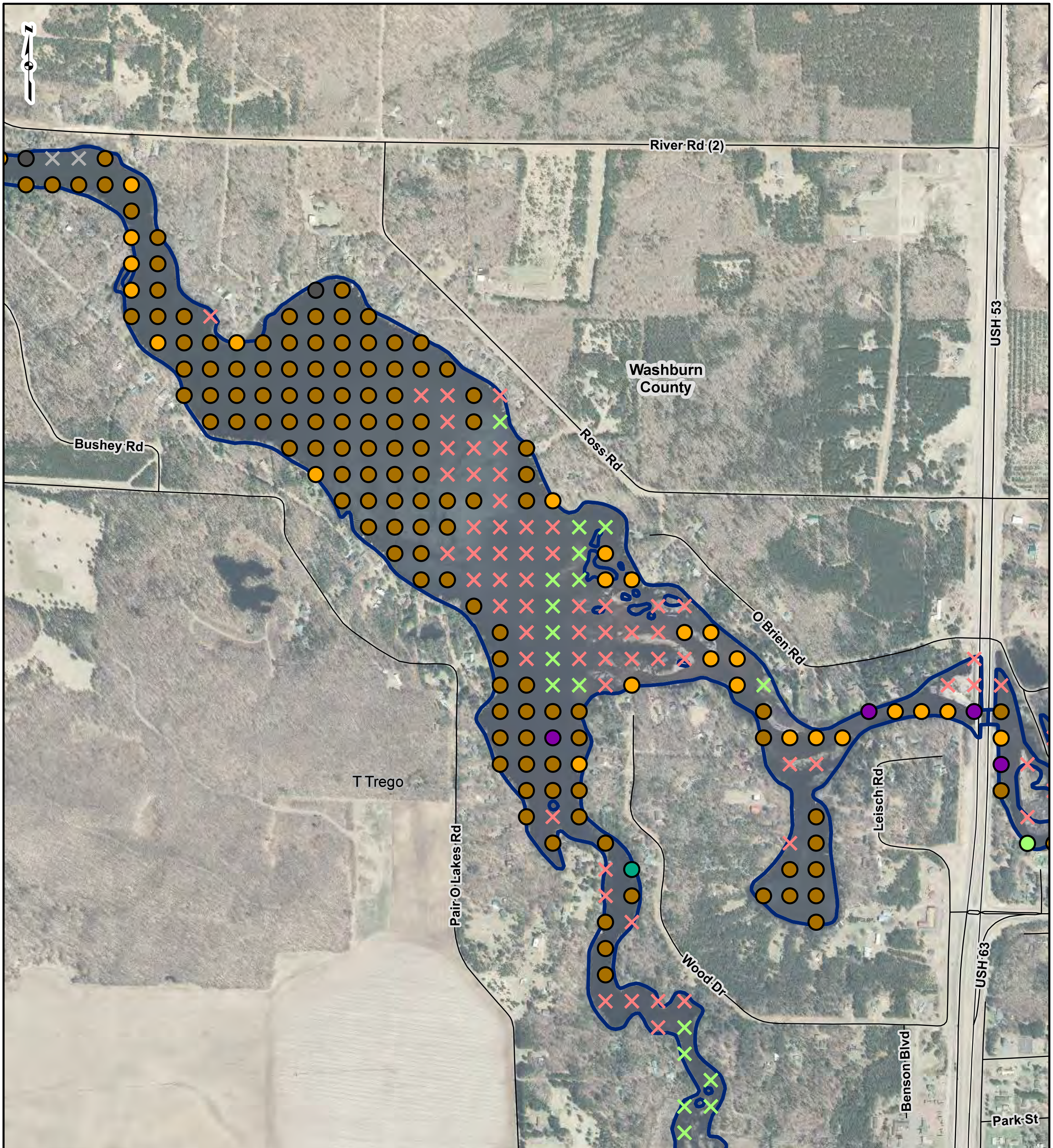
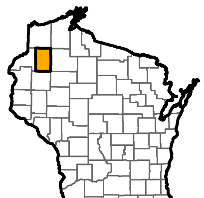


PROJECT LOCATION



WASHBURN COUNTY, WISCONSIN

LEGEND

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

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

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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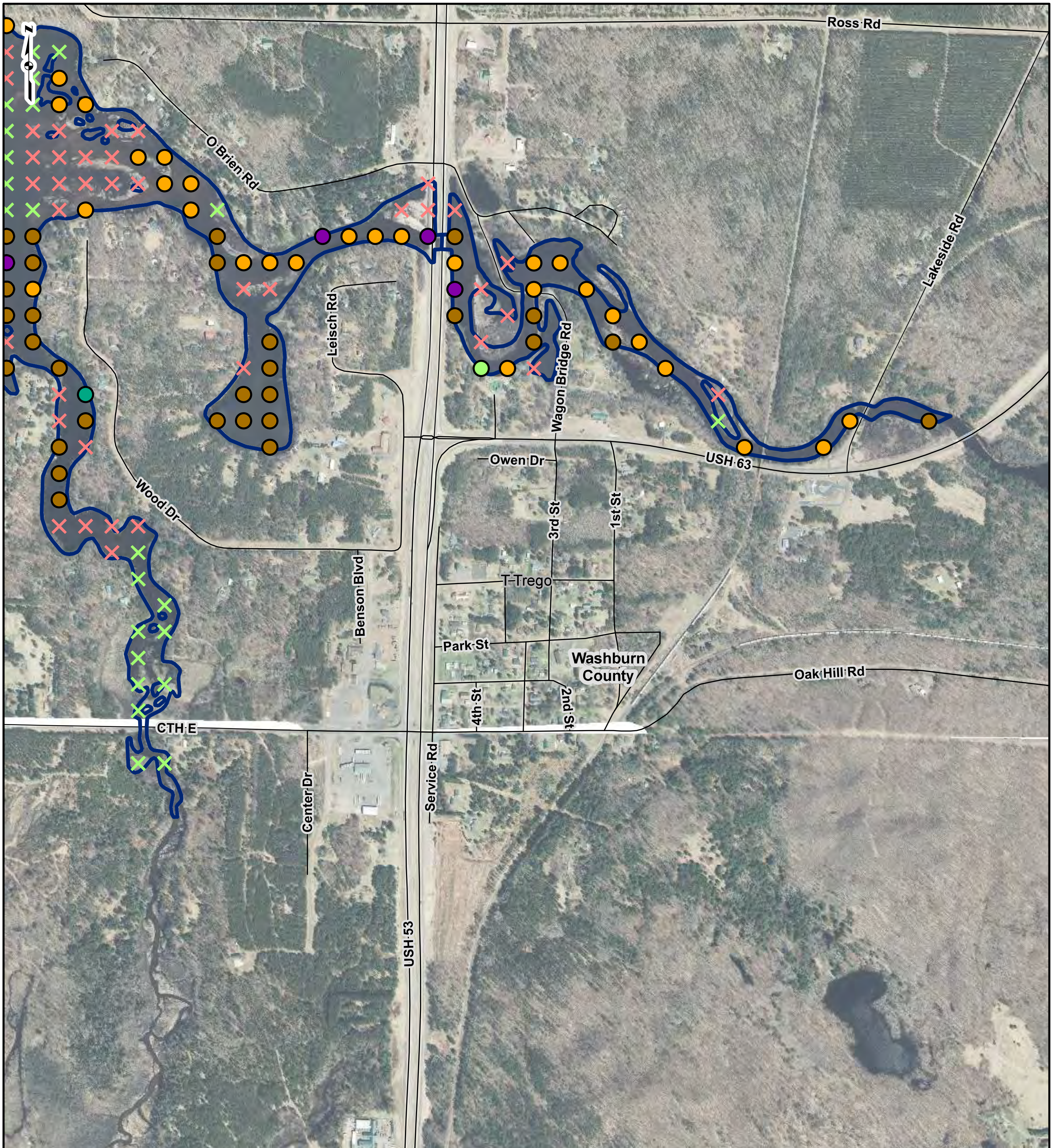


PROJECT LOCATION

WASHBURN COUNTY, WISCONSIN

LEGEND

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

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

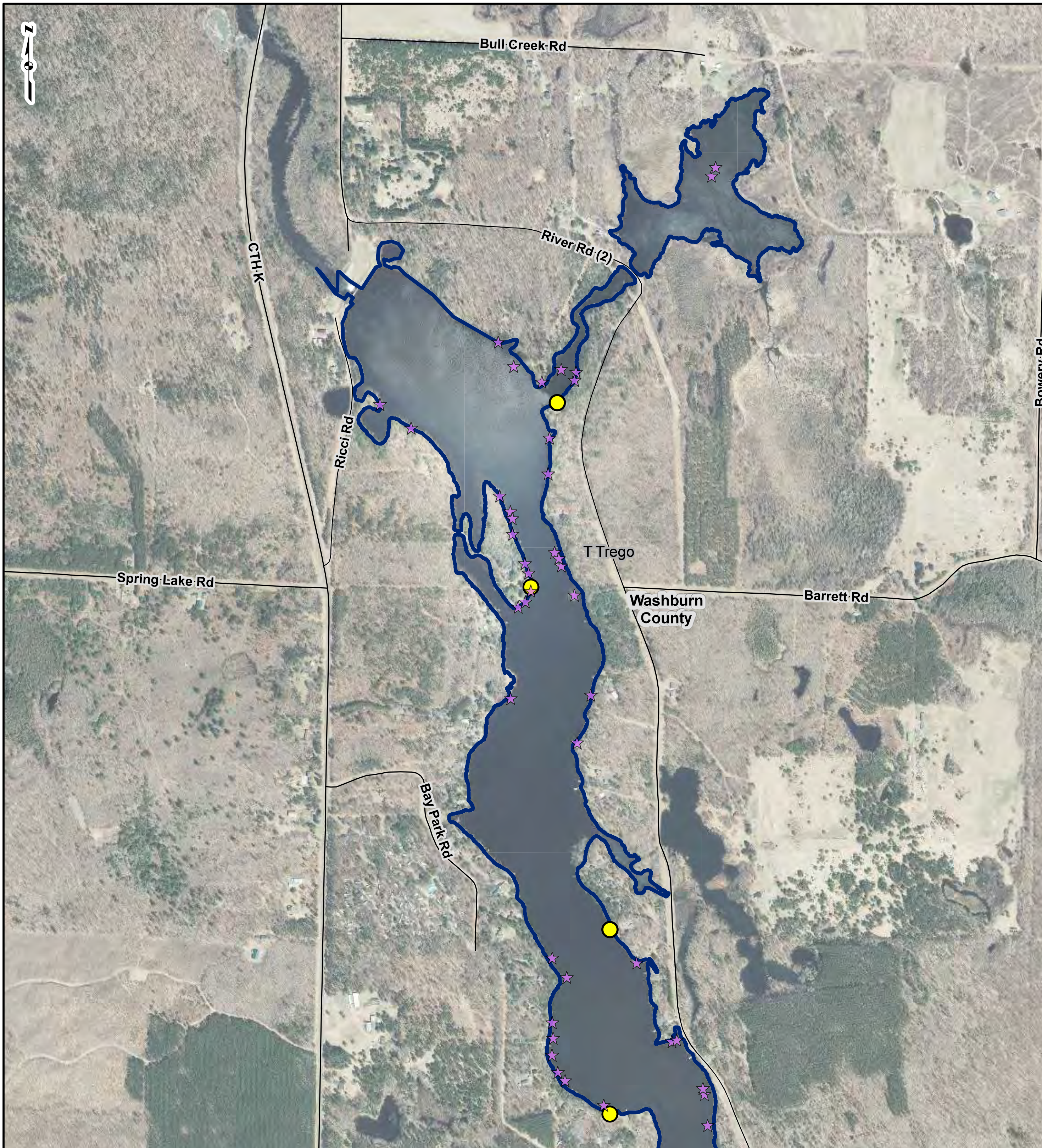
Mead & Hunt

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

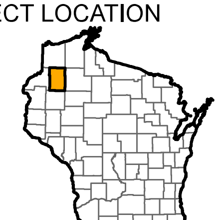
REFERENCE: DW_Image\EN_Image_Basemap_Leaf_Off: Accessed 10/27/2022. WDNR Counties, 2011. WISLR Community Boundary 2021. WISDOT Road Centerlines, 2021.

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

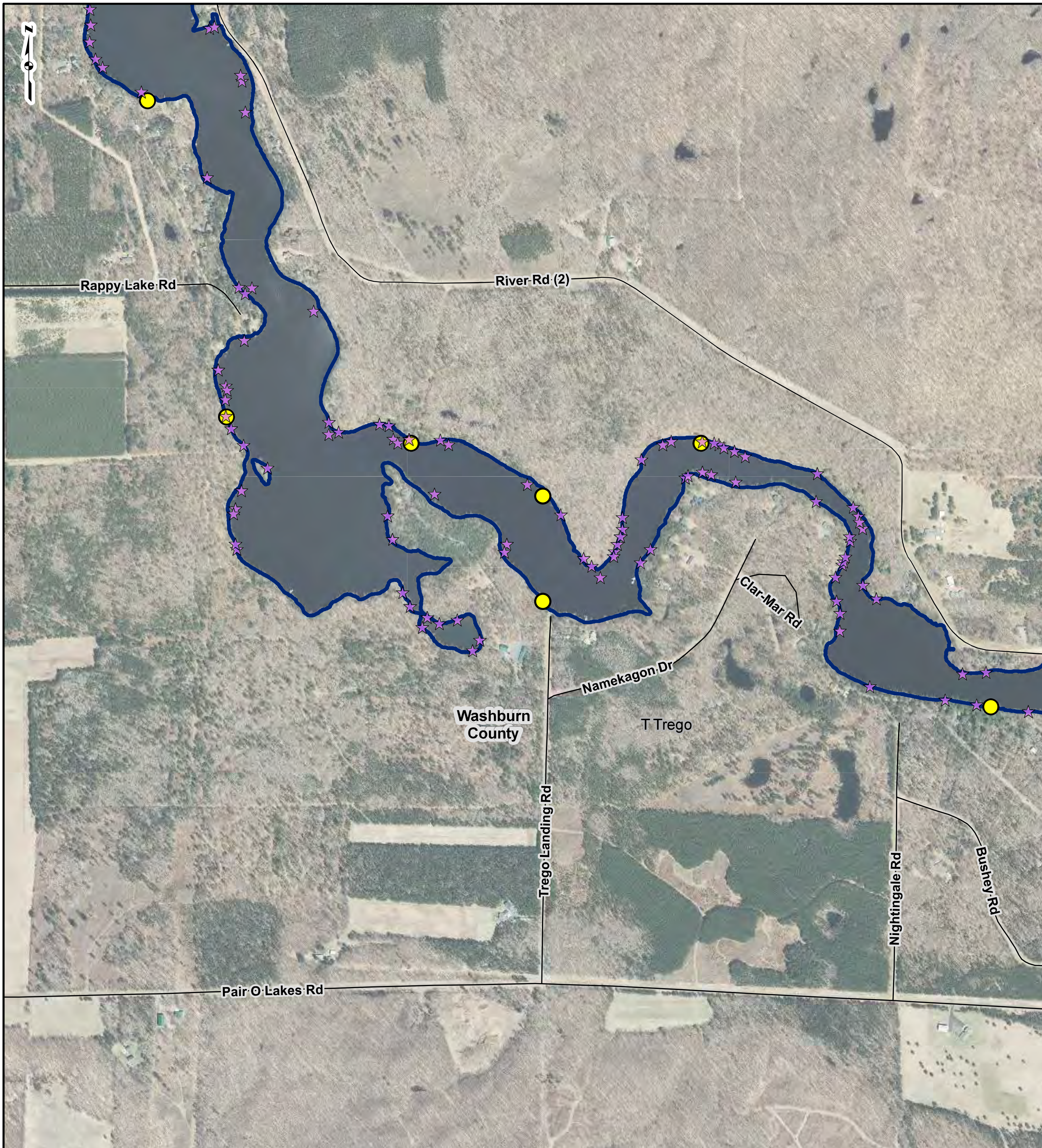
Figure 26
Coarse Woody Debris/Habitat
Sheet 1 OF 4

Trego Hydroelectric Project
Aquatic and Terrestrial
Invasive Species Study

DRAWN BY: EMW
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



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
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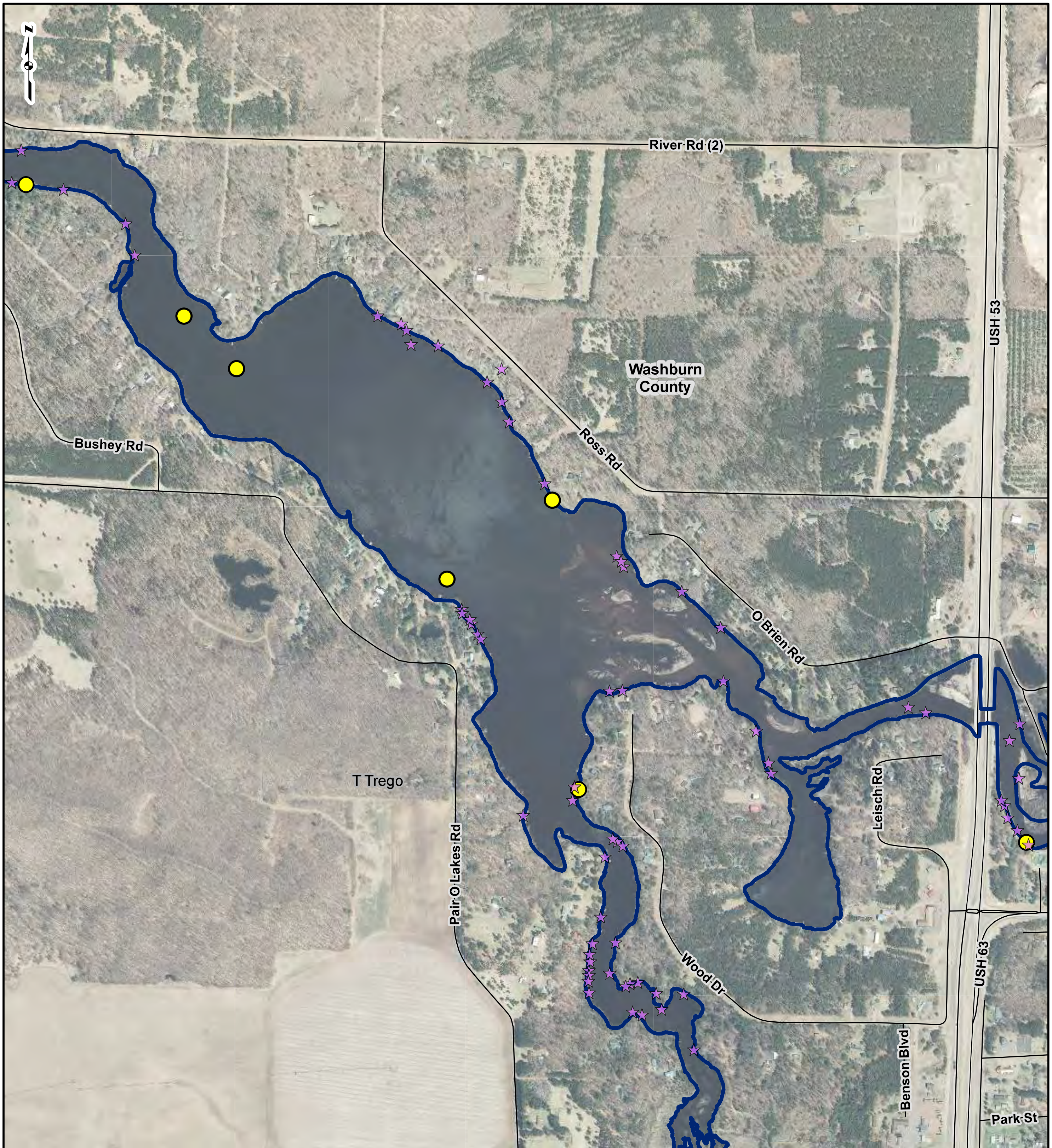
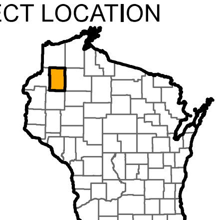


PROJECT LOCATION



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 3 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.

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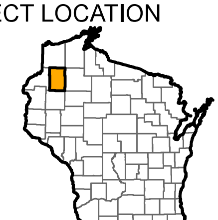
PROJECT LOCATION



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)	Ceratophyllum demersum	Myriophyllum sibiricum	Myriophyllum spicatum	Sparganium eurycarpum	Potamogeton Richardsonii	Nymphaea odorata	Potamogeton ~~[illegible]~~ gramineus	Potamogeton zosteriformis	Potamogeton Robbinsii	Elodea Canadensis	~~Bidens beckii~~ Vallisneria Americana	Nuphar variegata	Lemna Trisulca	~~Chara~~ Nitella	P. crispus	Heteranthera dubia
254	>11	–	–	–	–	–																
285	5.5	R	R	Cobble	Ø	N																
286	>10	–	–	–	–	–																
317	past dam	bouy's –			–	–																
318	4	S	R	sand	Ø	wood pilings	note - Lots Chinese mystery snail															
255	>10	–	–	–	Ø	–																
256	9.6	R	R	Gravel	Ø																	
224	>10	–	R	–	–	–																
197	5.6	S	R	sand	Ø	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	Ø	Y [illegible]																
119	3.0	S	R	Sand	Ø	Y [illegible]						V	N									
120	7.5	S	R	Sand	Ø	Y																
104	0.5	S	R	Sand	Ø	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			1				1	1	1	1		V	1	1	1	1
75	1.9	S	R	sand	1	N		1		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		
57	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													
229	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	0																	
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					2											
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		2	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	0																	
306	11.0 N	M	R	muck	0																	
249	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 spicatum	M. sibericum	Potamogeton crispus	Elodea canadensis	Nitella	Heteranthera dubia	P. zosteriformis	Nymphaea odorata	Nuphar variegata	P. robinsi	P. amplifolius	Lemna trisulca	Bidens beckii	P. praelongus	Vallisneria americana	P. epihydrus	P. friesii	P. gramineus	Equisetum sp	Sparganium eurycarpum	Typha	Utricularia vulgaris	P. spirillus	P. richardsonii	Sagittaria 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	0																										
180	14.0 N	M	R	muck	1						1																				
179	10.4 N	M	R	muck	1						1																				
178	10.4 Y	S	R	sand	0																										
175	6.5 N	S	R	Sand	0																										
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									1															
226	6.5 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		
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	2.5	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 Jost + 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. robbinsii	P. amplifolius	Lemna trisulca	Bidens beckii	P. praelongus	Vallisneria 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	9.4	Y	M	R		1								1										
110	10	N	M	R		1						1												
111	9.4	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	0																		
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	0																		
150	4.3	N	S	R	sand	0																		
152	9.4	Y	S	R	sand	0																		
153	6.9	N	M	R	muck	2		2		1				1					1		1			
154	10	Y	M	R	muck	0																		
155	9	N	M	R		1	1	1				1		1							1			
156	7.5	M	M	R		2	2	1			1		1								1			
157	7.9	N	M	R		1					1	1		1										
158	5.6	N	S	R	sand	1	1							1										
184	1.0	N	S	R	sand	0																		

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 Spicatum	M. sibiricum	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. ~~Stri~~ Stric.	
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		0																					
90	4.5	N	S		sand	0																					
59	10.5	Y	S		sand	1	1																				
60	10.5	Y	S		sand	0																					
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		–	–	–																						
86	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	0																					
91	10.4	Y	S		sand	0																					
106	6.5	Y	S		sand	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 fluctuans	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	1	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	N	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	4.8	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 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. gramineus / P. Fries.	Lemna minor / Spirodela polyrhiza	Wolffia / Ranunculus aquatilis	Eleocharis palustris / Stuckenia pectinata	Potamogeton natans					
435	4.3	N	M	P	org	2	1		1	1		2	1											
446	7.1	N	M	P	org	2						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	1 V	1	2			1 1	1							
465	2.0	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		1 V				1	1 1	1 1	1						
480	3.0	N	M	P	org	1	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			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	6.0	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	4.6	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	0																		
167	5.1	N	M	P	org	1	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 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. gramineus / P. fresii	Lemna minor / Spirodela polyrhiza	Wolffia / Sparganium sp.	P. richardsonii / P. natans					
141	2.0 N	M	P	org	2			2		filamentous												
118	0.8 N	M	P	org	1							1										
101	2.0 Y	M	P	org	1							1				1						
100	3.3 N	M	P	org	1			1	1													
115	2.5 Y	M	P	org	1				1		1	1										
139	2.4 N	M	P	org	1						1	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	2	1		2	1													
166	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 N	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										
281	4.0 N	M	P	org	1	1		1	1													
315	7.5 N	M	P	org	0																	
426	6.4 N	M	P	org	1						1											
427	2.7 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											
442	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)	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	Raphydrus	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					
280	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			
289	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							
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

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 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. [illegible]	P. hillii
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	10.2 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 N	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	7.1 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																			
309	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			
373	4.4 N	M	R	org	1	1				1			1			1		1						

Calla palustris growing along 3 [illegible]

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 sp.	Sparganium eurycarpum	Sparganium sp.	Ranunculus aquatilis	P. [illegible]
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															
390	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										
443	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)	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. friesii	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	Ø																		
362	8.0	N	M	P	org	Ø																		
363	6.5	N	M	P	org	Ø																		
383	7.0	N	M	P	org	Ø																		
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	3.0	N	M	P	org	1		1	1			1	1											
384	4.0	N	M	P	org	1			1	1			1											
364	10.0	N	M	P	org	Ø																		
342	35	N	M	P	org	1									1									
344	6.3	N	M	P	org	1							1											
365	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	Ø																		
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	Y	M	P	org	Ø																		
316	3.6	N	M	P	org	1	1			1			1		1									
345	6.9	N	M	P	org	1	1		1				1		1									
366	6.8	N	M	P	org	3			3	1														
386	5.6	M	M	P	org	1	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											
425	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

gai consultants
transforming ideas into reality

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

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	Najas 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
Y	147	7.6	S	P	sand	0																			
-	146	10.6	-	-	-	-																			
-	145	18.8	-	-	-	-																			
-	144	16.3	-	-	-	-																			
N	170	1.8	M	P	org	1															1				
N	169	14.4	S	P	sand	0																			
N	199	1.8	M	P	org	1					1														
-	198	17.1	-	-	-	-																			
-	225	17.8	-	-	-	-																			
-	257	16.4	-	-	-	-																			
Y	288	6.0	S	P	sand	1																			
Y	212	2.5	S	P	sand	1																			
-	317	NN - past bouys				-																			
-	287	17.6	-	-	-	-																			
-	286	16.5	-	-	-	-																			
-	285	NN - past bouys				-																			
-	254	16.2	-	-	-	-																			
N	255	6.0	S	P	sand	0																			
N	256	9.8	S	P	sand	0																			
N	224	10.4	S	P	sand	0																			
N	197	2.8	S	P	sand	1																			
-	168	17.6	-	-	-	-																			
N	142	13.1	S	P	sand	0																			
-	143	15.7	-	-	-	-																			
-	119	NN + temp		org	- fishing people																				
N	120	6.3	M	P	org	1																			
-	121	15.2	-																						
-	122	16.2	-																						
-	102	15.5	-																						
N	103	14.5	S	P	sand	0																			
-	88	15.3	-	-	-	-																			
N	87	3.5	S	P	sand	1			1																
N	76	5.5	M	P	org	3								3											
N	75	1.7	M	P	org	1					1			1	1						1			1	
N	64	4.0	M	P	~~sand~~ org.	2					1			1	1			1							

Sampling Point	Potamogeton natans	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	P. zosteriformis	Ranunculus aquatilis	Sagittaria sp. latifolia	Sparganium eurycarpum	Sparganium fluctuans	Sparganium spp.	Spirodela polyrhiza	Stuckenia pectinata	Utricularia minor	Utricularia vulgaris	Vallisneria americana	Filamentous algae	Equisetum sp.	Wolffia sp.
147																			
146																			
145																			
144																			
170								1											
169																			
199			1						1							1			
198																			
225																			
257																			
288																1			
212								1	1							1			
317																			
287																			
286																			
285																			
254																			
255																			
256																			
224																			
197																1			
168																			
142																			
143																			
119																			
120																1			
121																			
122																			
102																			
103																			
88																			
87																1			
76		1														2			
75					1	1			1										
64																2			

entered HL 8/24/22

Waterbody/Project: Hayward Lake

Crew: Laura Sass, Heather Lutzow

Date: 8/12/2022

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~~ Nitella flexilis	~~Brasenia schreberi~~ Bidens beckii	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	65	5.5	M	P	Org	2								2	1															1	1													
-	89	15.3	-	-	-	—																																						
N	88	13.2	S	P	Sand	0																																						
N	77	12.2	M	P	Org	1													1																									
N	66	11.3	M	P	Org	1													1																									
N	69	10.5	M	P	Org	0																																						
Y	68	11.8	M	P	Wood	0																																						
N	58	10.5	M	P	Org	1			1										1		1																							
N	57	10.0	M	P	Org	3													3																									
N	56	9.5	M	P	Org	2													2												1													
N	55	1.6	S	P	Sand	1			1			1																													1			
N	54	1.5	S	P	Sand	0																																						
N	44	2.4	S	P	Sand	0																																						
N	43	2.5	M	P	Org	2					1			1																1												2			
N	53	NN-	Terre		Obstr	—																																						
N	35	3.5	M	P	Org	2			1					1	1				1												1											1			
N	34	7.0	M	P	Silt	2					2																					1													
N	45	8.0	M	P	Silt	3	1				3																																		
N	23	4.0	M	P	Silt	3				1				1																1															
N	50	3.0	M	P	Silt	2	1			1	1							1		1										1															
N	29	5.5	M	P	Silt	3								3																1															
N	28	4.6	M	P	Silt	2				1	1			1						1										1	1													
N	30	5.0	M	P	Silt	2								3																1															
N	24	4.5	M	P	Silt	3																							|3|														
N	18	3.5	M	P	Silt	3				2				3	1															2											1			
N	19	3.6	M	P	Silt	3								1																2	1													
N	20	3.5	M	P	Silt	2	1							3																	2													
N	21	3.5	M	P	Silt	2																							|2|														
N	25	5.0	M	P	Silt	3								3																2															
N	26	4.5	M	P	Silt	3				1	1			3																	1													
N	27	4.5	M	P	Silt	2					1			2														1		1															
N	34	6.5	M	P	Silt	3	2				2																				1										1			
N	33	7.7	M	P	Silt	3	1				2																				2													
N	32	6.5	M	P	Silt	3					1																			3															
N	31	6.5	M	P	Silt	3					2																				0													

entered - HC 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	Ceratophyllum demersum	Chara sp.	~~Eleocharis acicularis~~ Najas flexilis	Elodea canadensis	Heteranthera dubia	~~Lemna minor~~ Eleocharis acicularis	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.
2	37	7.5	M	P	Silt, Org	3	1				3																				2													
2	38	8.0	M	P	Silt	2	1				2								1								1				1													
2	46	8.5	M	P	Silt	3													3																									
2	47	9.0	M	P	Silt	2													2																									
2	48	9.0	M	P	Silt	2													2											1	1													
2	39	7.5	M	P	Silt	3	3																								1													
2	40	8.5	M	P	Silt	2	2				1								1												1													
2	41	8.0	M	P	Silt	3					3																1				1													
2	42	3.0	M	P	Silt	3			2		2			1																	1										2			
2	49	9.5	M	P	Silt	2					1								2																									
2	50	8.5	M	P	Silt	2	3				1																				1													
2	51	6.6	M	P	Silt	3	2				1								1			1					1														1			
2	52	4.5	M	P	Silt	2								2																											2			
2	106	8.0	M	P	Silt	2																	2																		2			
2	125	7.5	M	P	Silt	2	2				1			1			1																											
2	123	9.5	M	P	Silt	1													1																									
1	127	15.0	-	-	-	-																																						
2	151	14.[illegible]	M	P	Org	0																																						
2	150	3.0	S	P	Sand	1							1		1												1																	
2	175	8.0	M	P	Org	2																																			2			
2	174	1.8	M	P	Org	2					2						1			1					1								1								1			
2	173	1.5	M	P	Org	1																											1											
2	149	4.5	M	P	Org	2			1																				3												2			
2	172	2.0	M	P	Org	2			1			1	1		1	1																	1											
2	200	2.0	M	P	Org	1			1						1		1			1	1												1								1			
2	201	5.0	M	P	Org	2			1					1			2													1	1													
2	202	10.0	M	P	Org	2	1				2								1																									
2	227	1.8	S	P	Sand	1							1				1																					1			1			
2	260	3.6	SM	P	Org	2						1					1				1																				1			
2	259	5.3	S	P	Sand	1						1					1																								1			
2	258	5.9	SM	P	Org	2											1												2												1			
2	289	4.0	M	P	Org	2			1								1								1				1												1			
2	290	8.0	M	P	Org	2	1										1												2															
2	291	5.0	M	P	Org	2			1								1												1												1			
2	219	2.0	M	P	Org	2					1						1												2															

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	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	309	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	~~silt~~ org	2			1					1																											2			
N	201	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																																						
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	-	-	-	-																																						
-	69	17.0	-	-	-	-																																						
N	59	0.5	M	P	org	1													1																									
N	100	11.0	M	P	org	2													2																									
N	101	10.5	M	P	org	2													2																									
N	102	10.0	M	P	org	2													2																									
N	62	2.2	M	P	org	2					1																														2			
N	74	7.8	M	P	org	2	1				2																														1			
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		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	2					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.
N	85	8.5	M	P	silt+org	1	1				1						1		1
N	86	7.2	M	P	silt+org	2					2						1		
Y	98	7.0	M	P	org	2					2						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	silt+org	2					2						1		
N	95	7.8	M	P	silt+org	3	1				1			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													
–	102	15.0	–	–	–	–													
N	109	9.6	M	P	org	1	1							1					1
Y	110	9.5	M	P	org	1	1										1		1
N	111	8.2	M	P	org	2	2										1		1
N	112	9.2	M	P	silt+org	2													2
N	113	4.3	M	P	org	2	1				2			1			1		1
Y	114	3.5	M	P	silt+org	2					1			1			1		
N	134	1.5	S	P	sand	1													
N	133	5.0	M	P	org	2								2			1		1
N	132	9.0	M	P	org	1													1
N	131	8.5	M	P	org	2											1		
N	130	8.7	M	P	org	1	1												
N	129	8.8	M	P	silt+org	2	1				2			1			1		
N	128	10.3	M	P	org	1											1		1
N	152	10.5	M	P	silt+org	1											1		1
N	153	10.5	M	P	silt+org	2								1					
N	154	10.0	M	P	silt+org	2													2
N	155	9.0	M	P	org	2	1				2								
N	156	8.0	M	P	org	1					1			1			1		
N	157	7.0	M	P	org	2	1										1		
N	158	5.0	M	P	org	3	2				2								
N	184	1.3	S	P	sand	1													
N	183	7.8	M	P	org	1													
N	182	8.0	M	P	org	2					2			1					

Sampling Point	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.
85												1													
86																						2			
98												1										1			
99																									
97																									
96																									
95								2				1													
94																									
93																									
92																									
107																									
102																									
109																						1			
110												1													
111												2													
112																									
113																						2			
114											1											2			
134															1			1							
133												1													
132												1													
131								1				2													
130												1													
129												1													
128																						1			
152																									
153								1				1										1			
154								1				1													
155																									
156								1				1													
157								1				1													
158																						2			
184																		1							
183																						1			
182												1													

entered - H 9/29/22

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

Crew: Laura [illegible] Heather [illegible]

entered 8/29 - HL

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
N	208	8.0	M	P	org	2
N	209	8.9	M	P	org	2
N	210	7.8	M	P	Slt+Org	3
N	211	8.5	M	P	Slt+Org	1
N	212	1.0	S	P	Sand	1
N	237	7.0	M	P	Slt+Org	1
N	236	7.9	M	P	Slt+Org	1
N	235	8.0	M	P	Slt+Org	3
N	268	10.5	M	P	Slt+Org	1
N	269	9.0	M	P	org	2
N	302	12.8	M	P	Slt+Org	Ø
N	270	10.8	M	P	Slt+Org	2
N	238	8.0	M	P	Slt+Org	1
N	239	2.0	S	P	Sand	1
N	271	13.4	M	P	Slt+Org	Ø
N	303	11.0	M	P	org	1
N	329	5.0	M	P	Slt+Org	2
N	304	11.9	M	P	Slt+Org	Ø
N	272	14.1	M	P	Org	Ø
N	240	2.0	S	P	sand	Ø
~~Y~~	241	4.0	M	P	org	2
N	213	6.0	M	P	Slt+Org	3
N	252	3.5	M	P	Slt+Org	1
N	223	4.5	M	P	org	Ø
N	222	5.5	M	P	Org	2
N	196	10.5	M	P	org	1
N	167	5.5	M	P	Slt+Org	2
N	140	5.5	M	P	Slt+Org	3
N	116	7.2	S	P	Sand	Ø
N	100	3.5	M	P	Slt+Org	1
N	101	2.5	M	P	Slt+Org	1
N	117	3.5	M	P	Slt+Org	3
Y	118	1.0	M	P	Org	1
N	141	2.8	M	P	Slt+Org	3
Y	139	2.5	M	P	Slt+Org	3

Sampling Point	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
208					1										
209		1			1										
210					2			1					2		
211													1		
212	1			1							1				
237					1										
236											1				
235					3			1			1				
268													1		
269													1		
302															
270								1			1				
238											1				
239											1				
271															
303					1						1				
329								1			1				
304															
272															
240															
241	1				1			1							
213			1		2			2							
252								1	1						1
223															
222								1							
196								1							
167								2							
140															
116															
100	1				1						1				
101								1			1				
117								3							
118					1			1			1				
141								3							
139								2							

Sampling Point	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.
208						1				1													
209																							
210						2				1										1			
211																				1			
212																							
237																				1			
236										1										1			
235										1										1			
268							1													1			
269										1										2			
302																				2			
270						1														2			
238																				1			
239																				1			
271																							
303										1													
329																				2			
304																							
272																							
240																							
241		1								1										1			
213								1		1													
252										1													
223																							
222										1										1			
196																							
167																				1			
140																				2			
116																							
100																V				1			
101																							
117																							
118																				1			
141																							
139										2										1			

Waterbody/Project: Hayward Lake Date: 8/3/2022
Crew: Laura Soss 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~~ Potamogeton crispus	Nitella sp.	Nuphar variegata	Nymphaea odorata
N	166	7.0	M	P	org	2															
N	195	6.8	M	P	org	2															
N	221	0.5	R	P	gravel	0															
N	251	6.4	M	P	org	0															
N	282	7.4	M	P	org	0															
N	316	4.0	M	P	Si, H	2					1				1						
N	315	5.0	M	P	Si, H, T	2								1	1						
N	343	9.4	M	P	Si, H	2		1			1			1			1				
N	344	7.0	M	P	Si, H	0															
N	345	7.0	M	P	Si, H	1					1			1			1				
N	366	7.0	M	P	Si, H	3					3						1				
N	386	6.5	M	P	Si, H	3					3						1				
N	400	4.0	M	P	Si, H	2								2			1				
N	401	4.1	M	P	Si, H	3					3			2			1			1	
N	414	9.0	M	P	Si, H	1															
N	425	7.5	M	P	Si, H	3					2			1							
Y	426	5.5	M	P	Si, H	2					2			2							
N	438	4.5	M	P	Si, H	2					1			2							1
N	441	3.0	M	P	Si, H	2					2				1		1				
N	447	5.0	M	P	Si, H	3								3			1				
N	455	5.5	M	P	Si, H	3					2			3			1				
N	467	6.5	M	P	Si, H	3	1				2			3			1				
N	474	5.5	M	P	org	3	2				2			2							
N	473	5.5	M	P	org	2	1							2							
N	466	9.5	M	P	org	1															
N	465	6.0	M	P	org	3			1		2			2		1					
N	471	6.0	M	P	org	3					1			1							
N	454	7.0	M	P	org	3					3			3				1			
N	453	6.3	M	P	org	3	1				2			3							
N	445	6.5	M	P	org	2					1										
N	446	9.0	M	P	org	1					1			1							
N	436	6.5	M	P	org	3					2			2							
N	435	5.3	M	P	org	2					1			1		1	1	1			
N	429	6.8	M	P	org	2					2							1			
N	413	8.3	M	P	org	1					1										

Sampling Point	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.
166																				2			
195										1										2			
221																							
251																							
282																							
316										1										2			
315																				2			
343												1								1			
344																							
345								1	1	1													
366																							
386										1													
400								1	1	1													
401									1	1													
414									1														
425									2	2													
426									1														
438					1				1														
441									1														
447									1														
455									1	1													
467									1	2													
474									1	3													
473									2														
466										1													
465					1				1														
471									3														
454										2													
453									1	1													
445									2														
446										1													
436										1													
435					2					1													
429									2														
413	1																						

entered 8/29 - HL

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~~ Najas flexilis	Lemna trisulca	~~Myriophyllum [illegible]~~ Potamogeton illinoensis	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.
2	181	9.0	M	P	org	2					2						1		1												1													
2	180	10.0	M	P	org	1	1										1		1																									
2	179	10.8	M	P	org	1													1																									
2	178	10.9	M	P	org	1													1																									
2	177	13.3	M	P	org	0																																						
2	204	14.6	M	P	org	0																																						
2	205	12.2	M	P	org	0																																						
2	206	12.4	M	P	org	0																																						
2	207	10.5	M	P	org	1	1												1																									
2	323	12.8	M	P	org	0																																						
2	[illegible]	12.8	M	P	org	0																																						
2	298	13.7	M	P	org	0																																						
2	297	12.2	M	P	org	0																																						
2	296	10.4	M	P	org	0																																						
2	293	8.5	M	P	org	1	1							1			1											1																
2	322	2.5	S	P	sand	1												1																							1			
2	262	12.6	M	P	org	0																																						
2	230	14.5	M	P	org	0																																						
1	231	15.1	—	-	—	—																																						
2	[illegible]	13.5	M	P	org	0																																						
2	264	13.9	M	P	org	0																																						
2	263	13.2	M	P	org	0																																						
2	302	1.5	S	P	sand	1										1	1																								1			
2	324	3.2	S	P	sand	1					1	1		1		1												1													1			
2	325	3.5	S	P	sand	1					1																														1			
2	326	2.3	S	P	sand	1	1																																		1			
2	327	13.6	S	P	sand	0																																						
2	328	1.0	S	P	sand	1						1				1																												
2	301	11.0	M	P	org	1	1				1	1		1					1												1													
2	300	11.5	M	P	org	0																																						
2	399	12.9	M	P	org	0																																						
2	265	14.3	M	P	org	0																																						
2	267	11.4	M	P	org	0																																						
~~2~~	~~[illegible]~~	~~NO~~	~~[illegible]~~		~~[illegible]~~																																							
2	234	9.6	M	P	org	1													1																						1			

entered 8/29 - HL

Waterbody/Project: Hayward Lake Date: 8/3/22
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~~ 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	399	8.6	M	P	org	2					2																				1													
N	385	6.5	M	P	org	2					1			2			1																											
N	365	5.5	M	P	org	3					1			3																	1													
N	364	8.5	M	P	org	0																																						
N	384	4.5	M	P	org	1					1			1			1							1				1																
N	398	3.5	M	P	org	3								3																	1													
N	397	3.5	M	P	org	3					1			2	1																1													
N	411	4.0	M	P	org	2								3																2														
N	422	3.0	M	P	org	3			1					3			1														2													
N	421	4.5	M	P	org	3								3	1		1													1														
N	433	5.0	M	P	org	2			1		2			2																2	2													
N	432	5.0	M	P	org	3								3																	1													
N	497	3.5	S	P	sand	2					2			1	1		2													1	1	1												
N	431	5.0	M	P	org	3			3		1																														1			
N	416	3.5	M	P	org	3				1	2			2			1													1	1										2			
N	417	5.0	M	P	org	2			1		2			3	1															1	1										1			
N	418	5.0	M	P	org	3					2			2			1													1	1													
N	419	4.8	M	P	org	3								3																1											2			
N	420	5.0	M	P	org	3					2			1																											2			
N	409	6.5	M	P	org	2													1														1								2			
N	410	4.5	M	P	org	2					1			2																														
N	396	5.5	M	P	org	3								1		1	1													1	3		2											
N	322	5.5	M	P	org	2								1																											2			
N	353	8.0	M	P	org	0																																						
N	363	[illegible]	M	P	org	1								1																														
N	362	2.0	M	P	org	0																																						
N	361	8.0	M	P	org	1								1			1		1												1													
N	381	5.0	M	P	[illegible]	2								1																	1										2			
N	395	5.0	M	P	org	3																									2													
N	408	7.0	M	P	org	1								1					1												1													
N	394	5.0	M	P	org	2					1			1																	2													
N	380	6.5	M	P	org	1																									1													
N	360	8.5	M	P	org	0								1			1														1										1			
N	342	4.5	M	P	org	2	1																																					
N	341	4.5	M	P	org	1											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~~ 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
N	359	8.5	M	P	org	Ø																			
N	379	7.5	M	P	org	1								1			1		1						
N	393	6.2	M	P	org	3					1			1											
N	407	7.5	M	P	org	1								1			1								
N	406	7.5	M	P	org	1													1						
N	398	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																			
N	340	4.0	M	P	org	2								2											
N	339	5.0	M	P	org	2				1	1			1					/						
N	367	8.5	M	P	org	Ø																			
N	377	8.5	M	P	org	Ø																			
N	390	8.5	M	P	org	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								
N	404	3.5	M	P	org	3								2	1										
N	403	3.5	M	P	org	2			1		2		1	1											
N	338	9.5	M	P	org	Ø																			
N	356	9.5	M	P	org	Ø																			
N	376	9.5	M	P	org	1													1						
N	385	5.5	M	P	org	2					1			1	1		1		1						
N	375	4.5	M	P	org	3					3			2			1								
N	355	6.0	M	P	org	2								1											
N	337	7.5	M	P	org	1																			
N	312	10.0	M	P	org	1					1														
N	280	4.5	M	P	org	2								1			1								
N	248	3.5	M	P	org	2	1							2							1				
N	219	4.0	M	P	org	3			1		2			2											
N	247	6.5	M	P	org	1					1			1			1								
N	279	4.5	M	P	org	1								3											
N	311	10.5	M	P	org	1					1			1											
N	236	9.0	M	P	org	Ø																			
N	364	6.0	M	P	org	2					2			1			1								
N	374	5.5	M	P	org	Ø								1											
N	373	4.5	M	P	org	2					2			2											

Sampling Point	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.
359																			
379																1			
393						3													
407																			
406																			
398																			
378																			
358						1													
340																			
339						1										2			
367																			
377																			
390																1			
391																			
405						1													
404			1																
403						1										2			
338																			
356																			
376																			
385					1														
375					2														
355						2										2			
337						1													
312																			
280																2			
248																1			
219					1	1										1			
247						1										1			
279						1										1			
311																			
236																			
364						1										1			
374																2			
373						1										1			

entered - HL 8/30

Waterbody/Project: Hayward Lake Date: 8/3/2022
Crew: Laura Sas 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	918	5.5	M	P	org	2					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					2																	1													
N	189	5.5	M	P	org	2	1				2			1													1			1	1													
N	24[illegible]	5.8	M	P	org	3					1			1			1													3	1										1			
N	[illegible]17	5.4	M	P	org	2					1						1														1										2			
N	246	7.5	M	P	org	2	1				2						1														1													
N	277	4.0	M	P	org	2					1			1			1														1										2			
N	[illegible]	10.0	M	P	org	0																																						
N	[illegible]	[illegible]	M	P	org	0																																						
N	[illegible]	[illegible]	M	P	org	0																																						
N	372	6.5	M	P	org	2					1			1																											2			
N	[illegible]	[illegible]	M	P	org	0																																						
N	[illegible]	10.5	M	P	org	0																																						
N	233	10.0	M	P	org	1					1																														1			
N	303	9.7	M	P	org	1								1			1		1																									
N	276	7.9	M	P	org	2					2																				1										2			
N	244	2.0	M	P	org	3	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

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	242	6.5	M	P	org	3																																			3			
N	243	8.5	M	P	org	2	1							2					1																									
N	275	10.5	M	P	org	2													2																									
N	307	10.5	M	P	org	1													1																						1			
N	332	11.0	M	P	org	0																																						
N	350	12.4	M	P	org	0																																						
N	370	1.5	S	P	sand	1	1																																					
N	349	7.5	M	P	org	1	1																								1													
N	331	13.4	M	P	org	0																																						
N	306	11.0	M	P	org	0																																						
N	274	10.3	M	P	org	1											1		1																									
N	277	13.4	M	P	org	0																																						
N	305	12.9	M	P	org	0																																						
N	300	5.2	M	P	org	2									1		1										2				1										1			

entered - HL 8/31

ATTACHMENT C

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

①

Waterbody/Project: Trego
Date: 6/9/2022
Crew: Lavia 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	4.9	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 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	M. spicatum	M. sibiricum	P. zosteriformis	E. canadensis	N. odorata	N. variegata	S. fluctuans	V. 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	Ø															
141	1.6	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	Ø															
162	5.0	N	M	P	org	Ø															
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		1		
173	4.5	N	M	P	org	Ø															
174	6.5	N	M	P	org	Ø															
175	6.8	N	M	P	org	Ø															
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	Ø															
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 Gass 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	P. crispus	M. spicatum	M. sibiricum	P. zosteriformis	E. canadensis	N. odorata	N. variegata	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							
148	30	N	M	P	org	Ø		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				2										
214	3.9	N	M	P	org	1						1						1	1			
218	38	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	26	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	1									
186	8.0	N	M	P	org	Ø																

(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	9.6 Y	S	P	wood	Ø											
252	2.4 N	R	P	Cobble	Ø											
262	6.0 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											
325	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: Treoo Date: 6/9/2022

Crew: Laura Sass Heather Lutcow

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	Sparganium eurycarpum	P. natans	P. praelongus	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	25	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													
478	9.0	Y	S	P	sand	Ø														
484	7.5	Y	M	P	org	3	3				1									
482	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							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														
364	4.0	Y	R	P	cobble	Ø														
360	9.8	N	R	P	cobble	Ø														

(7)

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	P. richardsonii	H. dubia	S. eurycarpum	L. trisulca
357	9.0	Y	S	P	sand	Ø														
351	8.6	N	S	P	sand	Ø														
349	7.8	Y	S	P	Sand	Ø														
341	6.8	Y	R	P	cobble	1									1					
336	9.6	Y	M	P	org	Ø														
332	10.5	Y	M	P	org	Ø														
328	2.6	Y	S	P	sand	Ø					V									
319	10	Y	M	P	org	Ø														
289	7.0	N	M	P	org	Ø														
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	Ø														
266	10.0	N	M	P	org	Ø														
265	9.5	N	M	P	org	Ø														
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	2.0	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	4.6	N	M	P	org	1	1													
248	1.8	Y	S	P	sand	1	1													
270	10.8	N	S	P	sand	Ø														
282	8.4	N	S	P	sand	Ø	V				V									
293	5.0	N	S	P	sand	1									1					
308	3.0	N	S	P	sand	Ø														
309	10.8	N	M	P	org	Ø														

357 thru 314 → "M" → Bottom is firm organic debris

(8)

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	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	11	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	6	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												

marsh cinquefoil

(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	N. variegata	P. robbinsii	Chara sp.	Nitella 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	2.5	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)	(LWD) (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	L. trisulca	S. fluitans	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	R	org	2	Y	1	1	1	1	V	V	V	V
489	7.5	R	P	gravel	Ø	N								
13	NN	—	—	—	—	—								
294	9.4	S	P	wood	Ø	Y								
283	3.4	S	P	sand	Ø	Y								
271	10.5	S	P	sand	Ø	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.	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 [illegible])	F. Algae	N. flexilis	Tolypella intricata
19	2	N	m	P	Org.	1						1		1	1						1					1				1			1	1				
23	3	N	m	P	Org	1								1	1						1																	
29	2.8	N	M	P	Silt	1				1		1		1	1		1													1			1		1			
32	2.5	N	m	P	org.	1								1			1													1								
37	3	N	m	P	org	1				1							1																					
41	2	Yes	m	P	Org.	1				1		1							1							1				1								
46	3.5	N	m	P	Org.	1				1		1					1													1								
39	3	N	m	P	Org.	1				1		1					1													1						1		
35	2.5	N	m	P	Org	3				3		1		1			1													2								
31	2.5	N	M	P	Org	2				1		2		1												1												
42	1.8	N	M	P	Org.	2				1	1	1		1	1		1													1			2	1			1	
43	3.5	N	m	P	Org.	2		1		2					1										1					1								
24	3.5	N	m	P	Org	3				1	1						3								1	1												1
45	1	N	S	P	Sand	∅																																
51	3.5	N	m	P	Org.	1						1					1				1									1								
52	3.5	N	m	P	Org	1						1					1																			1		
49	3.5	N	M	P	Org	3	1					3		1												1	1											
48	4	N	M	P	Org	1						1	1				1																					1
56	4	N	m	P	Org	1				1							1																1					
57	4.7	N	m	P	Org	1				1		1														1				1						1		1
58	2	N	m	P	Org.	∅																																
59	1.3	N	m	P	Org	∅																																
135	3.5	N	m	P	Org.	1																																
137	3.5	N	m	P	Org	1	1			1		1														1							1					
170	3.5	N	M	P	Org	∅																																
159	3.5	N	m	P	Org	3				3		1														2												
149	4.5	N	M	P	Org	1						1														1												
139	2.5	N	M	P	Org	∅																																
140	1.5	Y	S	P	Sand	1															1					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																										

↳ 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.	Ø																												
508	2.5	N	m	P	Org.	Ø																												
504	2.5	N	S	P	Sand	Ø																												
501	5.5	N	R	P	Boulder	Ø																												
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	Ø																												
495	4.5	N	M	P	Org.	Ø																												
65	5.5	N	R	P	cobble	Ø																												
64	3.5	N	S	P	Sand	Ø																												
63	2.5	N	S	P	Sand	Ø																												
62	2.5	N	S	P	Sand	Ø																												
61	3.5	N	R	P	cobble	Ø																												
55	1.5	N	S	P	Sand	Ø																												
54	3	N	S	P	Sand	Ø																												
53	2	N	S	P	Sand	Ø																												
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	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	R	P	cobble	Ø																												
60	1.5	N	M	P	Org.	1						1														1								1
72	2	N	S	P	Sand	Ø																												
85	1.5	N	S	P	Sand	Ø																												
95	1	N	S	P	Sand	Ø																												
84	3	N	S	P	Sand	Ø																												
94	2	N	S	P	Sand	Ø																												
71	2	N	S	P	Sand	Ø																												
19	2	N	M	P	Org.	Ø																												
18	3	N	M	P	Org.	1																											1	

✓JAK

Waterbody/Project: Trego
Date: 8/1/2022
Crew: Laura Jass, 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 (form)
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*	*Sparganium fluctuans*	*Spirodela polyrhiza*	*Stuckenia pectinata*	*Utricularia vulgaris*	*Vallisneria americana*
255	10.0	N	M	P	org	3											3																
207	2.5	N	S	P	sand	1	1			1		1														1							1
279	13.0	N	M	P	org	0																											
280	13.5	N	M	P	org	0																											
268	13.0	N	M	P	org	0																											
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	0																											
258	6.8	N	M	P	org	2				2																1							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	0																											
281	14.3	N	M	P	org	0																											
282	2.0	N	S	P	sand	1				1		1																					
293	[illegible]	N	S	P	sand	1																											1
308	2.8	N	R	P	grav	0																											
309	10.5	N	M	P	org	0																											
294	8.8	N	M	P	org	0																											
295	9.5	N	M	P	org	1											1																
283	5.7	N	M	P	sand	0																											
284	11.0	N	M	P	org	0																											
271	10.0	N	R	P	grav	0																											
260	13.5	N	M	P	org	0																											
249	1.5	Y	S	P	sand	1																											1

✓JAK

Waterbody/Project: Trego Lake

Crew: Laura Sass Heather Lutzow

Date: 8/4/2022

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
452	11.0	N	S	P	sand	1				1																							
450	1.5	N	S	P	sand	2																											2
445	16.0	–	–	–	–	–																											
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							3
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	10.0	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																											
305	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	∅																											
324	13.2	N	M	P	org	∅																											
323	14.5	N	M	P	org	∅																											
307	13.0	N	M	P	org	∅																											
392	12.6	N	M	P	org	∅																											
391	12.7	N	M	P	org	∅																											
306	13.0	N	M	P	org	∅																											
322	10.3	N	M	P	org	∅																											
321	13.6	N	M	P	org	∅																											
331	12.5	N	M	P	org	∅																											
335	13.7	N	M	P	org	∅																											
339	13.7	N	M	P	org	∅																											
340	4.0	N	S	P	sand	∅																											V
344	11.0	N	S	P	sand	∅																											
343	13.3	N	M	P	org	∅																											
346	15.2	-	-	-	-	-																											
348	12.4	-	-	-	-	-																											
354	2.5	N	S	P	sand	2																											2
367	1.3	N	S	P	sand	∅																											
378	15.4	-	-	-	-	-																											
389	12.2	N	M	P	org	∅																											
396	2.9	Y	S	P	sand	3																											3
411	2.5	N	R	P	grav	3																											3
428	2.0	N	S	P	Sand	∅																			V								V
438	10.0	N	M	P	org	∅																											
446	12.0	N	S	P	sand	∅																											
471	5.0	Y	S	P	sand	∅																											
478	12.5	N	R	P	grav	∅																											
489	2.5	N	S	P	sand	2				1		1																					1
484	6.0	N	S	P	sand	3				3																							1
483	5.5	N	M	P	org	3				2																							3
488	3.0	N	S	P	sand	2						2																					1
492	7.2	N	M	P	org	2				1		1													1								1
278	10.0	N	M	P	org	∅																											

✓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*			
250	13.2	N	M	P	Org	Ø																														
251	11.9	N	M	P	org	Ø																														
263	11.2	N	M	P	org	Ø																														
274	11.0	N	M	P	org	1				1																										
275	7.1	N	M	P	Org	Ø																														
286	6.0	N	M	P	org	Ø																														
299	8.0	N	M	P	org	Ø																														
300	5.5	N	M	P	org	Ø																														
314	12.3	N	S	P	Sand	Ø																														
313	13.3	N	R	P	grav	Ø																														
315	11.0	N	M	P	org	Ø																														
316	11.6	N	M	P	org	Ø																														
317	12.6	N	S	P	sand	Ø																														
318	12.0	N	R	P	gravel	Ø																														
301	0.5	N	R	P	gravel	Ø																														
302	11.0	N	R	P	bould	Ø																														
287	13.5	N	R	P	cobble	Ø																														
276	11.5	N	S	P	Sand	Ø																														
264	7.5	N	S	P	sand	Ø																														
253	10.0	N	S	P	sand	Ø																														
242	8.8	N	S	P	sand	Ø																														
236	7.3	N	M	P	org	Ø																														
229	3.5	N	S	P	sand	1																				1										
230	9.0	N	M	P	org	Ø																														
231	10.5	N	M	P	org	Ø																														
232	10.5	N	S	P	sand	Ø																														
233	11.0	N	S	P	sand	Ø																														
224	5.5	Y	M	P	org	1				1																										
225	5.0	N	M	P	org	Ø																														
226	5.5	N	M	P	org	1				1							1																			
227	5.5	N	M	P	org	1				1							1																			
223	9.0	N	M	P	org	Ø																											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 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*				
218	3.8	N	M	P	org	1				1		1			1		1																				
217	4.0	N	R	P	gravel	0																															
212	9.1	N	M	P	org	2						1		1			2																				
211	5.9	N	M	P	org	2				1	1						2									1											
200	9.2	N	M	P	org	1				1											1												1				
187	7.5	Y	M	P	org	1				1					1																						
199	1.5	N	S	P	sand	1																											1				
186	8.4	N	M	P	org	0																															
198	6.4	N	M	P	org	1				1																1							1				
209	7.0	Y	M	P	org	0																															
208	7.2	N	M	P	org	1											1																				
216	6.0	N	M	P	org	3											1																3				
220	10.0	N	M	P	org	1											1																				
222	9.3	N	M	P	org	1				1																1											
228	9.5	N	S	P	sand	0																															
237	6.9	N	M	P	org	3				1																							3				
246	11.5	N	S	P	sand	0																															
235	12.0	N	S	P	sand	0																															
234	10.0	N	R	P	grav	0																															
241	10.0	N	M	P	org	1				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																2											
261	5.8	N	M	P	org	3																											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																															
313	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

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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	Ø																															
207	9.8	N	M	P	org	Ø																															
196	9.0	N	S	P	sand	Ø																															
197	7.0	N	M	P	org	1											1																				
185	8.0	N	M	P	org	Ø																															
172	3.5	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	Ø																															
150	2.5	N	M	P	org	Ø																															
151	9.0	N	M	P	org	Ø																															
141	1.0	N	M	P	sand	Ø																															
132	3.0	N	M	P	org.	Ø																															
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									1							2				
105	5.5	[illegible]	M	P	org	Ø																															
96	6.4	N	M	P	org	1																											1				
87	4.0	N	M	P	org	1																				1								1			
76	4.5	N	M	P	org	3																											3				
66	3.5	N	M	P	org	1				1																1							1				
67	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	Ø																															
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	8.8	N	M	P	org	1											1																				
144	3.8	N	M	P	org	1						1			1		1																				
134	4.0	N	M	P	org	Ø																															
133	5.7	N	M	P	org	Ø																															
142	7.5	N	M	P	org	Ø																															
143	4.1	N	M	P	org	1											1																				

✓ JAK

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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				
152	6.5	N	M	P	org	1											1																1				
153	4.4	N	M	P	org	Ø																															
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											2							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	Ø																															
174	8.0	N	M	P	org	Ø																															
175	7.4	N	M	P	org	Ø																															
176	4.5	N	M	P	org	1				1		1			1		1																1				
177	5.6	N	M	P	org	2	1			2																											
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	Ø																															
195	3.5	N	M	P	org	1						1																									
192	2.5	N	M	P	org	Ø																															
193	4.0	N	M	P	org	1				1																											
192	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																				
201	4.4	N	M	P	org	1											1						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																		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		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	Sparganium fluctuans	Zizania sp.	Aquatic moss
257	NN-	Plants			350	18.7																					
242	NN-	Plants			352	16.2																					
77	NN	Rice			353	17.7																					
88	NN	Rice			356	20.9																					
97	NN	Rice			359	21.9																					
115	NN	Rice			372	16.6																					
210	NN	plants			377	19.3																					
326	NN	plants			376	21.9																					
402	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	26.0																					
					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

gai consultants
transforming ideas into reality

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
- [x] 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
- [x] 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
- [x] 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?

- [x] 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
- [x] 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
- [x] 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

		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	
Project	Hayward					Relative Abundance		2	1		1	1	2	1		
County	Sawyer	1	Developed - Residential	46.0087073	-91.48209123	Length of Shoreline		342	60		35	65	332	15		
Date	8/2/2022; 8/3/2022		Developed - Residential / Northern			Relative Abundance	2	2	1	1	1	1	1	1	1	
	Kellen Black	2	Mesic Forest	46.0093846	-91.46804122	Length of Shoreline	2506	4130	583	79	311	25	1299	1781	2204	
Field Crew	Heather Lutzow		Hayward Lake Boat Landing and			Relative Abundance	2	2	2			1	2			
	Laura Sass		Hayward City Beach	46.0092070	-91.47778859	Length of Shoreline	1075	1095	783			138	328			
						Relative Abundance	2	3	3			1	3	1	2	
			East and South of Dam	46.0058979	-91.48425677	Length of Shoreline	508	1279	2218			229	1279	5	290	
						Relative Abundance	3	3				1	3	1		
			West and South of Dam	46.0051798	-91.48626946	Length of Shoreline	2301	3105				5	2291	25		
						Relative Abundance										
						Length of Shoreline										
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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
- [X] 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
- [X] 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
- [X] 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: 45.910182 Longitude: -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)

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		

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: 45.910325 Longitude: -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 ____________________

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 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	1	Northern Mesic Forest / Developed - Residential	45.9095981	-91.82714982	Relative Abundance			2	3	1		3	
County	Washburn					Length of Shoreline			936	4834	198		4531	
Date	8/1/2022; 8/4/2022	2	Northern Mesic Forest / Developed - Residential	45.9058197	91.83177378	Relative Abundance			1	1	1	1		
Field Crew	Kellen Black					Length of Shoreline			480	197	123	62		
	Heather Lutzow	3	Northern Mesic Forest / Developed - Residential	45.9201186	-91.85647773	Relative Abundance					1			
	Laura Sass					Length of Shoreline					5			
		4	Northern Mesic Forest / Developed - Residential	45.9248628	-91.86401172	Relative Abundance			1	2	1		2	
						Length of Shoreline			138	2471	50		4526	
		5	Northern Mesic Forest / Developed - Residential	45.9318298	-91.87885816	Relative Abundance			1		1			1
						Length of Shoreline			10		10			10
			Trego Landing Road Boat Landing	45.9212136	-91.86836159	Relative Abundance			1					
						Length of Shoreline			10					
			Cash Road Boat Landing	45.9098279	-91.82513304	Relative Abundance		1						
						Length of Shoreline		5						
			North Side of Dam	45.9484061	-91.88620636	Relative Abundance	1	1	2					
						Length of Shoreline	5	20	1207					
			South Side of Dam	45.9455827	-91.88822835	Relative Abundance		1	4					
						Length of Shoreline		33	3858					
						Relative Abundance								
						Length of Shoreline								
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ATTACHMENT J
Hayward Water Sample Results

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			

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
University of Wisconsin–Madison

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

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			

Report ID: 10236350

Wisconsin State Laboratory of Hygiene
UNIVERSITY OF WISCONSIN-MADISON

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

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
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Results relate only to the items tested.
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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

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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:	Invoice To:
HEATHER LUTZOW GAI CONSULTANTS 3313 S PACKERLAND DR SUITE E DE PERE, WI 54115	HEATHER LUTZOW GAI CONSULTANTS 3313 S PACKERLAND DR SUITE E DE PERE, WI 54115 Customer ID: 356553

Field #:	Hayward - Res, WF	ID#:	583131
Project No:		Sample Location:	HAYWARD LAKE - DEEP HOLE
Collection End:	8/3/2022 6:30:00 PM	Sample Description:	DNR'S DEEP HOLE STATION
Collection Start:		Sample Type:	SU-SURFACE WATER
Collected By:	LAURA SASS	Waterbody:	2725500
Date Received:	8/11/2022	Point or Outfall:	
Date Reported:	10/19/2022	Sample Depth:	
Sample Reason:		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
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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

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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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			

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
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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
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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			

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

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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: 636482002

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

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)
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

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Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

Wisconsin State Laboratory of Hygiene
University of Wisconsin–Madison

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: 637981001

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, 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			

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: 637981001

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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(800)442-4618 - FAX (608)224-6213
http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 637981002

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- 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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2601 Agriculture Drive, PO Box 7996
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(800)442-4618 - FAX (608)224-6213
http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 637981002

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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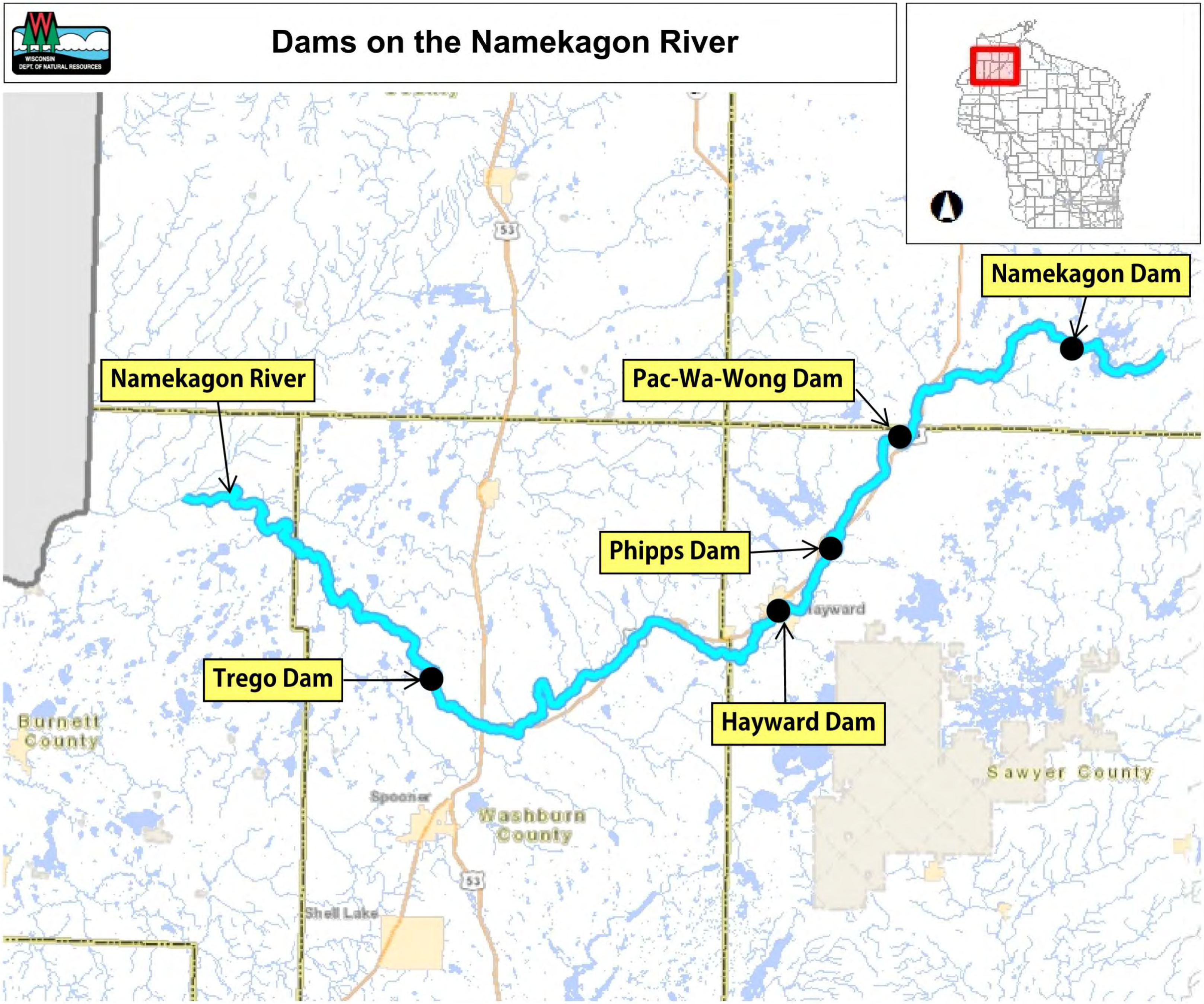
Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

APPENDIX E-4 Dams on the Namekagon River

Dams on the Namekagon River

WISCONSIN DEPT. OF NATURAL RESOURCES



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
Rivers and Streams
Intermittent Streams
Lakes and Open water

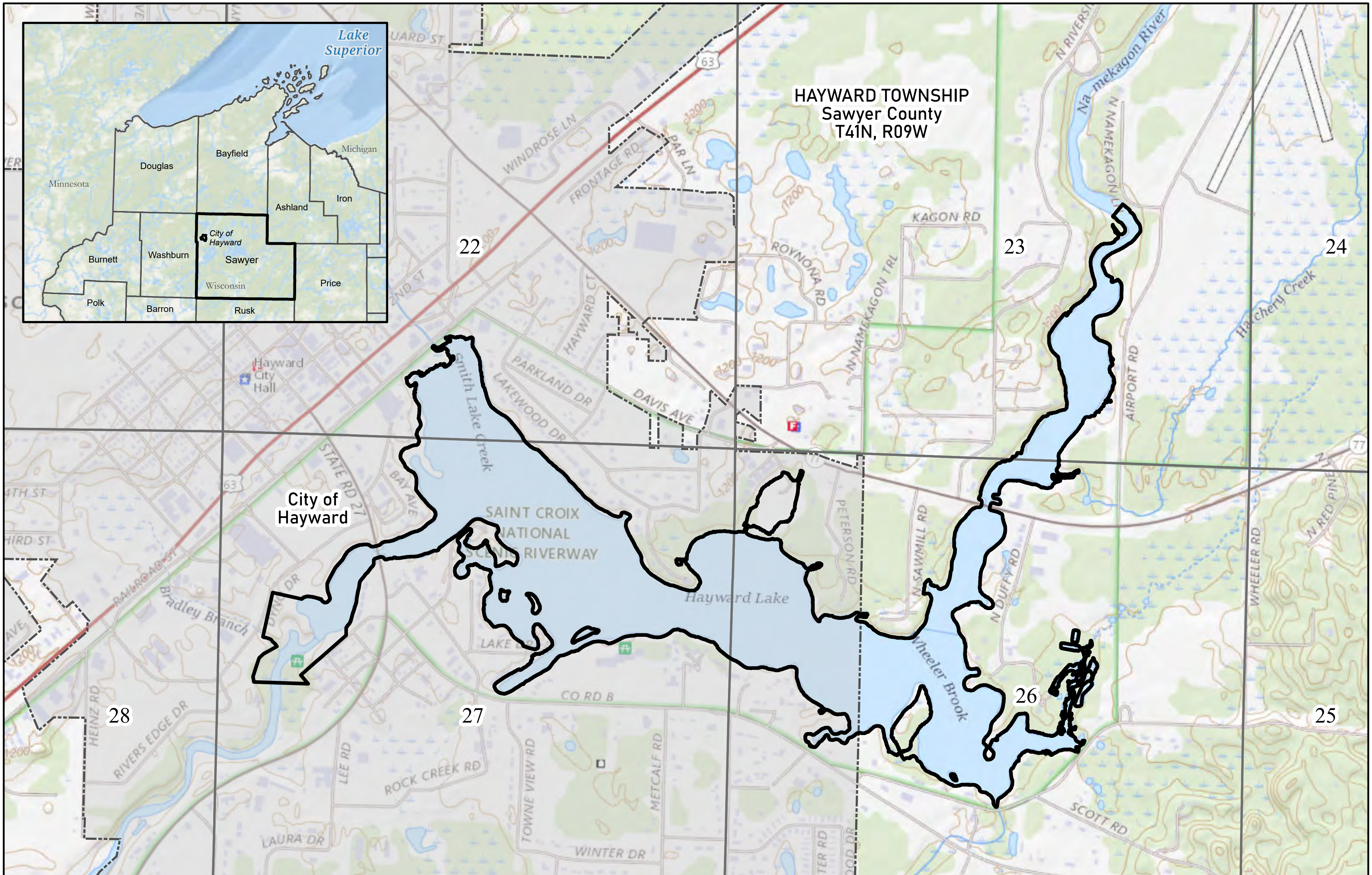
Notes

16.0 0 8.00 16.0 Miles

NAD_1983_HARN_Wisconsin_TM

1: 506,880

APPENDIX E-5 Topographic Maps of the Hayward and Trego Project Vicinities



Proposed Project Boundary
Municipal Boundary
Section

Note: the impounded Proposed Project Boundary is established at elevation 1,187.5 feet NGVD 1929.

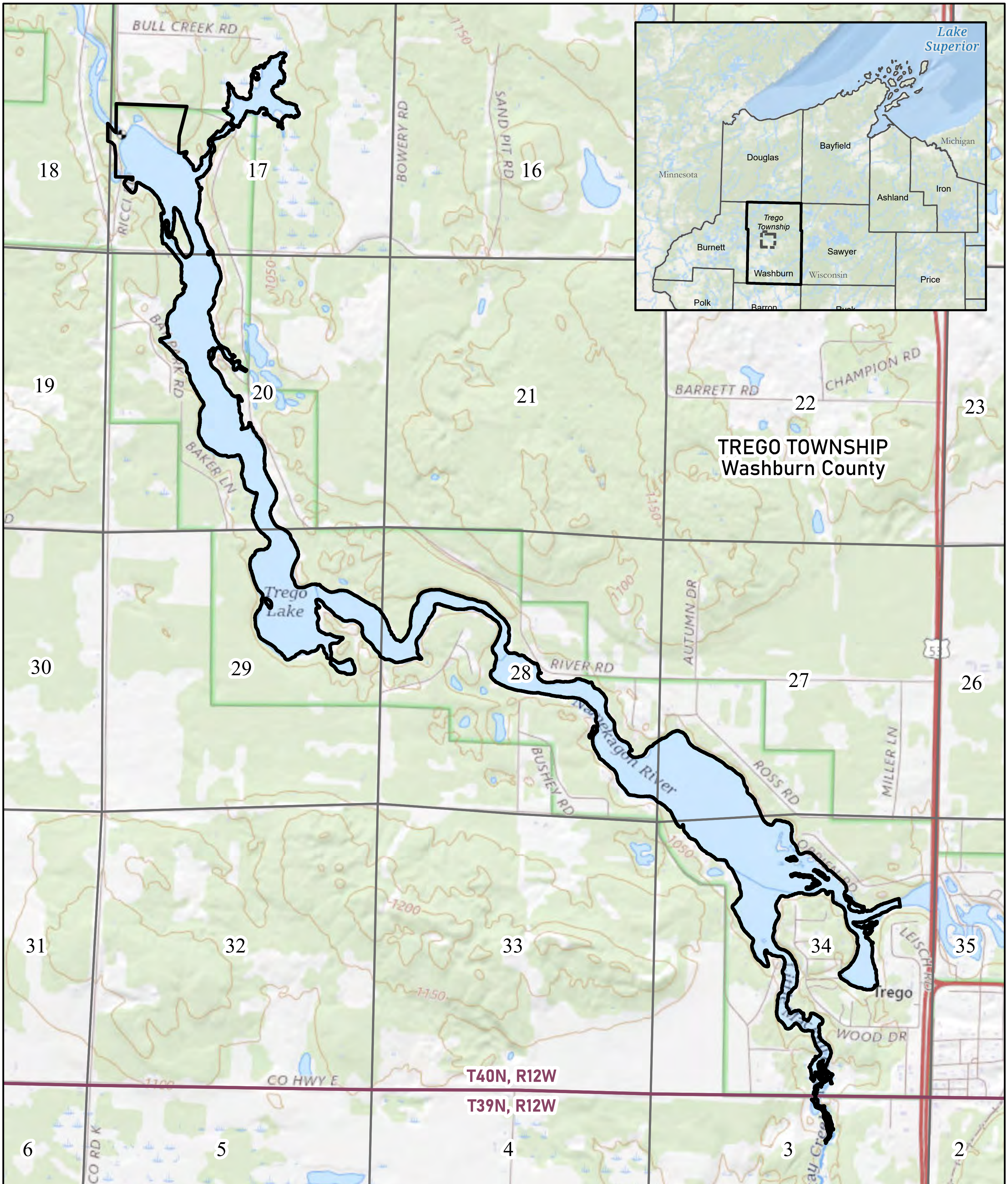
0 1,000 2,000 Feet

Hayward Hydroelectric Project
Topographic Map

FERC No. 2417

Source Layer: USGS The National Map; Wisconsin Department of Natural Resources GIS Open Data Portal

X:\2400100\192923.01\TECH\Hayward and Tego\Project Maps\Hayward\DLA\PRO\Hayward_DLA_Maps.aprx



Proposed Project Boundary

Township Range

Section

Note: the impounded Proposed Project Boundary is established at elevation 1,035.2 feet NGVD 1929.

Xcel Energy

Mead & Hunt

Trego Hydroelectric Project
Topographic Map

FERC No. 2711

X:\2400100\192923.01\TECH\Hayward and Trego\Project Maps\Trego\DLA\PRO\Trego_DLA_Maps.aprx

Source Layer: USGS The National Map; Wisconsin Department of Natural Resources GIS Open Data Portal

APPENDIX E-6 Hayward Project Soils Report

Soil Map—Sawyer County, Wisconsin
(Hayward Soils Data)

Map Scale: 1:17,000 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 250, 500, 1000, 1500

Feet: 0, 500, 1000, 2000, 3000

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sawyer County, Wisconsin
Survey Area Data: Version 18, Jun 8, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 28, 2012—Jul 8, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
383B	Mahtomedi loamy sand, 0 to 6 percent slopes	87.2	16.1%
383D	Mahtomedi loamy sand, 12 to 30 percent slopes	2.8	0.5%
407A	Seelyeville and Markey soils, 0 to 1 percent slopes	9.4	1.7%
771A	Lenroot loamy sand, 0 to 3 percent slopes	192.4	35.6%
3446A	Newson muck, 0 to 2 percent slopes	1.3	0.2%
W	Water	247.7	45.8%
Totals for Area of Interest		**540.9**	**100.0%**

RUSLE2 Related Attributes

This report summarizes those soil attributes used by the Revised Universal Soil Loss Equation Version 2 (RUSLE2) for the map units in the selected area. The report includes the map unit symbol, the component name, and the percent of the component in the map unit. Soil property data for each map unit component include the hydrologic soil group, erosion factor Kf for the surface horizon, erosion factor T, and the representative percentage of sand, silt, and clay in the mineral surface horizon. Missing surface data may indicate the presence of an organic layer.

Report—RUSLE2 Related Attributes

Soil properties and interpretations for erosion runoff calculations. The surface mineral horizon properties are displayed or the first mineral horizon below an organic surface horizon. Organic horizons are not displayed.

RUSLE2 Related Attributes–Sawyer County, Wisconsin								
Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value		
						% Sand	% Silt	% Clay
383B—Mahtomedi loamy sand, 0 to 6 percent slopes								
Mahtomedi	75	200	A	.10	5	82.5	9.0	8.5
383D—Mahtomedi loamy sand, 12 to 30 percent slopes								
Mahtomedi	80	79	A	.10	5	82.5	9.0	8.5
407A—Seelyeville and Markey soils, 0 to 1 percent slopes								
Markey	35	249	B/D	—	1	—	—	—
771A—Lenroot loamy sand, 0 to 3 percent slopes								
Lenroot	85	249	A	.10	5	82.5	9.0	8.5
3446A—Newson muck, 0 to 2 percent slopes								
Newson	85	249	A/D	.17	5	80.5	17.0	2.5

Data Source Information

Soil Survey Area: Sawyer County, Wisconsin
Survey Area Data: Version 18, Jun 8, 2020

APPENDIX E-7 Hayward Project Shoreline Monitoring Report

6737 West Washington St.
Ste. 2100
West Allis, WI 53214

T 262.879.1212
TRCcompanies.com

January 19, 2023

Matt Miller
Xcel Energy
1414 West Hamilton Avenue
Eau Claire, WI 54702-0008

Subject: Shoreline Monitoring of Archaeological Sites and Erosion Inspection at the Hayward Hydroelectric Project (FERC No. 2417)
WIARC No. 290

Dear Mr. Miller:

On August 17, 2022 a TRC archaeologist inspected the shoreline of the Hayward Hydroelectric Project (Project) located on the Namekagon River in Hayward, Wisconsin (Figure 1). The survey had two goals: first, to determine if any of the three archaeological sites noted in the Wisconsin Historic Preservation Database (WHPD) have been affected by operation of the Project, and second, to document any erosion along the shoreline and assess if any archaeological sites were exposed at those locations.

Background

The Project has a history of archaeological site surveys and erosion monitoring efforts from 1979 through 2013 as documented in five surveys of the Project shoreline (Fitting 1977, Weir et al. 1979, Van Dyke and Meer 1991, Van Dyke 2003, 2013). The 1991 survey was required by the Federal Energy Regulatory Commission (FERC) as part of the relicensing process for the Project. Two of the three previously known sites were noted as unaffected by hydro operations (47SY29, 47SY119); the third site, two parallel rows of submerged wooden pilings, was thought to be the remains of a railroad bridge or tramway into the lake (Van Dyke and Meer 1991). The 1991 survey report recommended that the pilings be evaluated for National Register of Historic Places (NRHP) significance and the following year they were evaluated (Van Dyke 1992). The 2003 and 2013 surveys reviewed the shoreline through non-excavation observation of the entire shoreline, with specific focus on the previously reported archaeological sites and bank erosion.

The federal relicensing effort for the Project requires, under the Programmatic Agreement, an identification of archaeological properties through a shoreline survey and a determination if any cultural resource sites that might be eligible for the NRHP are being affected by normal hydro operations. In addition to the cultural resource component of the survey, the entire shoreline was inspected by boat to identify any areas of eroding shoreline as part of the overall relicensing effort. Mead & Hunt, Inc., contracted with TRC Environmental (TRC) to conduct this archaeological monitoring survey of the shoreline (Figure 1).

Literature and Archives Results

TRC archaeologists reviewed the Wisconsin Historic Preservation Database (WHPD) and the archaeological sites noted there are re-plotted on Figures 2 and 3. The WHPD includes the

Archaeological Site Inventory (ASI), Architecture and History Inventory (AHI), and Archaeological Reports Inventory (ARI); as well as the National Register of Historic Places (NRHP) database, historic county atlases, historic US Geological Survey (USGS) 15-Minute and 7.5-Minute Topographic Quadrangle maps, and other appropriate sources that could yield information. The results of the literature and archives search are described below.

47SY29

This site, described in the WHPD as a prehistoric campsite/village of unknown cultural affiliation, yielded one fragment of felsite and one fragment of quartzite debitage during a survey that was reported by Fitting in 1977 (Weir et al. 1979). The site was again investigated in 1991 when it was reported as a small lithic scatter that appeared to be unaffected by hydro operation (Van Dyke 1991, 1994). The 2003 and 2013 shoreline surveys of the hydroelectric project found no artifacts or erosion at the site shoreline (Van Dyke 2003, 2013). No additional archaeological work has been reported for the site.

47SY54 *(Hayward Mill Site)*

The WHPD lists the Hayward Mill site as a logging era dam/historic earthwork, mill/sawmill that was already heavily disturbed by 1979 (Weir et al. 1979). The WHPD map locates it on the northwest side of Namekagon River. When the site was reported, it was mapped on the southeast side of the river; the location was corrected in 1992 when a survey found remnants of the mill site. The 1992 survey was conducted to assess site proximity to a proposed bridge reconstruction project (Groethe 1992). The Hayward Mill location was confirmed in 1994 by review of an 1892 map entitled *Northern Wisconsin Lumber Companies Plant 1892* (note in ASI #6394). Another note in the same ASI states: “site boundaries amended in 2016 to better conform to mapped location of structure and area of NWLC holdings”.

Later surveys of the hydroelectric shoreline found no artifacts or erosion at the bank of the WHPD-mapped site location (Van Dyke 2003, 2013). Part of the site was resurveyed in 2014 for proposed reconstruction of a segment of STH 27, but no cultural materials were recovered from the part of the project that overlapped 47SY54 (Keene 2014). The site had been heavily disturbed by urban development, except for some remnants of the dam and mill pond, and today is occupied by a Lake Superior District Power Company Electric Generating Station (WHPD ASI 6394). There is no record of any other archaeological work at the site.

47SY121

A 1977 survey reported the site as: “...the pillar supports of a former railroad bridge across Lake Hayward within the confines of the City of Hayward. This bridge was probably used in association with the Hayward Mill located in the vicinity” (Fitting et al. 1977: 45).

The 1991 shoreline monitoring survey (Van Dyke 1991) examined the pillars from a boat from the shore out into the lake as far as they were visible and recommended a Phase II NRHP evaluation. In 1992, it was evaluated for NRHP criteria of significance (Van Dyke 1992). The 1992 report (not available) was summarized in a later report.

> In the absence of an existing historic context for the logging industry, literature and archives research, interview, and fieldwork were used to identify and evaluate the structural remains. These were ultimately identified by a 95 year old local resident as the remains of a railroad trestle that was used to load logs into an impoundment in the Namekagon River near the Hayward Mill. The trestle was in operation for an unknown length of time but, between the years 1889 and 1922. Since the remains do not satisfy the criteria of significance of the NRHP, the site was not nominated to the NRHP (Van Dyke 1994: 22).

The 2003 and 2013 shoreline monitoring surveys did not find artifacts or erosion at the bank of the WHPD-mapped site location (Van Dyke 2003, 2013). There is no record of archaeological work at the location since the last survey.

47SY158/BSY-0044 *(Friske Mound Site)*

The WHPD lists the Friske Mound site as a probable Woodland site consisting of a mound like feature, with an oral tradition of mounds and a village/campsite, as well as a logging camp (WHPD ASI 22424). The unverified mound was reported in 1991 because of an interview with a local resident (Van Dyke 1991). The resident said that the mound was "set back more than 50 meters from the present bank of the flowage, and well above the water level" (Van Dyke 1991: 28).

The 2003 monitoring survey noted no artifacts or erosion at the bank (Van Dyke 2003) while a later survey added that the site, as mapped, did not touch the shoreline, and was not affected by operation of the hydro (Van Dyke 2013). With the unverified mound situated in an area that was also speculated as a former logging camp site, it is possible that the mound is a structural remain from a former logging camp. Although the status as a burial site is not verified, the site is protected under Wis. Stats. *§157.70*. No additional archaeological work is recommended.

FIELDWORK

The August 17, 2022 survey was done on foot with access to the shoreline facilitated by a boat and motor operated by Xcel Energies Hydro staff. The Project shoreline is photo-characterized in Photos 1-9. Archaeological site shorelines at 47SY29, 47SY54, 47SY121, and the unverified burial site 47SY158/BSY-0044, were examined on foot.[1] The shoreline was inspected for erosion from the boat which moved slowly along the reservoir very close to the banks. No overall shoreline erosion was identified, nor had any site specific erosion been noted in previous monitoring surveys. The site locations, identified by their site numbers, are shown on Figures 2 and 3, while Figures 4 and 5 show the site photo locations. The results are described below.

47SY29

The shoreline was inspected on foot. Surface collection along the river bank yielded no artifacts. The shoreline of the site is stable with a mix of trees, grasses and managed lawn extending to the water with

[1] WHPD site locations were downloaded to the geode and tablet prior to going into the field.

emergent vegetation offshore (Photo 10). No additional archaeological work is recommended. Future shoreline monitoring should follow the current HRMP schedule.

47SY54 ***(Hayward Mill Site)***

The shoreline was inspected on foot. Surface collection along the river bank yielded no artifacts. The shoreline of the site is stable with a mix of pine, oak, and birch trees extending to the water, and is comprised of commercial, residential, and recreational areas, and emergent vegetation in the water (Photos 11 and 12). No additional archaeological work is recommended. Future shoreline monitoring should follow the current HRMP schedule.

47SY121

The shoreline where the pilings had intersected previously, was inspected on foot. Surface collection along the river bank did not yield artifacts. The shoreline is stable with a mix of pine, oak, and birch trees, and managed lawn extending to the water (Photo 13). No additional archaeological work is recommended. Future shoreline monitoring should follow the current HRMP schedule.

47SY158/BSY-0044 ***(Friske Mound Site)***

The shoreline at the location where the mound was reported was inspected on foot. Surface collection along the river bank did not yield artifacts. The land is stable at the shore with a mix of pine, oak, and birch trees extending to the water (Photos 14 and 15). No additional archaeological work is recommended. Future shoreline monitoring should follow the current HRMP schedule.

The remainder of the Project shoreline is well vegetated with pine, birch, oak, and grasses (Figures 1-9). Much of the shoreline is comprised of residential lots and there are no areas of riprap or other manmade shoreline protection.

CONCLUSION AND RECOMMENDATION

The results of the literature and archives research noted two archaeological sites are reported adjacent to the shore, one in the water culminating at the bank, and one unverified mound site which was reported as at least 50 meters inland. The sites have well vegetated and stable shorelines. No artifacts or archaeological features were encountered, and no additional archaeological work is recommended. Future shoreline monitoring should continue to follow the current HRMP schedule of every 10 years beginning in 2033.

If Xcel Energy personnel identify or become aware of erosion at any of the known archaeological sites, or of any new substantial erosion, they should consult with an archaeologist and the State Historic Preservation Office to determine the best means to proceed. If I can provide additional assistance, I can be reached by phone at 262-225-5105, or by email at AVanDyke@trcscompanies.com.

Sincerely,

TRC Environmental Corporation

Allen P. Van Dyke
Principal Archaeologist – Midwest

Attachments: 5 Figures, 15 Photos, and Archaeological Reports Inventory Form

REFERENCES CITED

Fitting, J. E.

1977 An Archaeological Survey of the St. Croix National Scenic Riverway Phase I Report. CAI Report #1815. Commonwealth Associates, Inc. Jackson, Michigan.

Groethe, J. B.

1992 WDOT Archaeological Survey Field Report of the Replacement of STH 27 Bridge over the Namekagon River in Hayward, Sawyer County Wisconsin. Wisconsin Historical Society-Museum Archaeology Program. Madison, Wisconsin.

Keene D.

2014 Phase I Archaeological Investigation STH 27, CTH B to RR Street, Sawyer County, Wisconsin, ARI, Chicago, Illinois.

Van Dyke, A. P., and R. Meer

1991 An Archaeological Survey of the Hayward Hydroelectric Project on the Namekagon River at Hayward, Sawyer County, Wisconsin (FERC Project #2417). BZ Engineering, Inc. Reports of Investigation No., 19192. West Allis, Wisconsin.

Van Dyke, A. P.

1992 Archaeological Evaluation of 47 Sy-121, Submerged Pilings in Hayward Lake, Sawyer County, Wisconsin. BZ Engineering, Inc., Archaeological Services Division, Reports of Investigation No. 192110. West Allis, Wisconsin.

2003 Five-Year Reservoir Shoreline Surveys for Eroding Archaeological Sites. AVD Archaeological Services, Inc., Union Grove, Wisconsin.

2013 10-Year Archaeological Monitoring at Trego (FERC #2711), Hayward (FERC #2417), Thornapple (FERC #2475), Big Falls (FERC #2390-01), and Chippewa Falls (FERC #2440) Hydroelectric Projects. AVD Archaeological Services, Union Grove, Wisconsin.

Van Dyke, A.P. and K. Hoppe

1994 Archaeological Survey of the Lake Holcombe Hydroelectric Project in Chippewa and Rusk Counties, Wisconsin. FERC Project No. 1982. Archaeological Services Division Report of Investigations No. 194190.

Weir, D. J., J. E. Fitting, and J. W. Mueller

1979 An Archaeological Survey of the St. Croix National Scenic Riverway Final Report (Phase III). Commonwealth Associates Inc. Jackson, Michigan.

Table 1. Photo Locations

Photo #	Latitude	Longitude
1	46.00931	-91.4784
2	46.00587	-91.4754
3	46.00403	-91.4585
4	46.00353	-91.4578
5	46.00641	-91.4644
6	46.0114	-91.457
7	46.01171	-91.4547
8	46.01171	-91.4547
9	46.01327	-91.4535
10	46.0103	-91.479
11	46.00874	-91.4827
12	46.00783	-91.4833
13	46.00716	-91.4701
14	46.01239	-91.4544
15	46.01295	-91.4538

FIGURES

Figure 3.2.2-1: Hayward Project Boundary

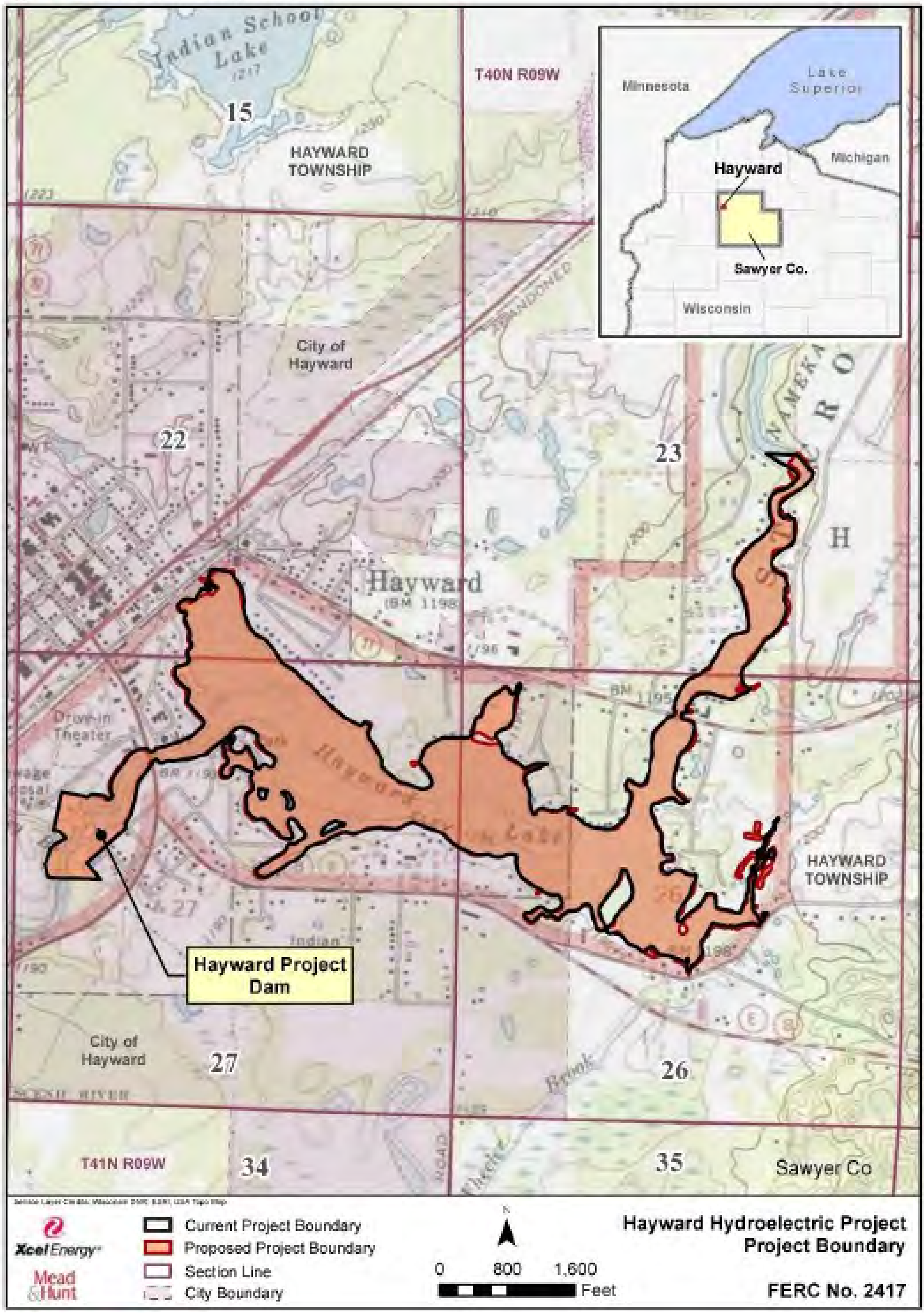


Figure 1

BASE MAP FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES. SITE LOCATION INFORMATION TAKEN FROM WHPD, (2022)

1 " = 833 '
1:10,000

0 2,000 4,000 FEET

TRC
6737 W WASHINGTON STREET
SUITE 2100
WEST ALLIS, WI 53214
PHONE: 262.879.1212

TRC - GIS

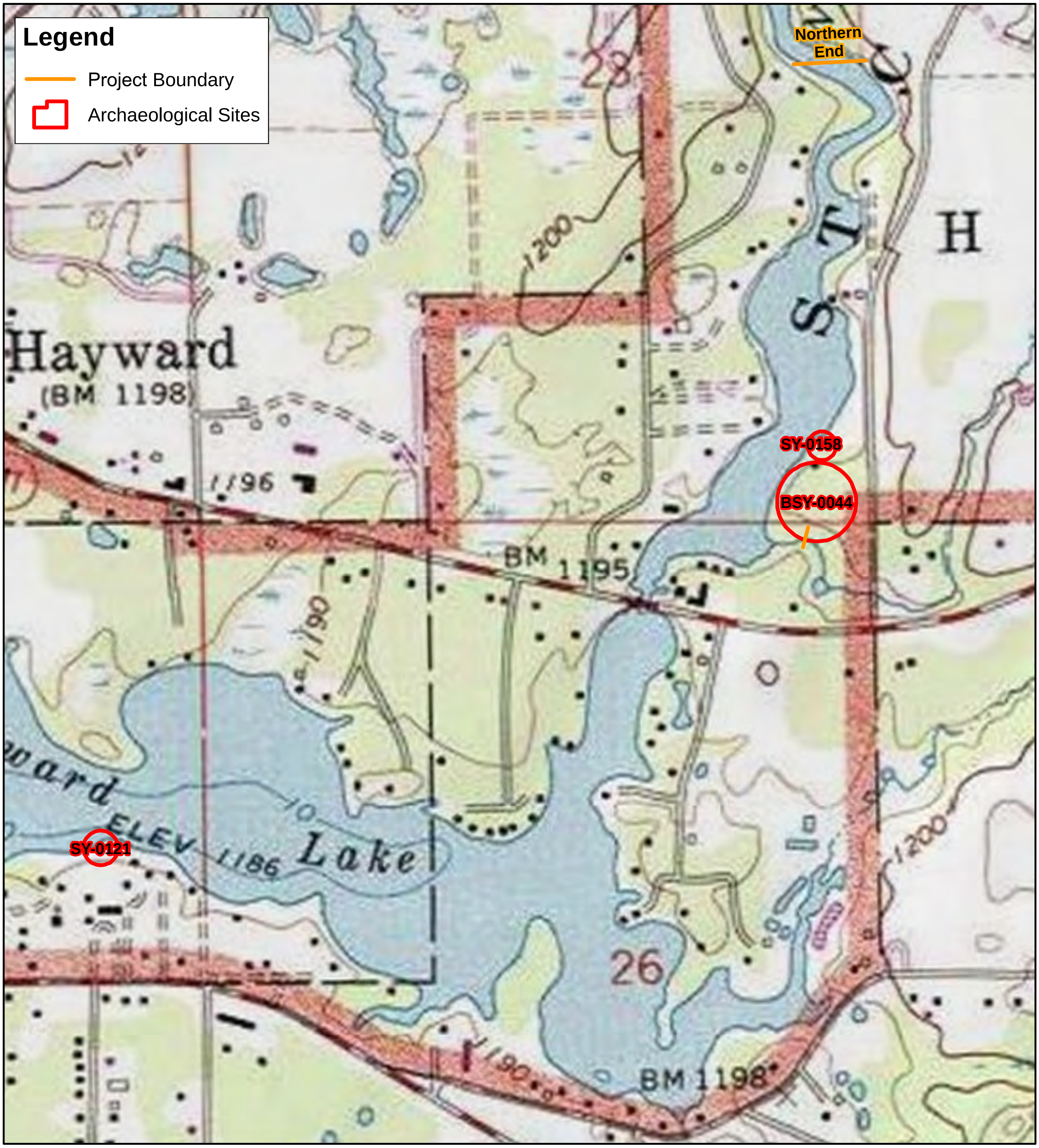
PROJECT:
XCEL ENERGY
HAYWARD HYDRO SURVEY
SAWYER COUNTY, WI

TITLE:
WHPD Site Location Map

DRAWN BY:	A.MCMAHON
CHECKED BY:	R.KLABACKA-WILLIAMS
APPROVED BY:	A.VAN DYKE
DATE:	OCTOBER 2022
PROJ. NO.:	483549
FILE:	[rpt]_Figx_[Hayward]_8x11.mxd

FIGURE 2

P:\ARCHAEOLOGY\TRC\Project by Client\Mead & Hunt\2022\Trego and Hayward Hydros\Hayward\Hayward GIS\[rpt]_Figx_[Hayward]_8x11.mxd -- Saved By: <ACP>AMcMahon </ACP>on 9/19/2022, 09:29:18 AM



BASE MAP FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES. SITE LOCATION INFORMATION TAKEN FROM WHPD, (2022)

1 " = 833 '
1:10,000

0 2,000 4,000 FEET

TRC
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WEST ALLIS, WI 53214
PHONE: 262.879.1212

TRC - GIS

PROJECT:

XCEL ENERGY
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SAWYER COUNTY, WI

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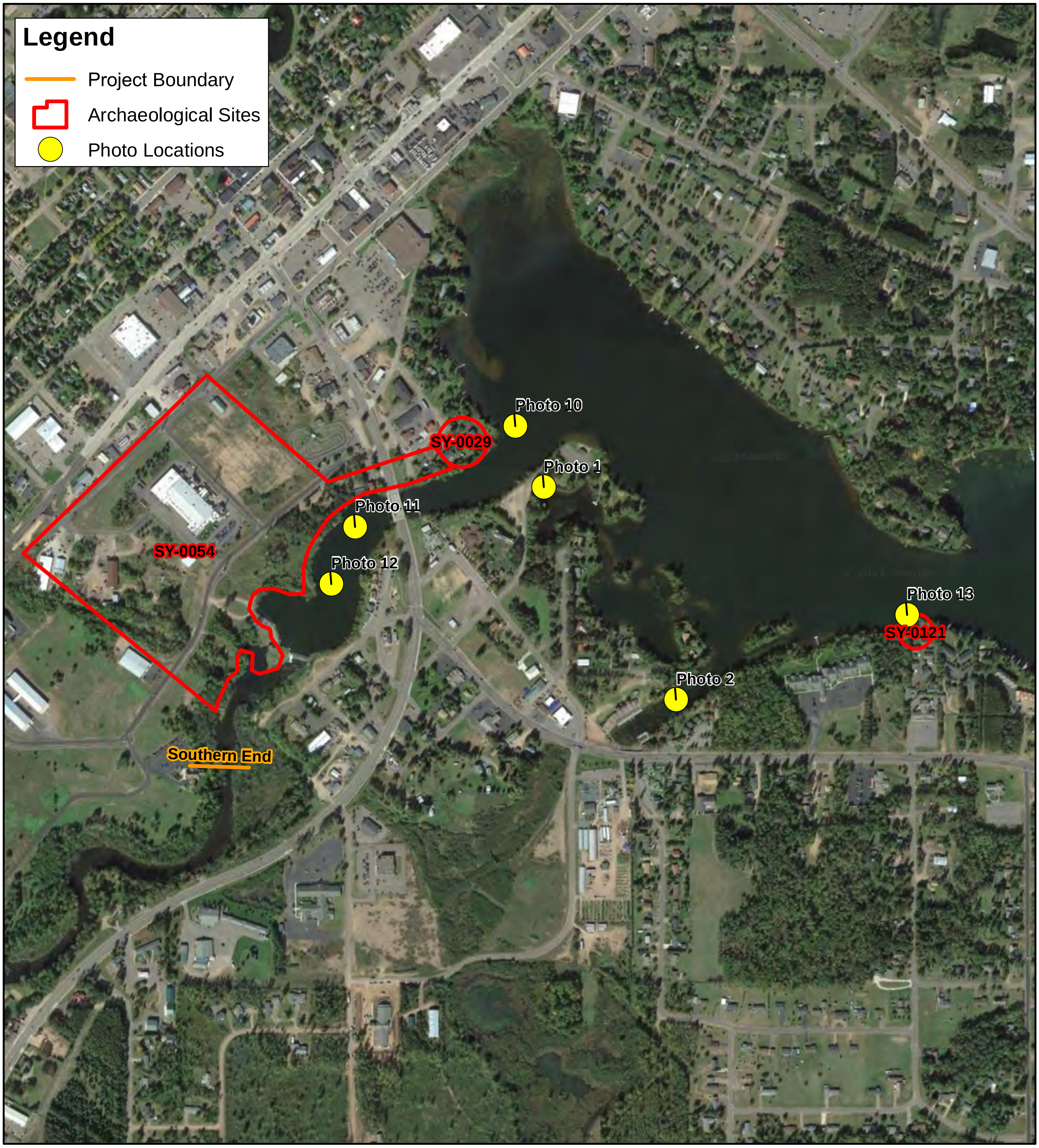
APPROVED BY:	A.VAN DYKE
DATE:	OCTOBER 2022
PROJ. NO.:	483549
FILE:	[rpt]_Figx_[Hayward]_8x11.mxd

FIGURE 3



BASE MAP FROM GOOGLE EARTH PRO & PARTNERS, (2022). SITE LOCATION INFORMATION TAKEN FROM WHPD, (2022)

1 " = 833 '
1:10,000

0 2,000 4,000 FEET

TRC
6737 W WASHINGTON STREET
SUITE 2100
WEST ALLIS, WI 53214
PHONE: 262.879.1212

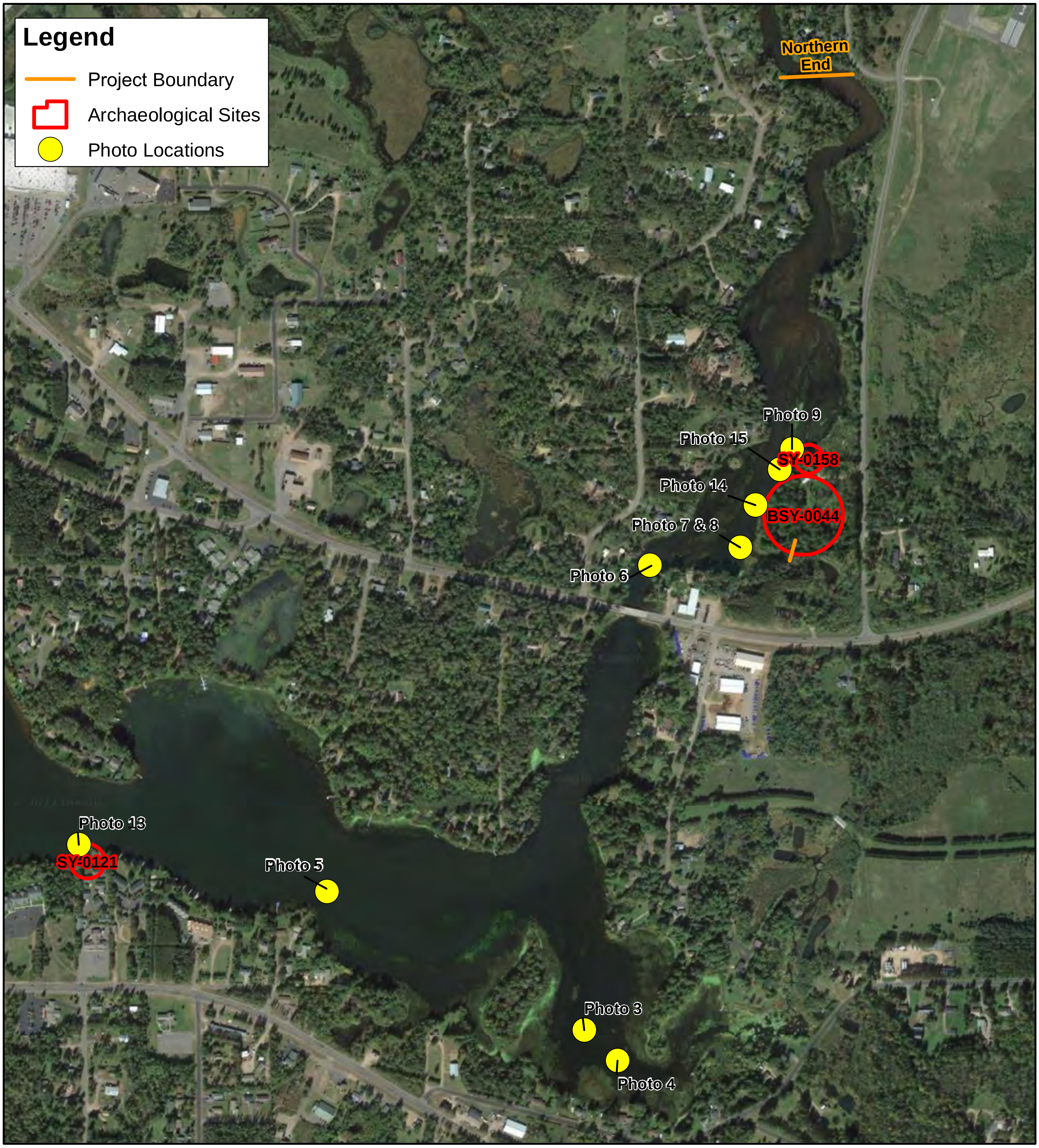
TRC - GIS

PROJECT:
XCEL ENERGY
HAYWARD HYDRO SURVEY
SAWYER COUNTY, WI

TITLE:
Photo Location Map

DRAWN BY:	A.MCMAHON
CHECKED BY:	R.KLABACKA-WILLIAMS
APPROVED BY:	A.VAN DYKE
DATE:	OCTOBER 2022
PROJ. NO.:	483549
FILE:	[rpt]_Figx_[Hayward]_8x11.mxd

FIGURE 4



BASE MAP FROM GOOGLE EARTH PRO & PARTNERS, (2022). SITE LOCATION INFORMATION TAKEN FROM WHPD, (2022)

1 " = 833 '
1:10,000

0 2,000 4,000 FEET

TRC

6737 W WASHINGTON STREET
SUITE 2100
WEST ALLIS, WI 53214
PHONE: 262.879.1212

TRC - GIS

PROJECT:	XCEL ENERGY HAYWARD HYDRO SURVEY SAWYER COUNTY, WI
TITLE:	**Photo Location Map**

DRAWN BY:	A.MCMAHON
CHECKED BY:	R.KLABACKA-WILLIAMS
APPROVED BY:	A.VAN DYKE
DATE:	OCTOBER 2022
PROJ. NO.:	483549
FILE:	[rpt]_Figx_[Hayward]_8x11.mxd

FIGURE 5

PHOTOS


Photo 1: Emergent vegetation at shoreline. View to North.


Photo 2: Shoreline - pine, oak, and birch to water, emergent vegetation. View to Southeast.


Photo 3: Pine, oak, and birch to waterline, emergent vegetation. View to West.


Photo 4: Pine, oak, and birch to water, emergent vegetation at shore. View to Southeast.


Photo 5: Residential lots - pine, oak, and birch to water, emergent vegetation. View to South.


Photo 6: Pine, oak, and birch to water, emergent vegetation. View to South.

Photo 7: Pine, oak, and birch to water, emergent vegetation. View to East.

Photo 8: Pine, oak, and birch to water, emergent vegetation at shore. View to East.

Photo 9: Pine, oak, and birch to water, emergent vegetation. View to East.

Photo 10: 47SY29 - mowed lawn, pine, oak, & birch, emergent vegetation. View to West.

Photo 11: 47SY54 - commercial property and emergent vegetation. View to West.

Photo 12: 47SY54 - pine, oak, and birch at bank, emergent vegetation. View to West.


Photo 13: 47SY121 – house yard and pine, oak, and birch. View to South.


Photo 14: 47SY158/BSY-0044 - Unverified mound 50 meters inland. View to East.


Photo 15: 47SY158/BSY-0044 - pine, oak, birch, and emergent wetland vegetation. View to East.

ARCHAEOLOGICAL REPORTS INVENTORY FORM

ARCHAEOLOGICAL REPORTS INVENTORY FORM

WHS PROJECT # N/A

COUNTY Sawyer

AUTHORS: Van Dyke, A.P. and R. Klabacka-Williams

REPORT TITLE: Shoreline Monitoring of Archaeological Sites and Erosion Check on the Hayward Hydroelectric Project (FERC No. 2417)

DATE OF REPORT (MONTH AND YEAR): January 2023

SERIES/NUMBER: TRC ROI #290

PLACE OF PUBLICATION: West Allis, WI

LOCATIONAL INFORMATION [LEGAL DESCRIPTION OF SURVEY AREA (T-R-S)]
41N, 9W, sections 22, 23, 26, 27

U.S.G.S. QUAD MAP(S): Hayward 7.5"

SITE(S) INVESTIGATED: SY-0029, SY-0054, SY-0121, SY158/BSY-0044

ACRES INVESTIGATED: N/A

AGENCY # ____

INVESTIGATION TECHNIQUES COMPLETED (Check all that apply.)

- [x] Historical Research
- [ ] Interview/Informant
- [x] Records/Background
- [x] Literature Background Research
- [ ] Traditional Knowledge
- [x] Monitoring
- [ ] Shovel Testing/Probing
- [x] Surface Survey
- [ ] Soil Core
- [x] Walk Over/Visual Inspection
- [ ] Mechanical Stripping
- [ ] Test Excavation/Phase II
- [ ] Major Excavation/Phase III
- [ ] Remote Sensing
- [ ] Geomorphology
- [ ] Underwater
- [ ] Avocational Survey
- [ ] Chance Encounter
- [ ] Osteological Analysis
- [ ] Faunal Analysis
- [ ] Floral Analysis

ABSTRACT: [x] Included in report [ ] Written in space below

APPENDIX E-8 Water Quality Study Report

STUDY REPORT

for

Hayward Hydroelectric Project (FERC Project No. 2417) and Trego Hydroelectric Project (FERC Project No. 2711)

Water Quality Monitoring Study

Prepared for:
Shawn Puzen
Shawn.Puzen@meadhunt.com
Mead & Hunt, Inc.
Phone: (920) 593-6865

Prepared by:

Great Lakes Environmental Center, Inc.
739 Hastings Street
Traverse City, Michigan 49686
Phone: (231) 525-0493
Principal Contact Person: Dennis McCauley
dmccauley@glec.com

February 7, 2023

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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.

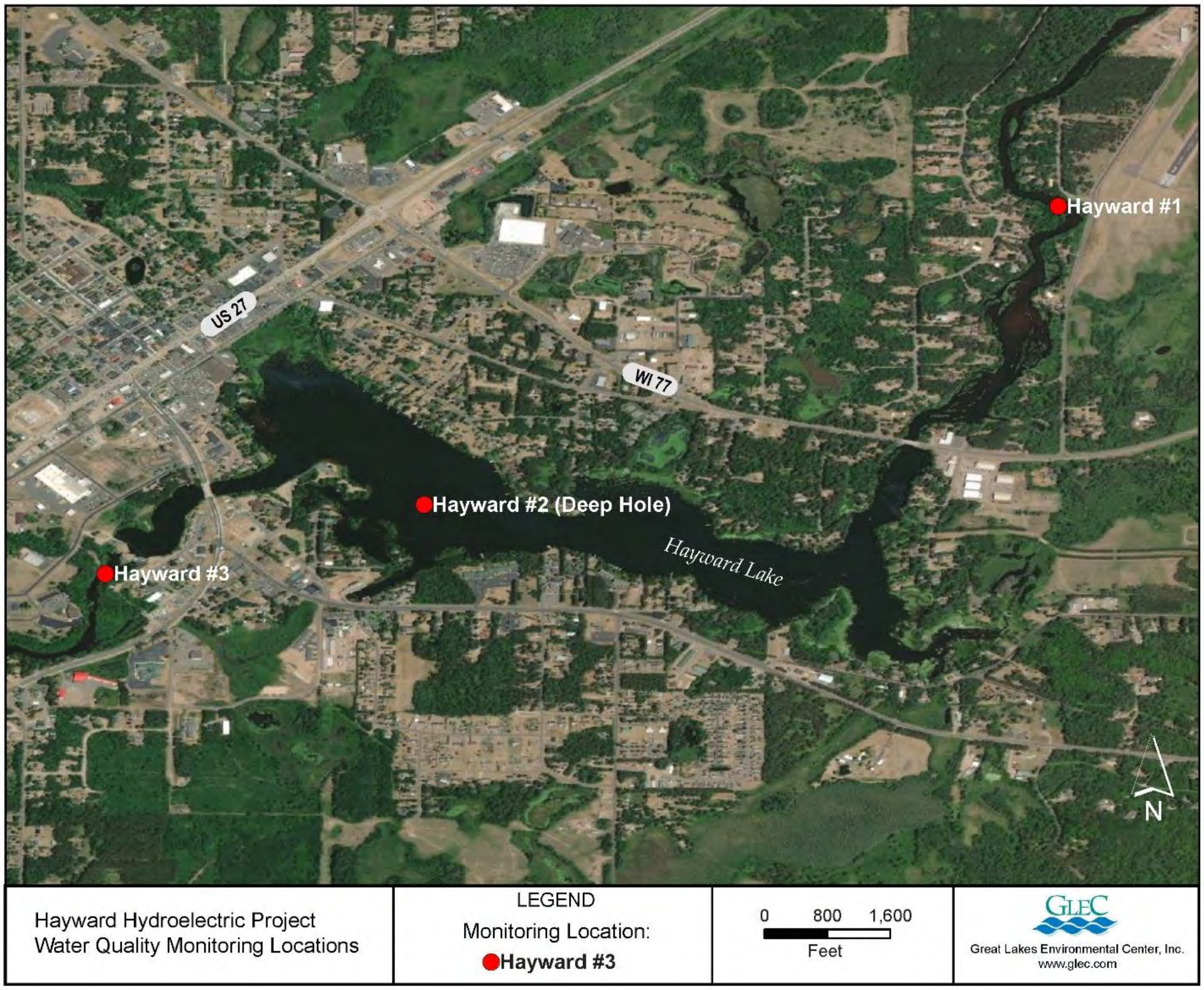

FIGURE 1. HAYWARD SAMPLING LOCATIONS FOR THE 2022 WATER QUALITY ASSESSMENT. HAYWARD #1: 46.01897, -91.45208, HAYWARD #2: 46.00855, -91.47421, HAYWARD #3: 46.00614, -91.48534

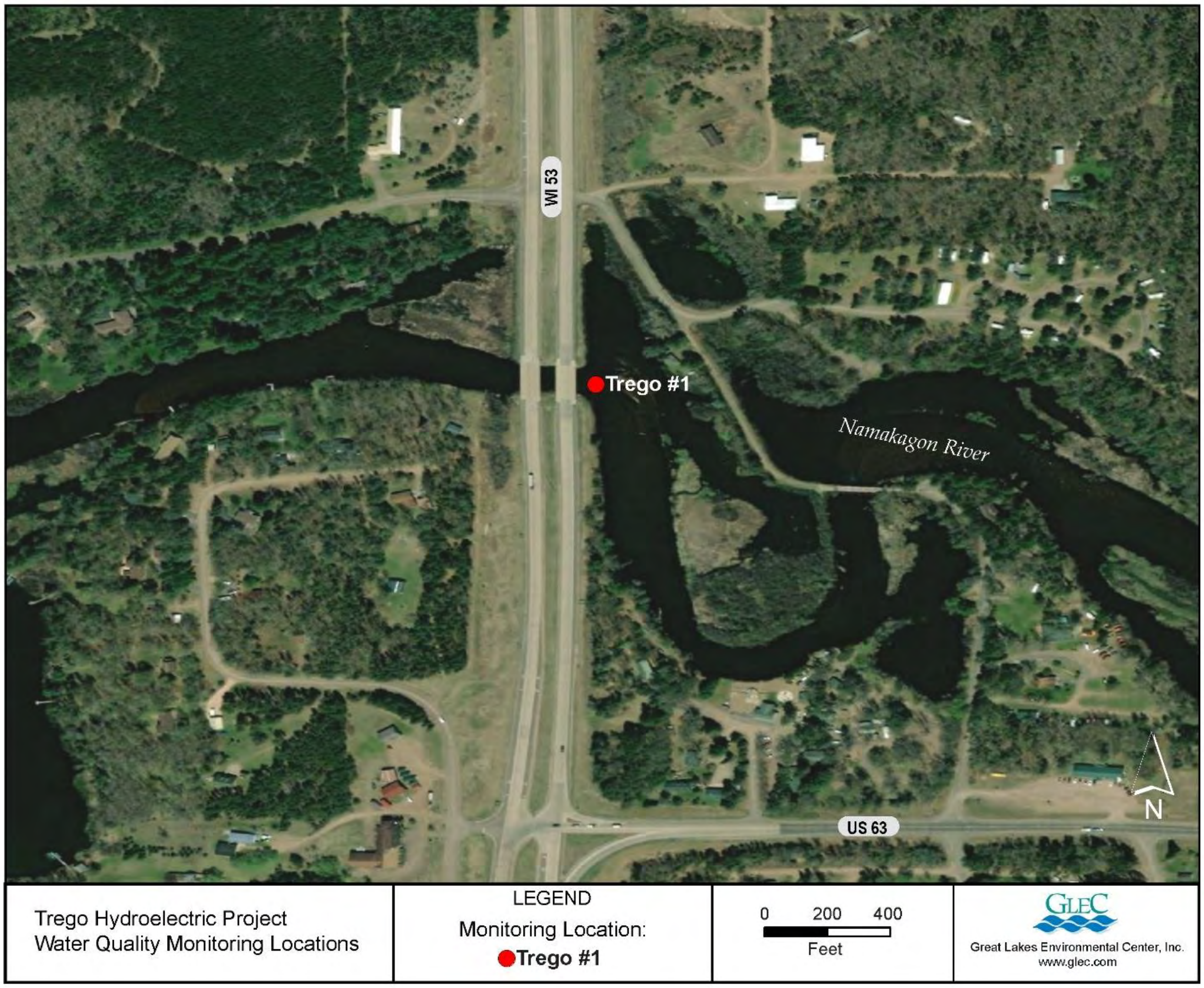

FIGURE 2. TREGO #1 SAMPLING LOCATION FOR THE 2022 WATER QUALITY ASSESSMENT. TREGO #1: 45.90951, -91.82713

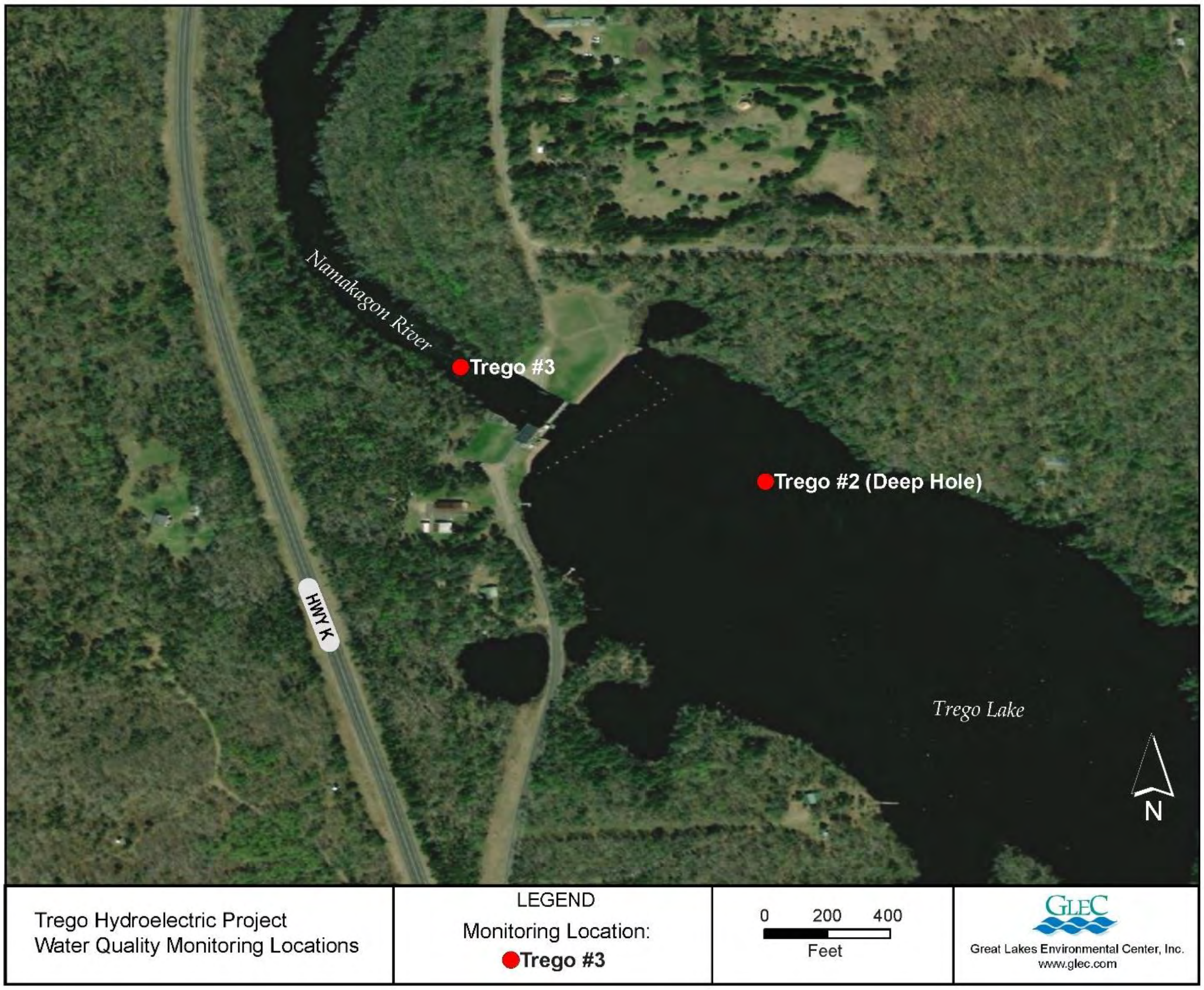

FIGURE 3. TREGO #2 AND TREGO #3 SAMPLING LOCATIONS FOR THE 2022 WATER QUALITY ASSESSMENT. TREGO #2: 45.94750, -91.88639, TREGO #3: 45.94850, -91.88905

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><th>Month</th><th>May</th><th>June</th><th>July</th><th>Aug</th><th>Sept</th><th>Oct</th></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><th>Month</th><th>May</th><th>June</th><th>July</th><th>Aug</th><th>Sept</th><th>Oct</th></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 (°C)	**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.

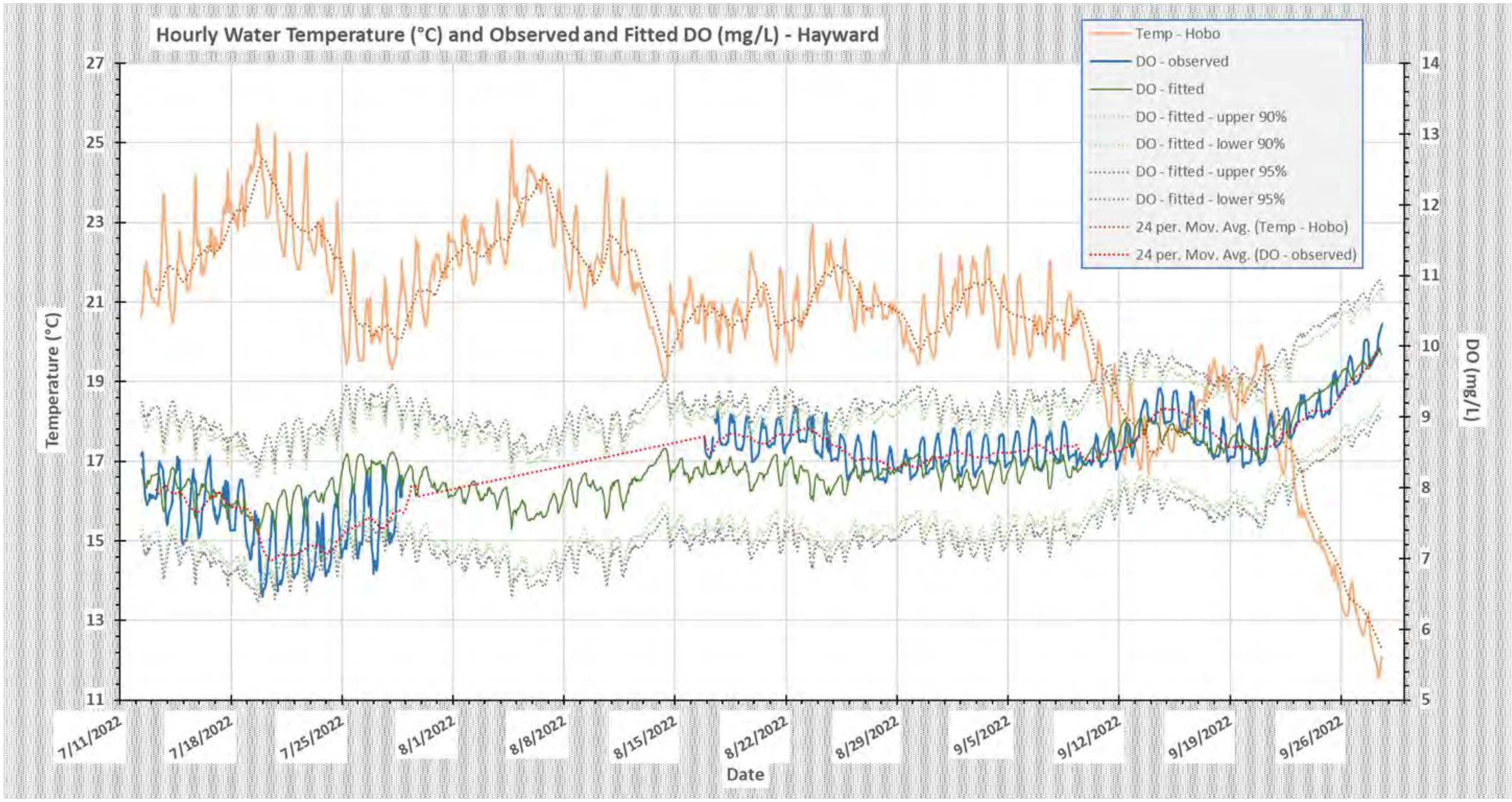

FIGURE 6. PREDICTION OF MISSED HOURLY DO VALUES FOR HAYWARD LOCATION #3 (DOWNSTREAM)

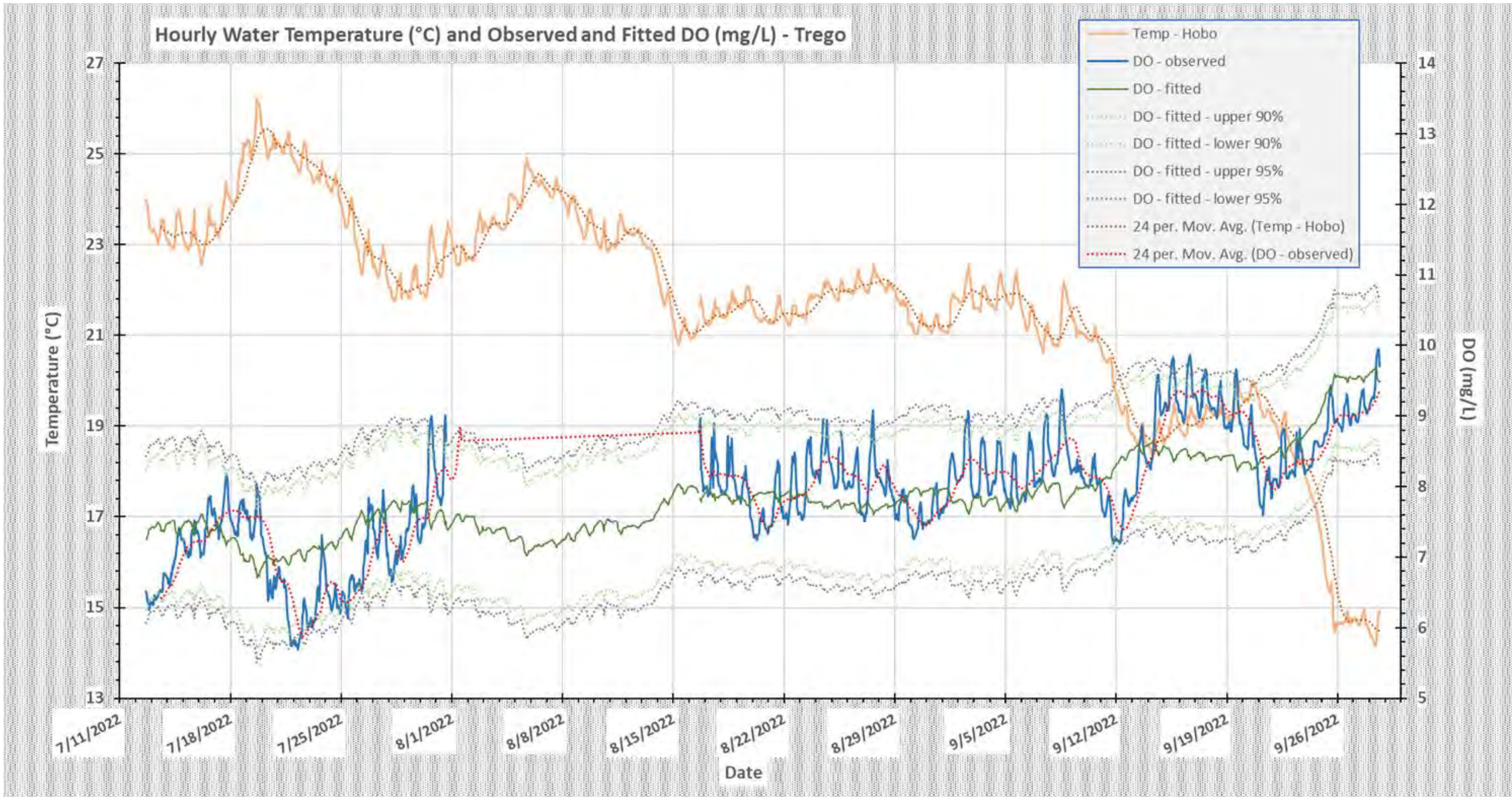

FIGURE 7. PREDICTION OF MISSED HOURLY DO VALUES FOR TREGO LOCATION #3 (DOWNSTREAM)

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).

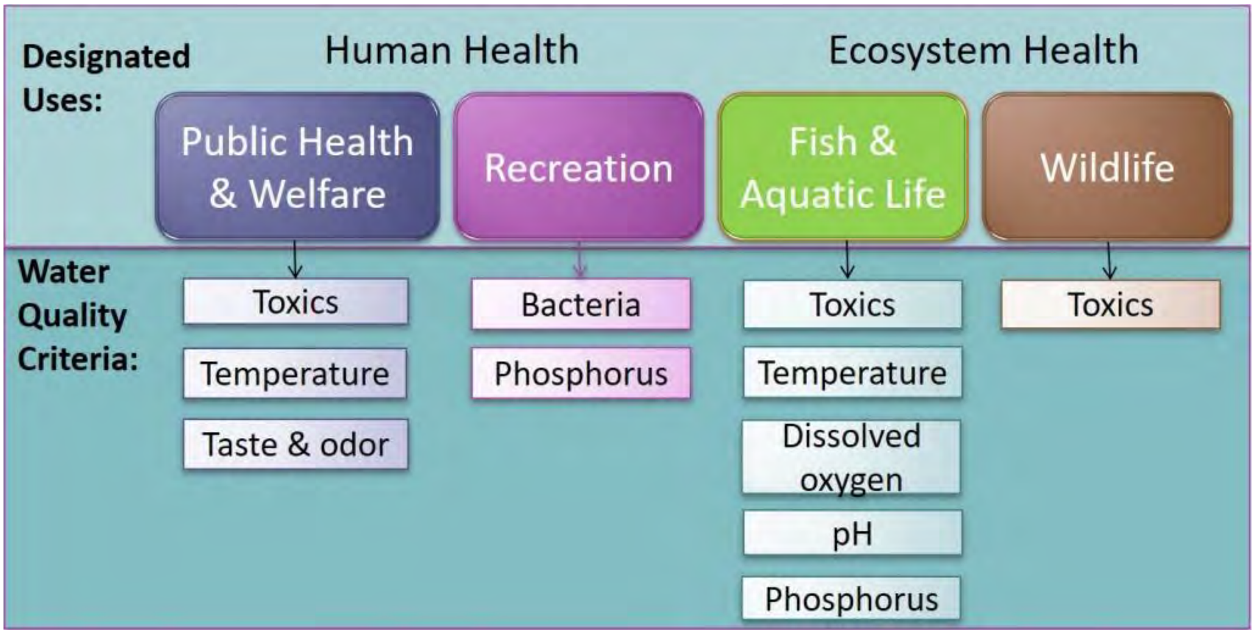

FIGURE 8. WISCONSIN GRAPHIC OF SURFACE WATER STANDARDS AND CRITERIA (Source: https://dnr.wisconsin.gov/topic/SurfaceWater/Standards.html)

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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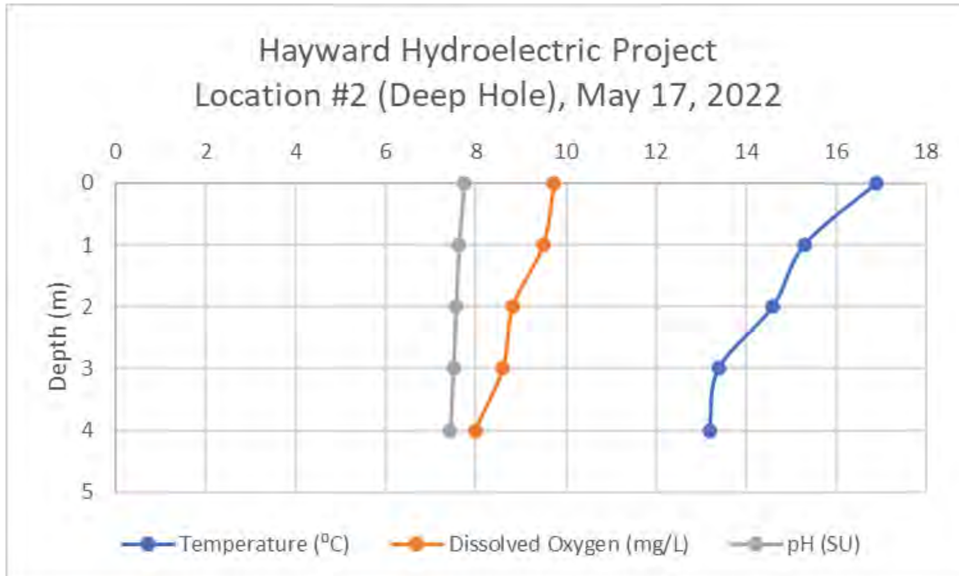
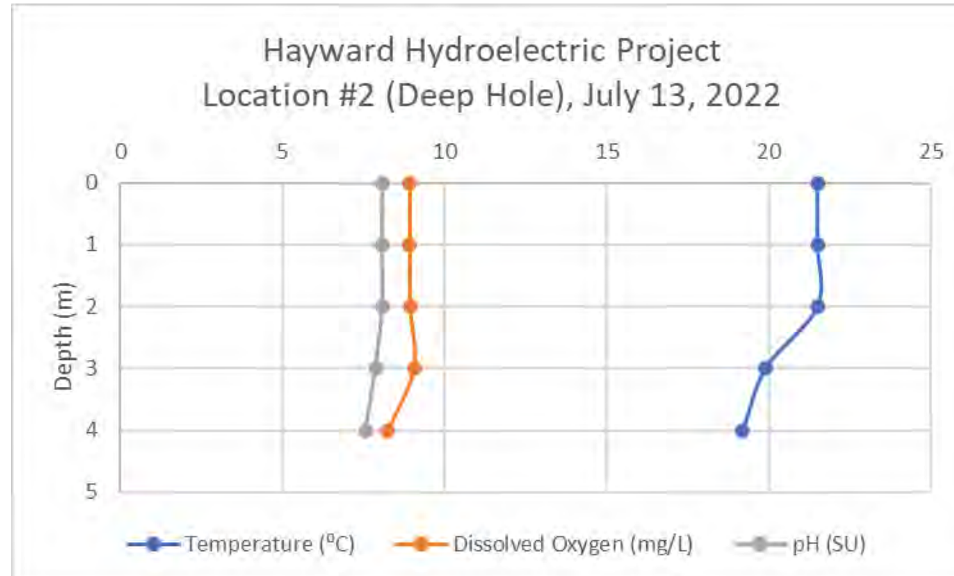
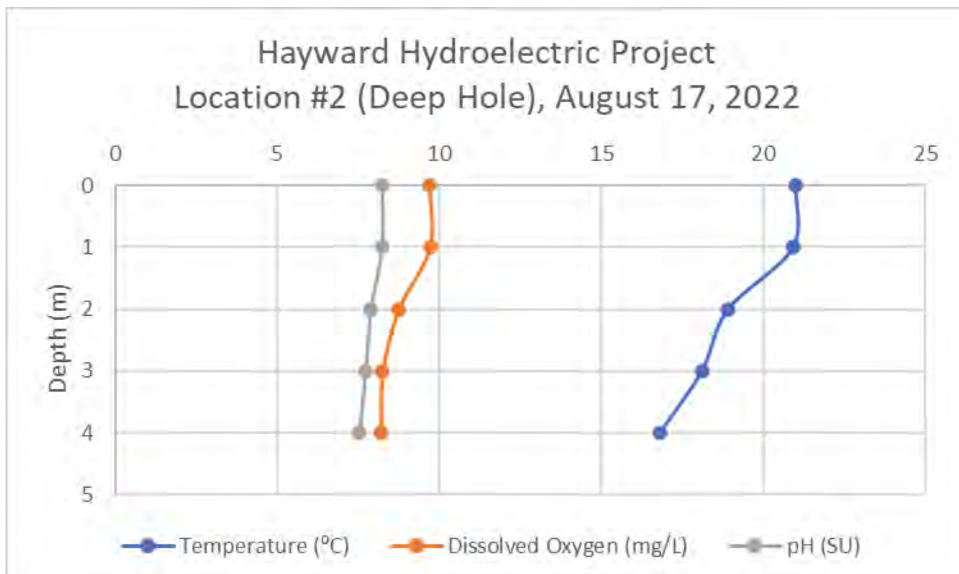
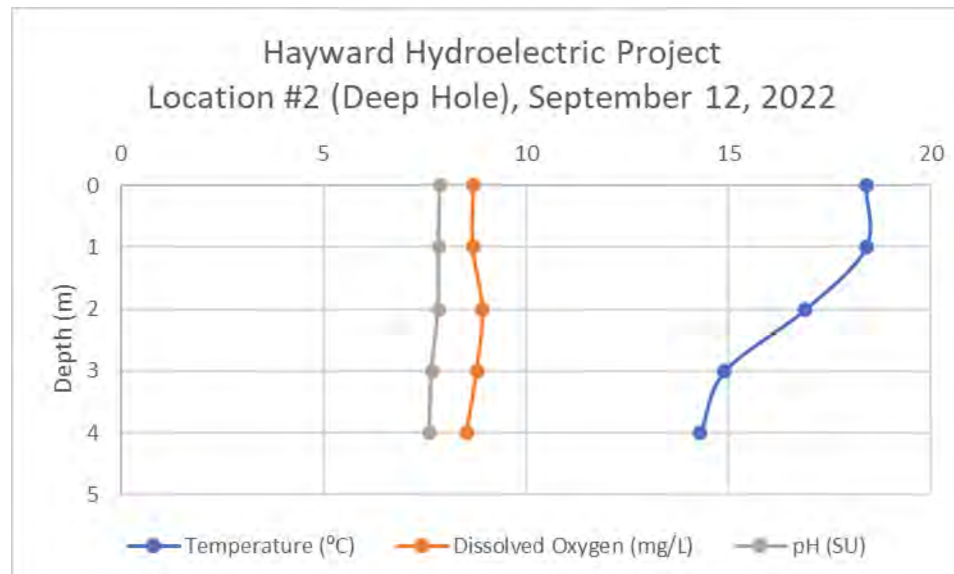
APPENDIX A

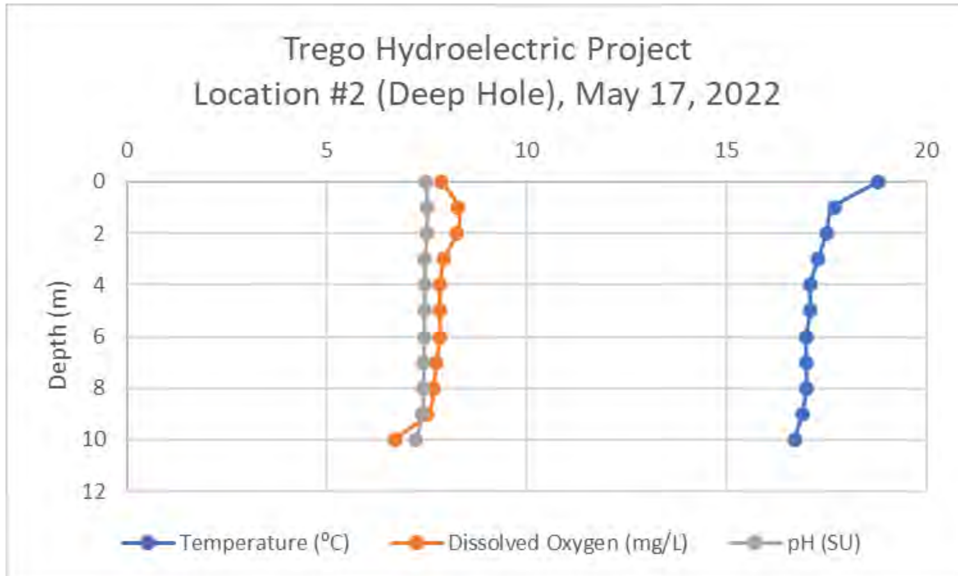
Temperature, Dissolved Oxygen, and pH Depth Profiles

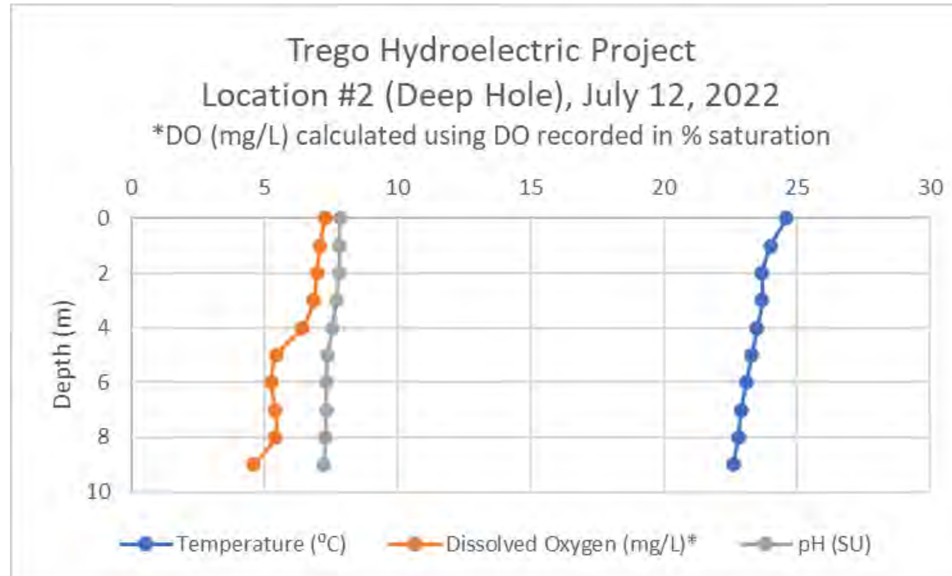

Hayward Hydroelectric Project
Location #2 (Deep Hole), May 17, 2022
0 2 4 6 8 10 12 14 16 18
Depth (m)
0 1 2 3 4 5
Temperature (°C)
Dissolved Oxygen (mg/L)
pH (SU)

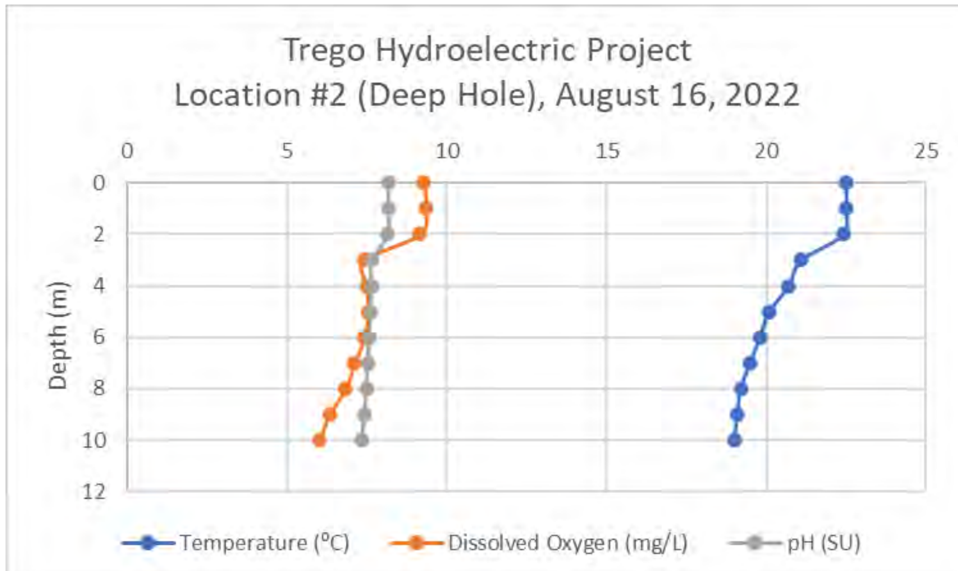

Hayward Hydroelectric Project
Location #2 (Deep Hole), July 13, 2022
0 5 10 15 20 25
Depth (m)
0 1 2 3 4 5
Temperature (°C)
Dissolved Oxygen (mg/L)
pH (SU)

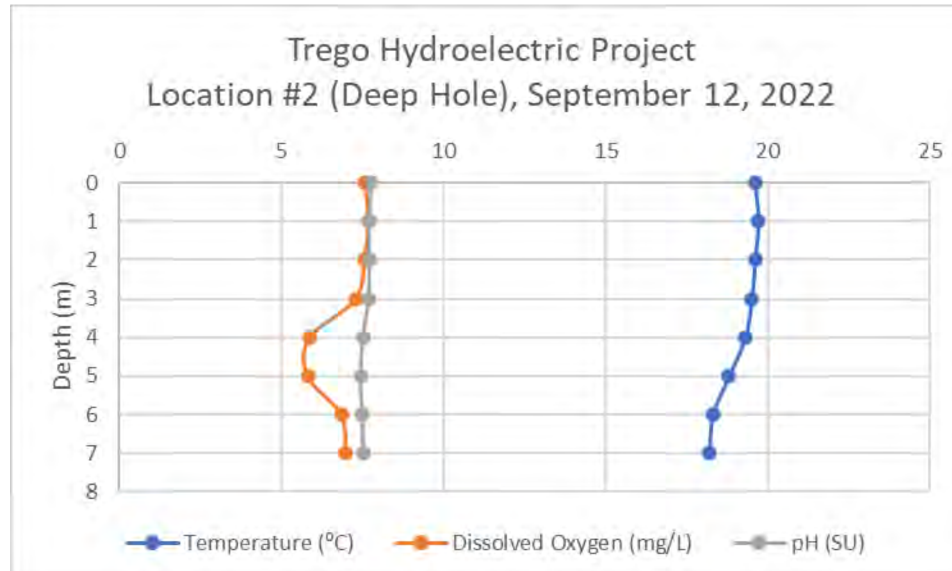

Hayward Hydroelectric Project
Location #2 (Deep Hole), August 17, 2022
0 5 10 15 20 25
Depth (m)
0 1 2 3 4 5
Temperature (°C)
Dissolved Oxygen (mg/L)
pH (SU)


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
Depth (m)
Temperature (°C)
Dissolved Oxygen (mg/L)
pH (SU)

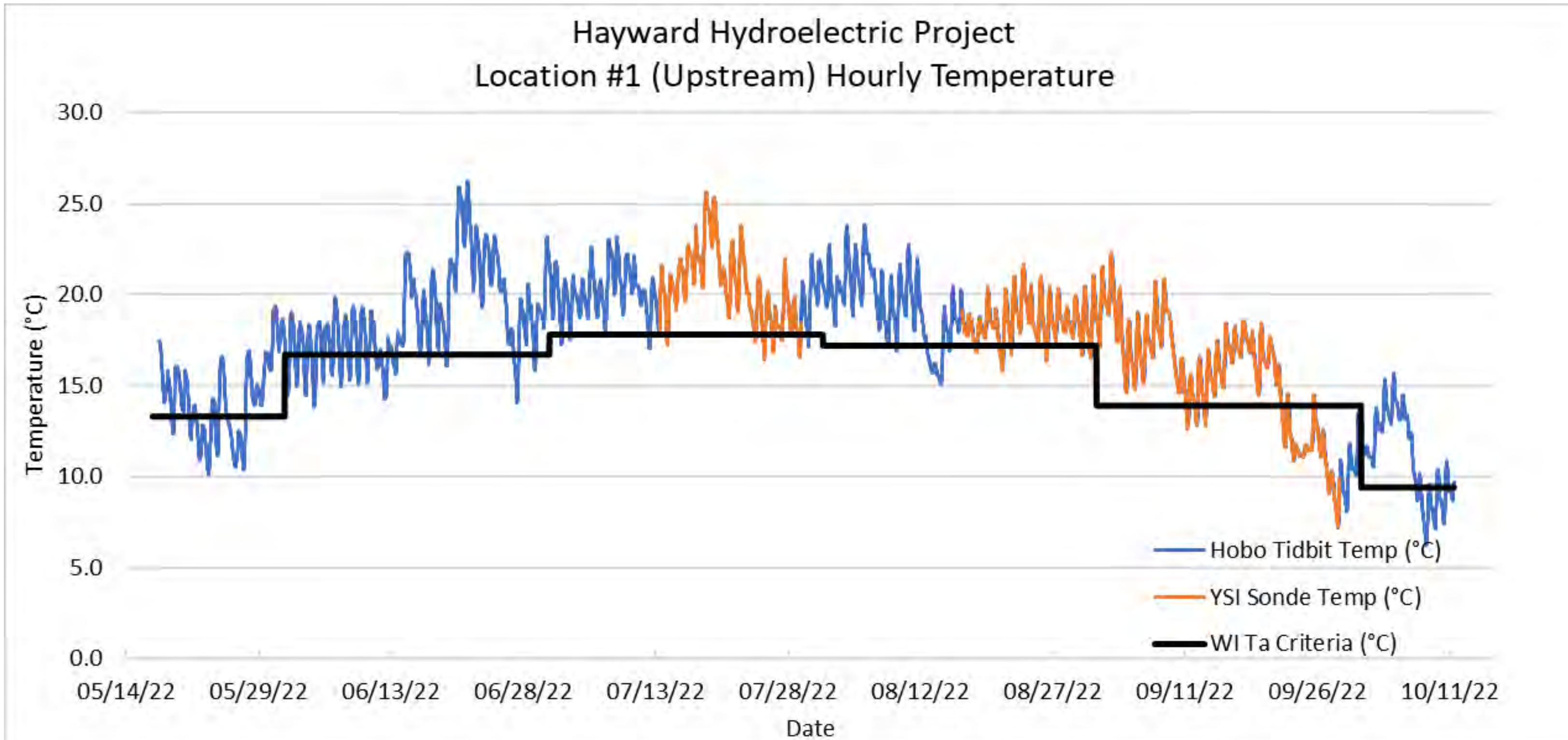

Trego Hydroelectric Project
Location #2 (Deep Hole), July 12, 2022
*DO (mg/L) calculated using DO recorded in % saturation
Depth (m)
Temperature (°C)
Dissolved Oxygen (mg/L)*
pH (SU)


Trego Hydroelectric Project
Location #2 (Deep Hole), August 16, 2022
Depth (m)
Temperature (°C)
Dissolved Oxygen (mg/L)
pH (SU)


Trego Hydroelectric Project
Location #2 (Deep Hole), September 12, 2022
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
30.0
25.0
20.0
15.0
10.0
5.0
0.0
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
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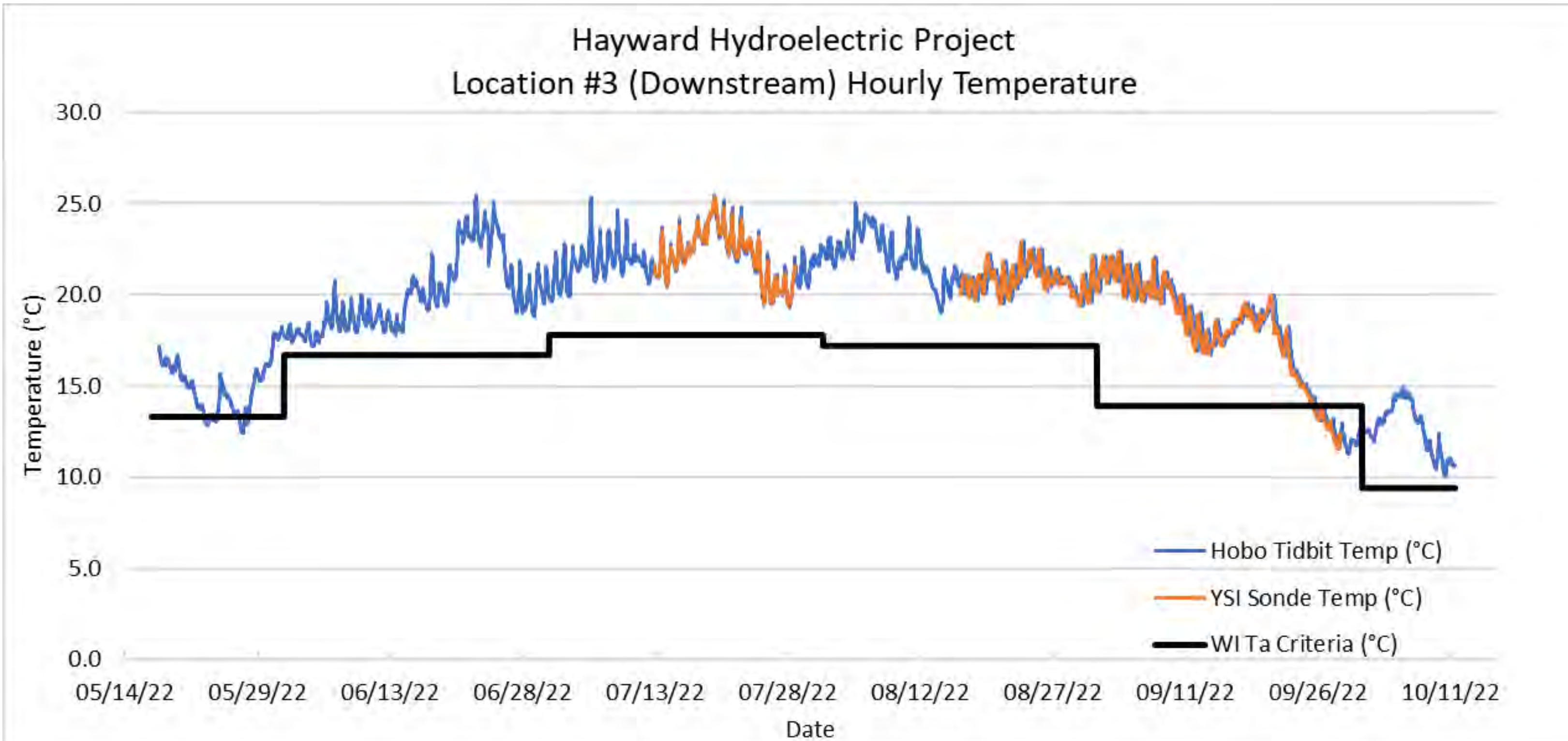
10/11/22
Date
Hobo Tidbit Temp (°C)
YSI Sonde Temp (°C)
WI Ta Criteria (°C)


Hayward Hydroelectric Project
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Temperature (°C)
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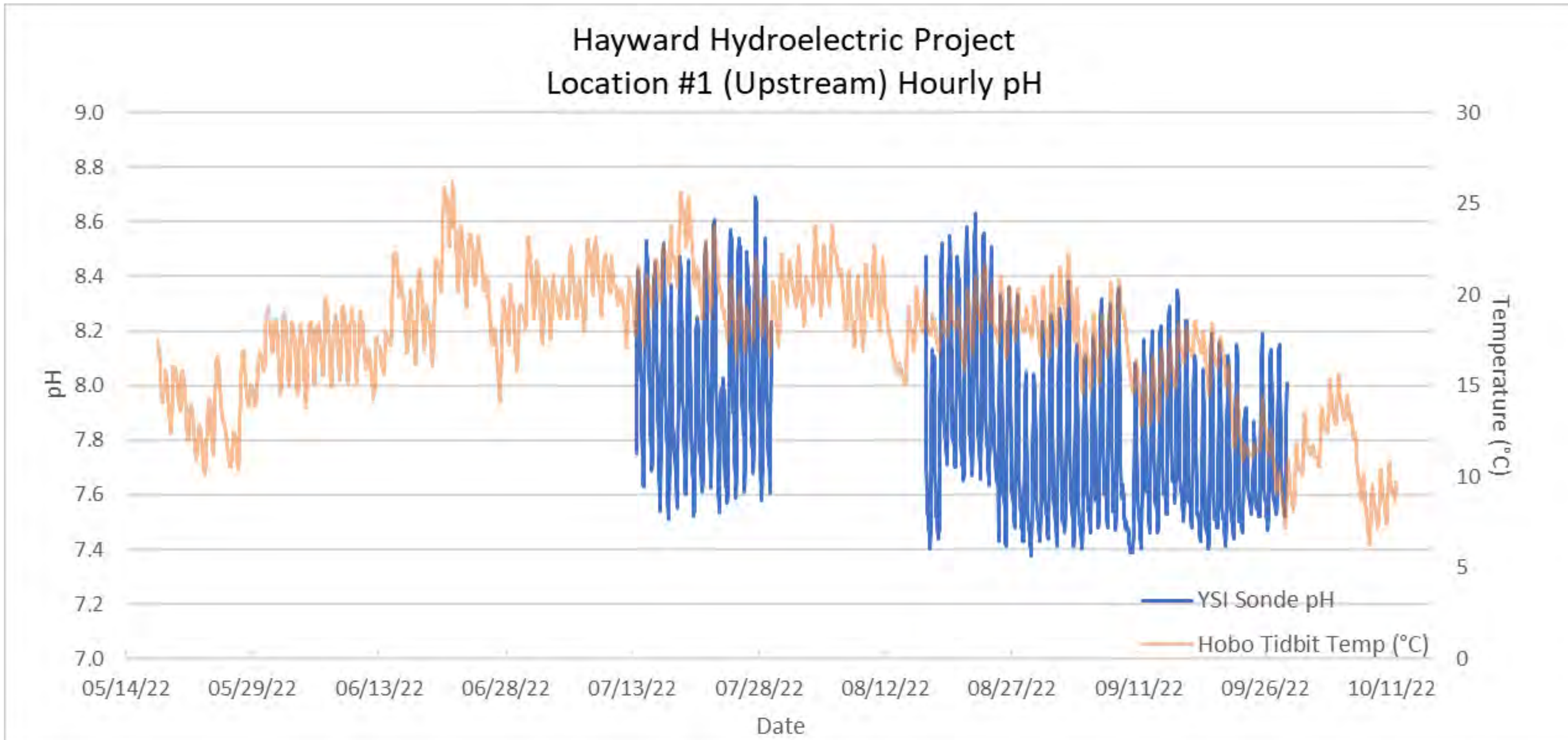
15.0
10.0
5.0
0.0
05/14/22
05/29/22
06/13/22
06/28/22
07/13/22
07/28/22
08/12/22
08/27/22
09/11/22
09/26/22
10/11/22
Date
Hobo Tidbit Temp (°C)
YSI Sonde Temp (°C)
WI Ta Criteria (°C)


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
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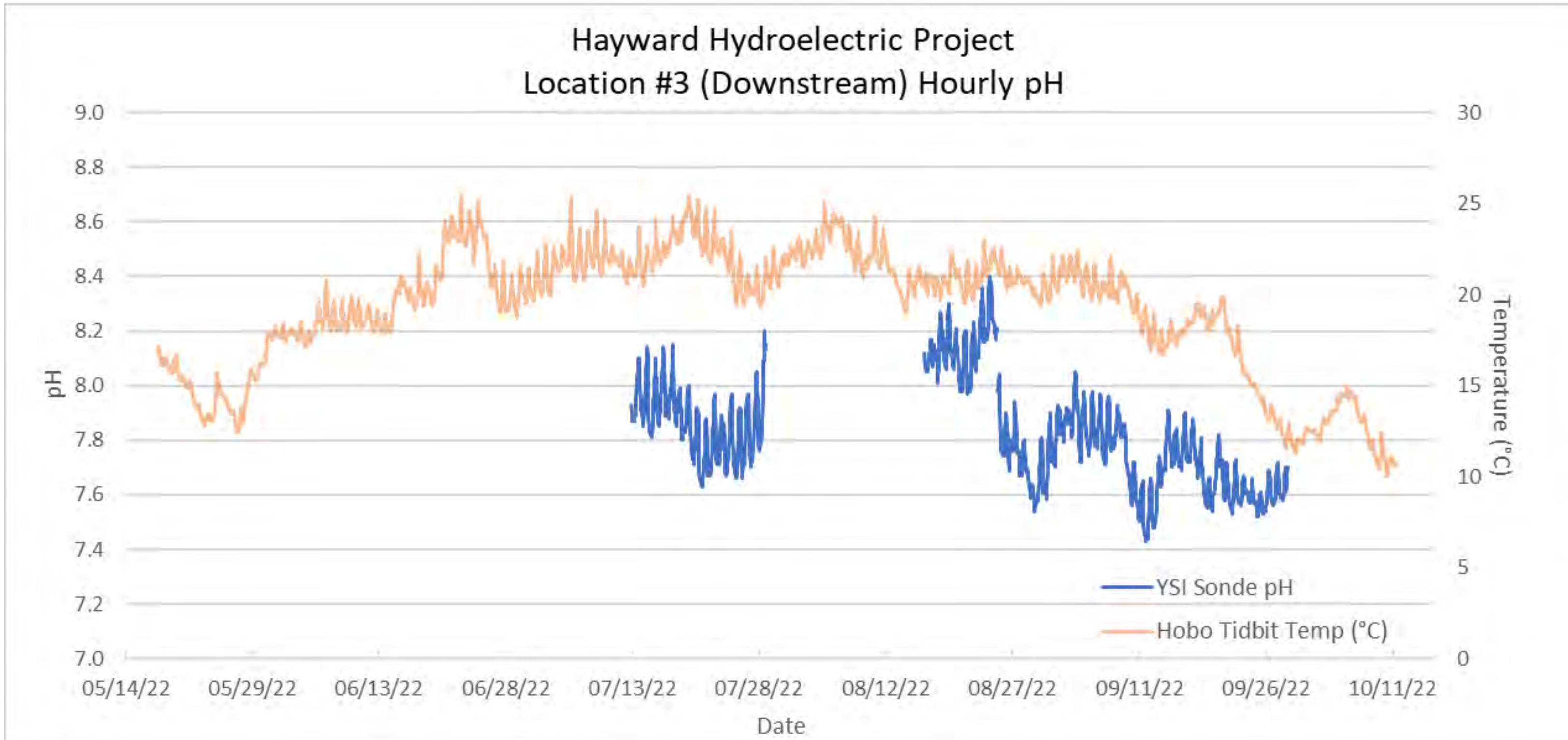
Date
YSI Sonde pH
Hobo Tidbit Temp (°C)



Hayward Hydroelectric Project
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9.0
8.8
8.6
8.4
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7.2
7.0
pH
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Temperature (°C)
05/14/22
05/29/22
06/13/22
06/28/22
07/13/22
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08/12/22
08/27/22
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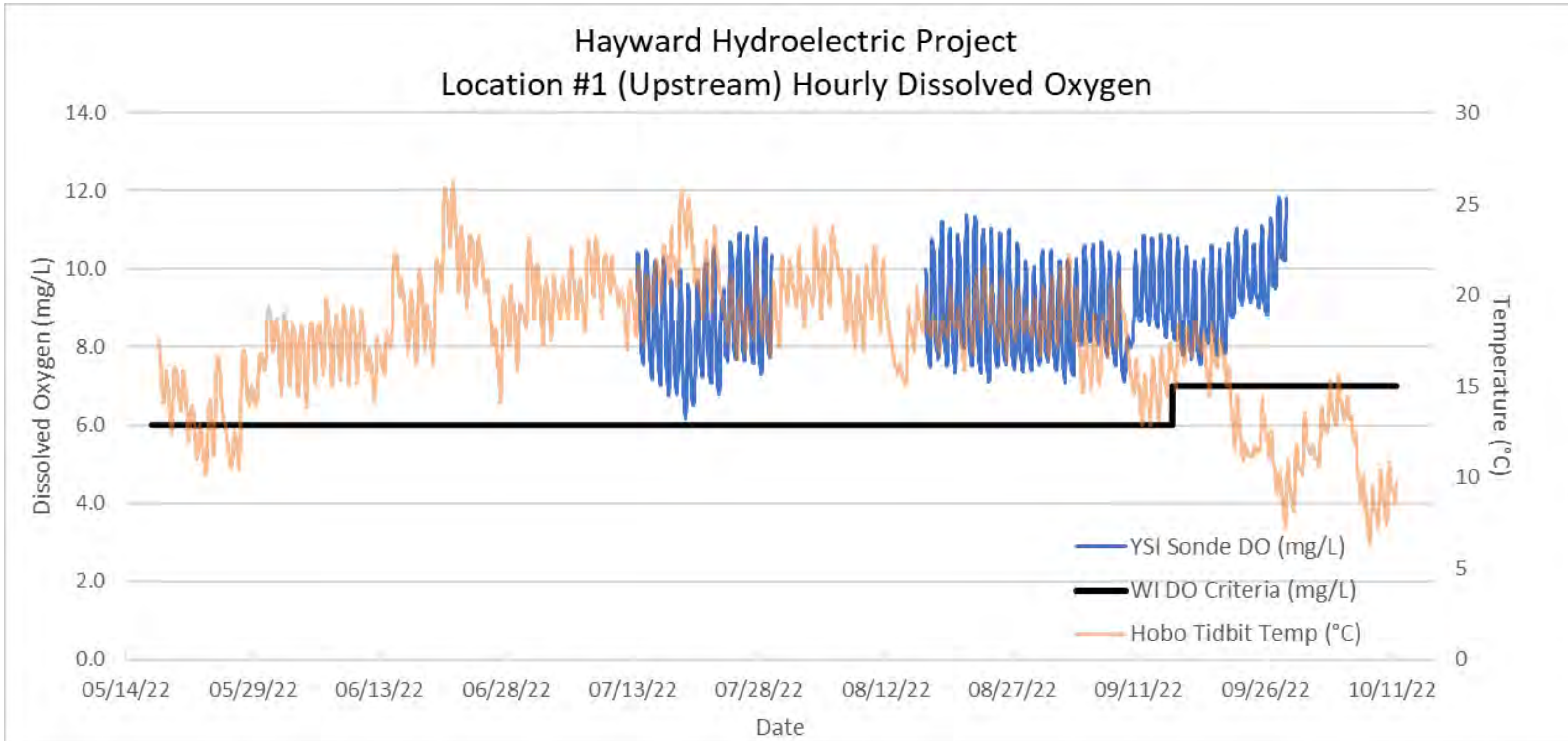
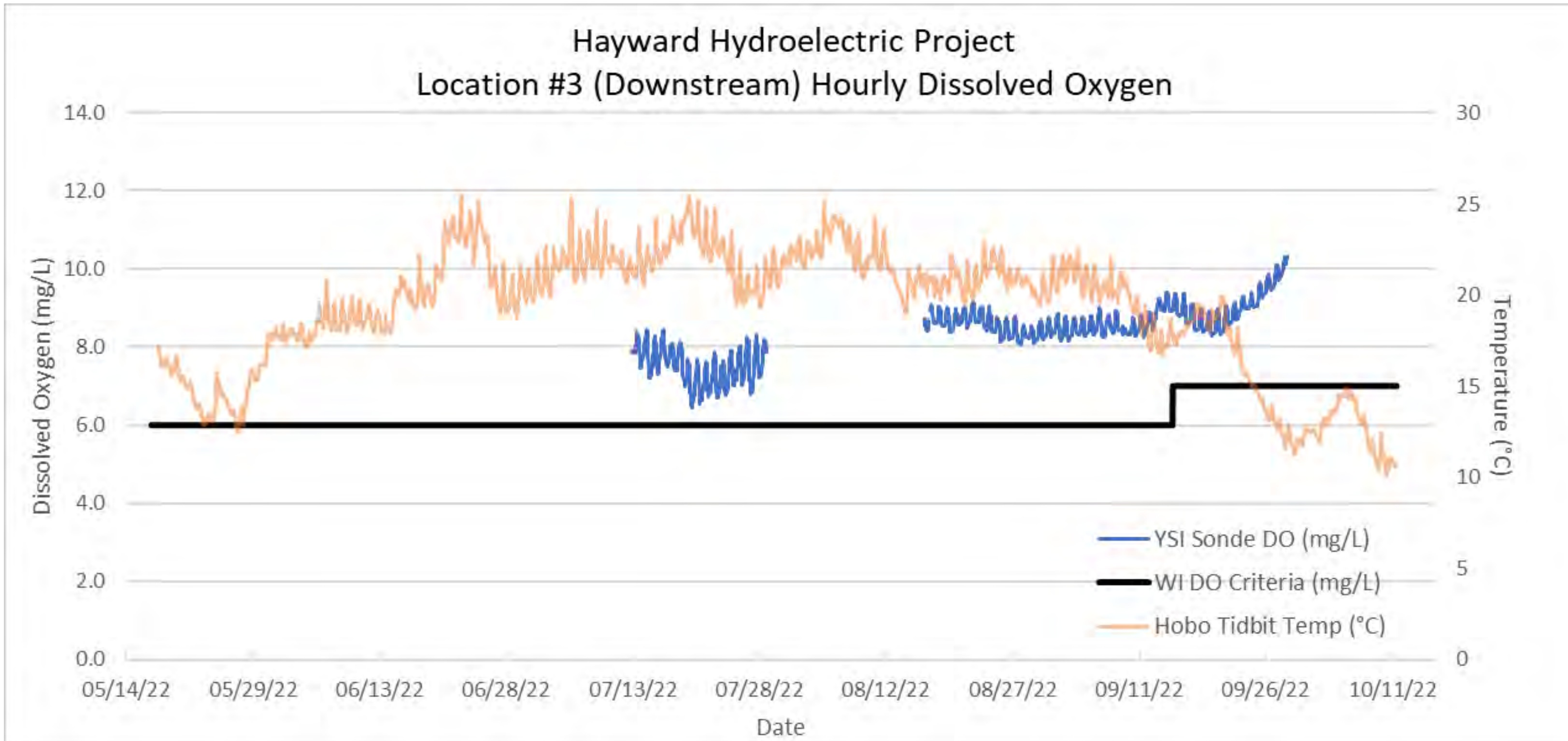
09/26/22
10/11/22
Date
YSI Sonde pH
Hobo Tidbit Temp (°C)


Hayward Hydroelectric Project
Location #1 (Upstream) Hourly Dissolved Oxygen
Dissolved Oxygen (mg/L)
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Temperature (°C)
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 #3 (Downstream) Hourly Dissolved Oxygen
Dissolved Oxygen (mg/L)
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12.0
10.0
8.0
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4.0
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Temperature (°C)
30
25
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06/13/22
06/28/22
07/13/22
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08/12/22
08/27/22
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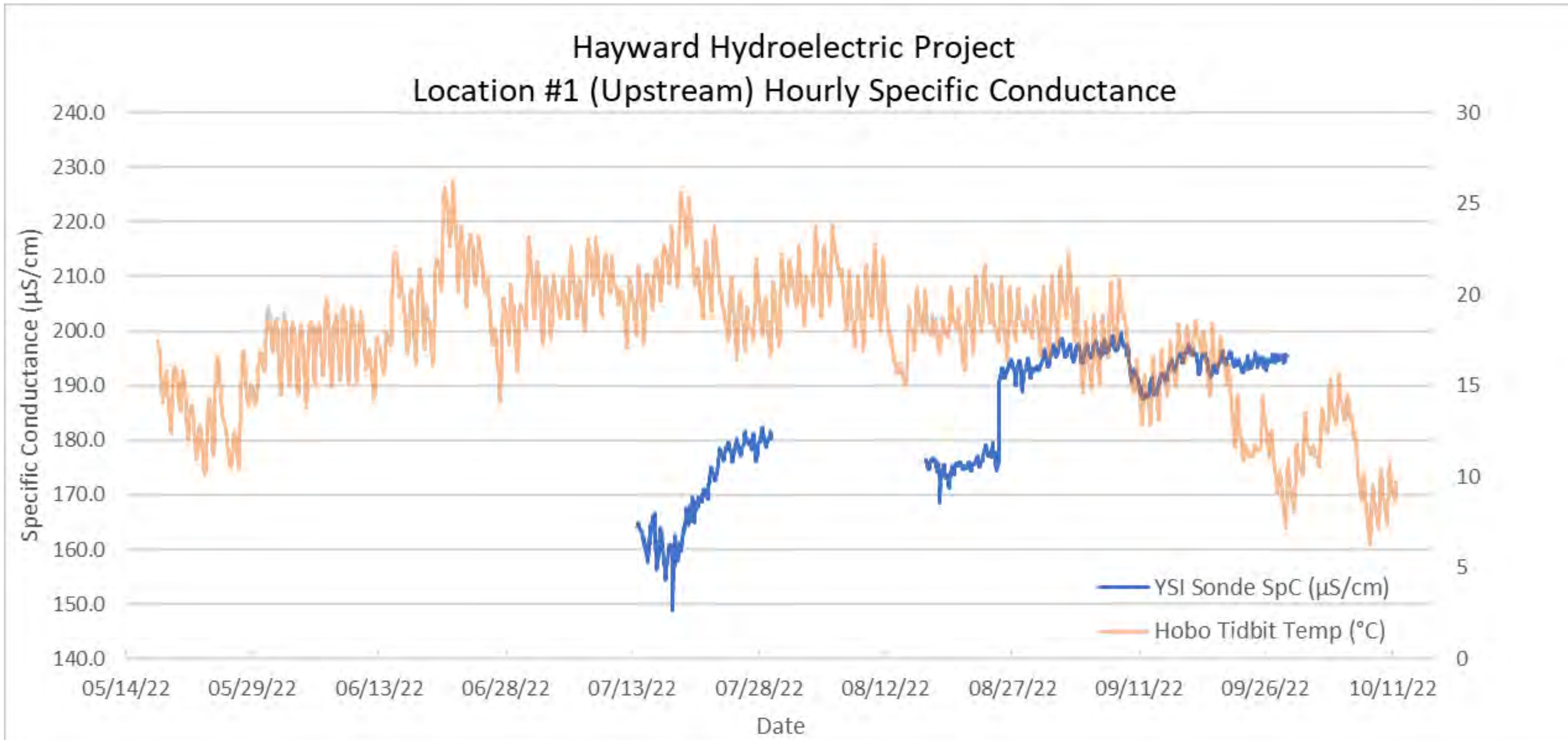
10/11/22
Date
YSI Sonde DO (mg/L)
WI DO Criteria (mg/L)
Hobo Tidbit Temp (°C)


Hayward Hydroelectric Project
Location #1 (Upstream) Hourly Specific Conductance
Specific Conductance (µS/cm)
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230.0
220.0
210.0
200.0
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170.0
160.0
150.0
140.0
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10
5
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06/13/22
06/28/22
07/13/22
07/28/22
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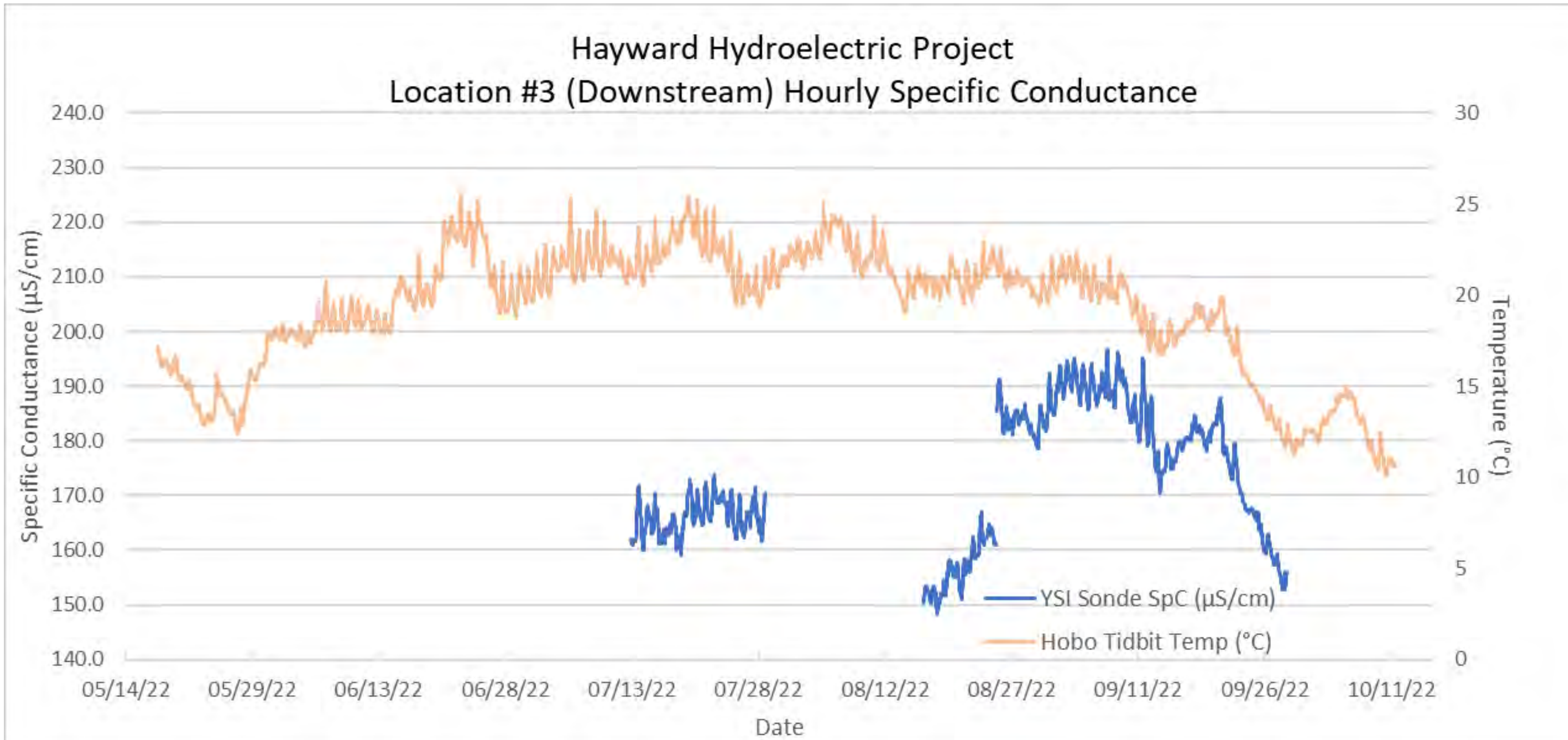
09/26/22
10/11/22
Date
YSI Sonde SpC (µS/cm)
Hobo Tidbit Temp (°C)


Hayward Hydroelectric Project
Location #3 (Downstream) Hourly Specific Conductance
Specific Conductance (µS/cm)
240.0
230.0
220.0
210.0
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170.0
160.0
150.0
140.0
Temperature (°C)
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25
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10
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0
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06/13/22
06/28/22
07/13/22
07/28/22
08/12/22
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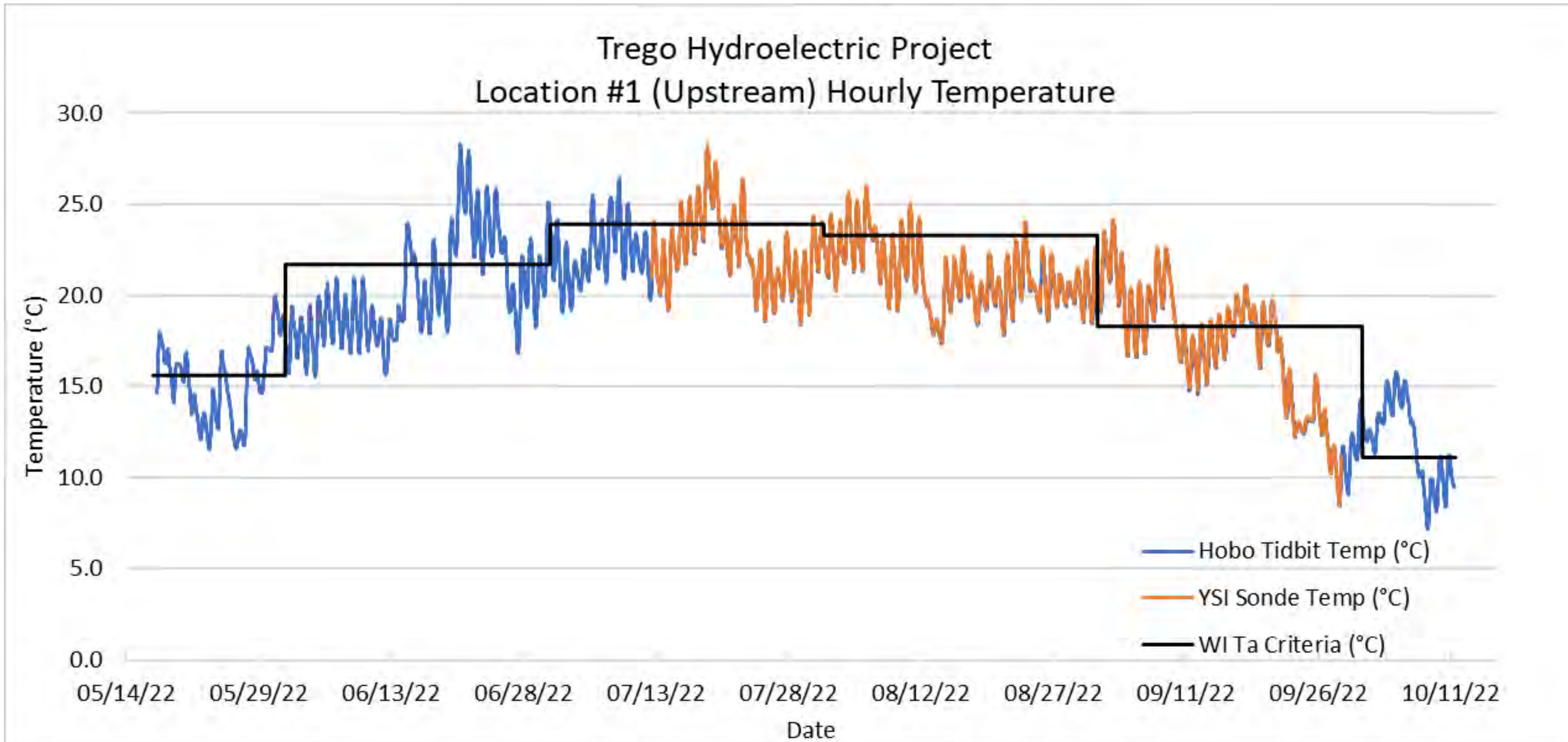
09/26/22
10/11/22
Date
YSI Sonde SpC (µS/cm)
Hobo Tidbit Temp (°C)


Trego Hydroelectric Project
Location #1 (Upstream) Hourly Temperature
Temperature (°C)
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20.0
15.0
10.0
5.0
0.0
05/14/22
05/29/22
06/13/22
06/28/22
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07/28/22
08/12/22
08/27/22
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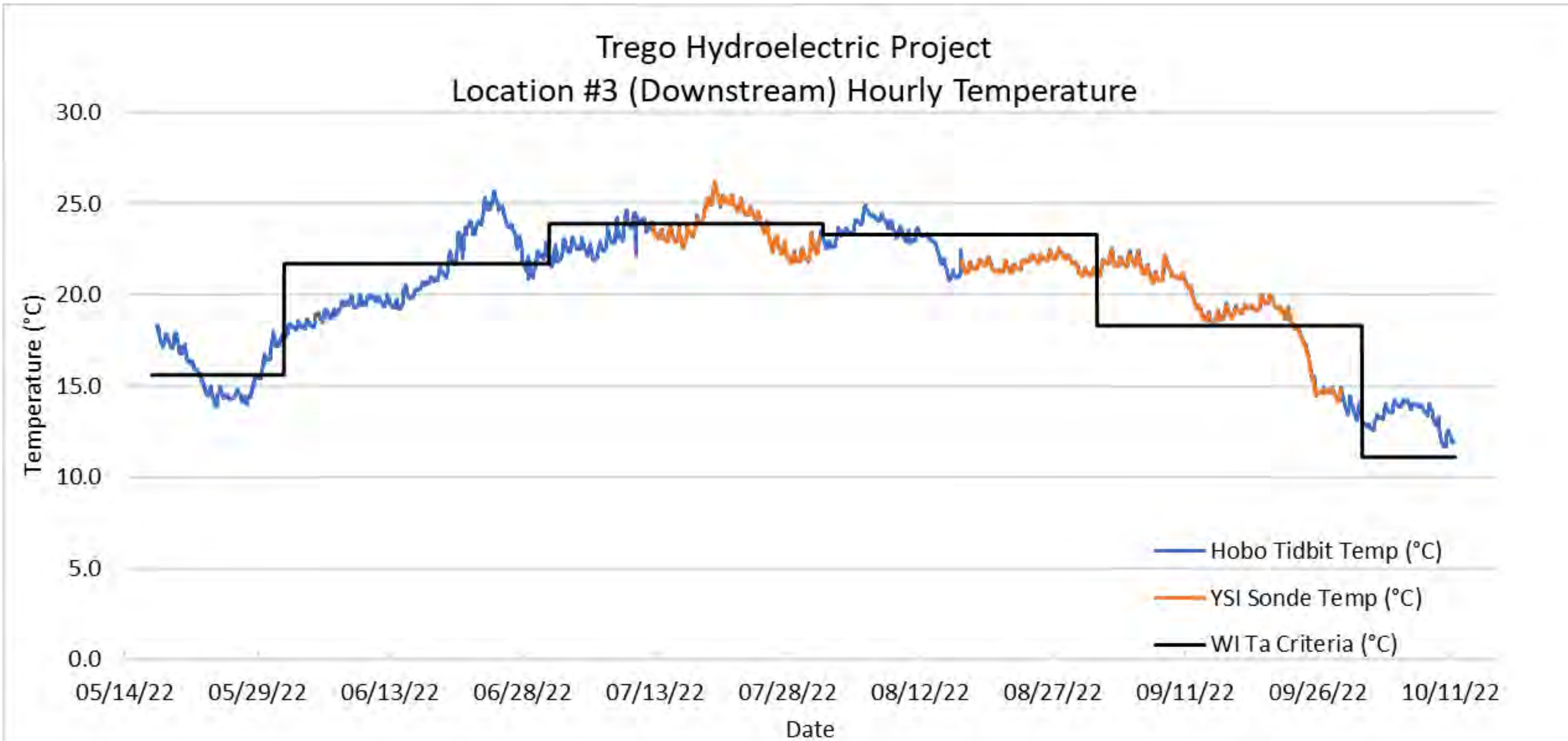
Date
Hobo Tidbit Temp (°C)
YSI Sonde Temp (°C)
WI Ta Criteria (°C)


Trego Hydroelectric Project
Location #3 (Downstream) Hourly Temperature
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25.0
20.0
15.0
10.0
5.0
0.0
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
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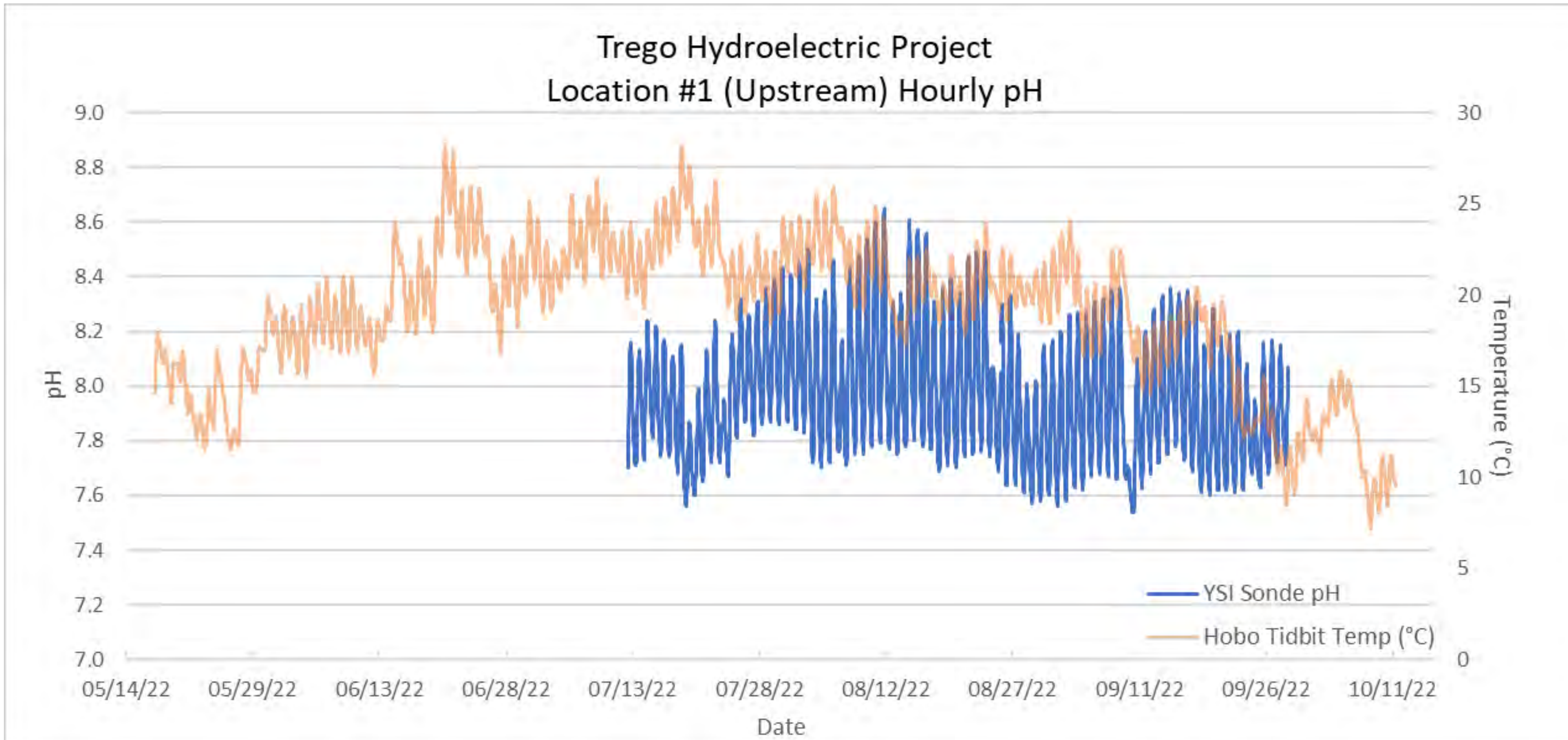
YSI Sonde Temp (°C)
WI Ta Criteria (°C)


Trego Hydroelectric Project
Location #1 (Upstream) Hourly pH
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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
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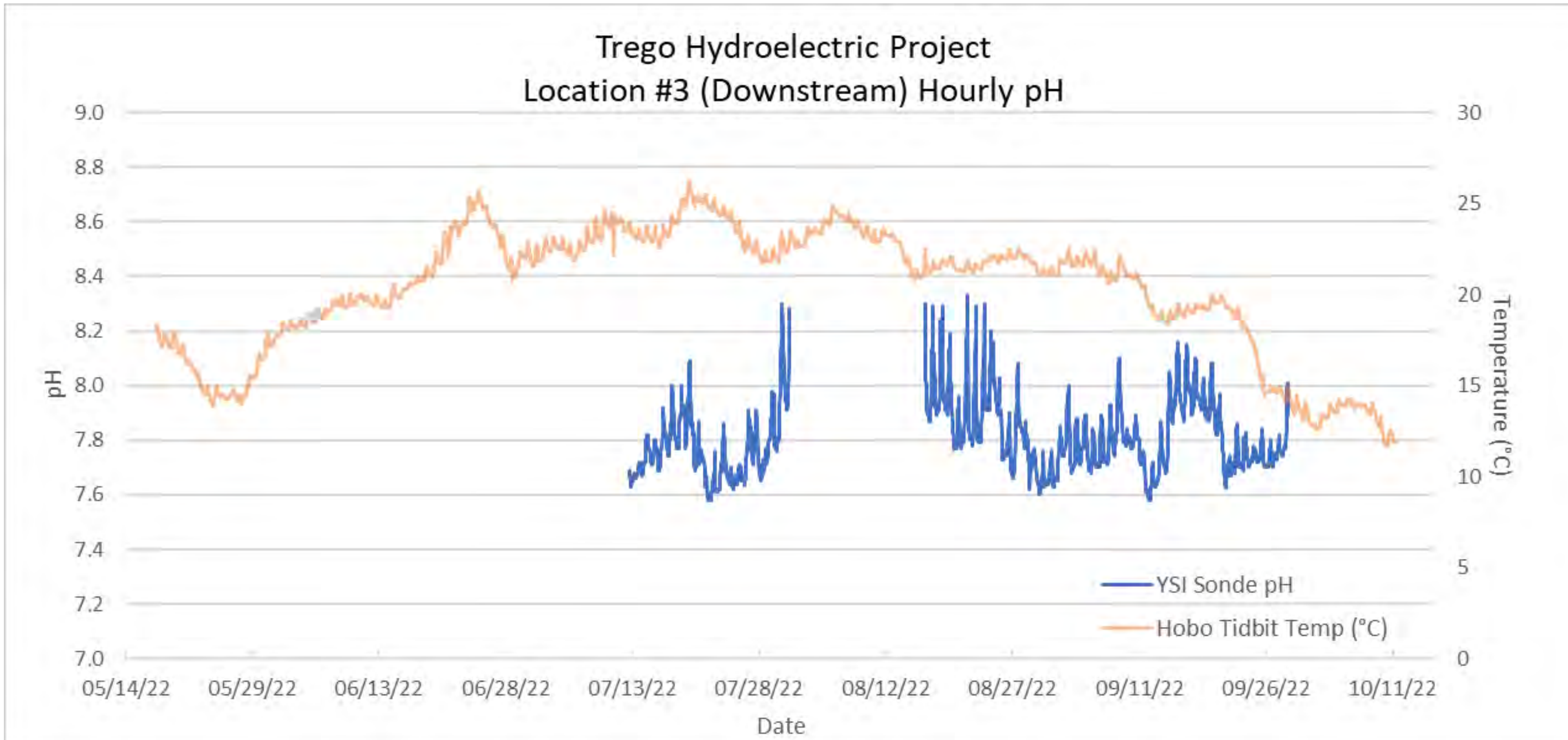
Hobo Tidbit Temp (°C)



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
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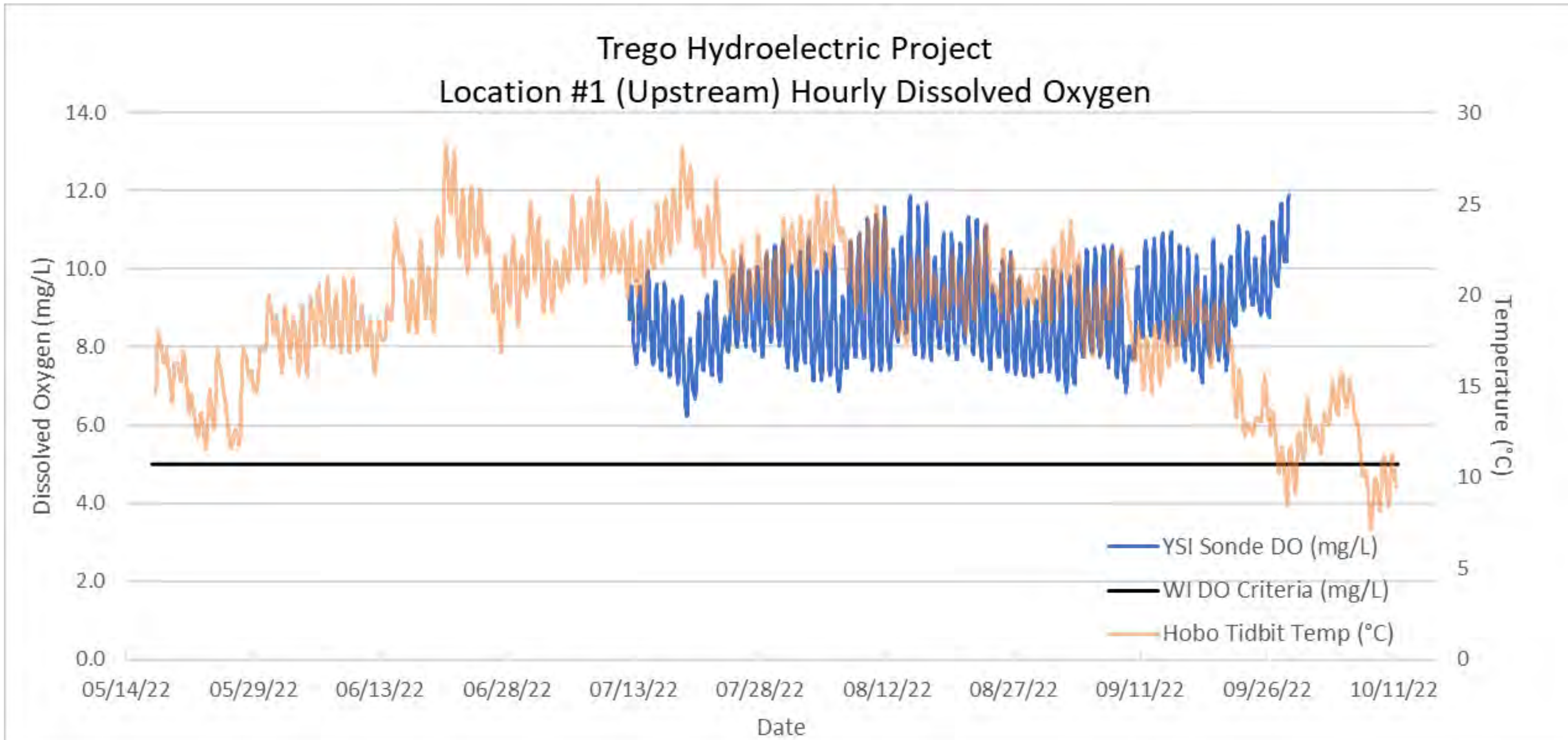
Date
YSI Sonde pH
Hobo Tidbit Temp (°C)



Trego Hydroelectric Project
Location #1 (Upstream) Hourly Dissolved Oxygen
Dissolved Oxygen (mg/L)
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Temperature (°C)
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
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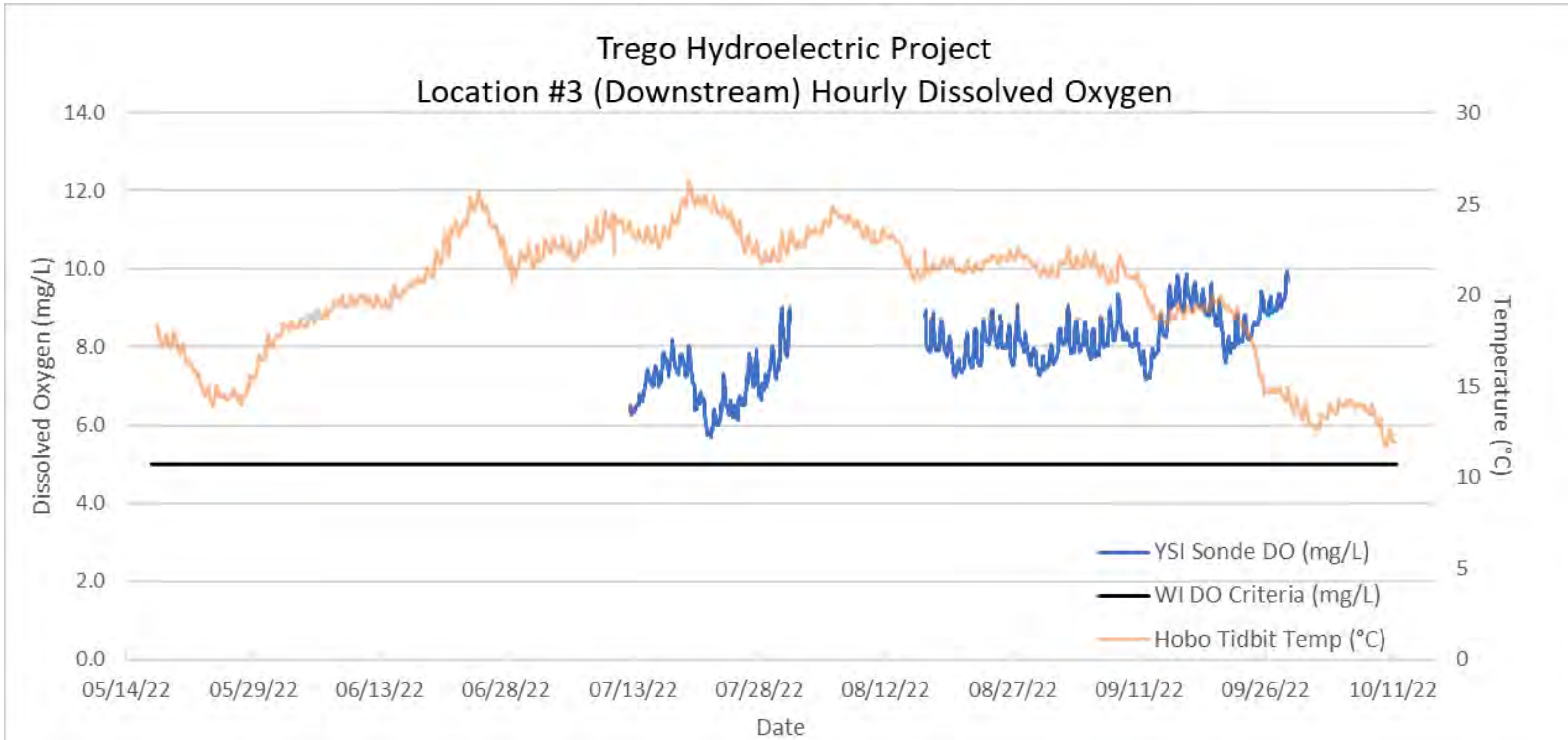
09/26/22
10/11/22
Date
YSI Sonde DO (mg/L)
WI DO Criteria (mg/L)
Hobo Tidbit Temp (°C)


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
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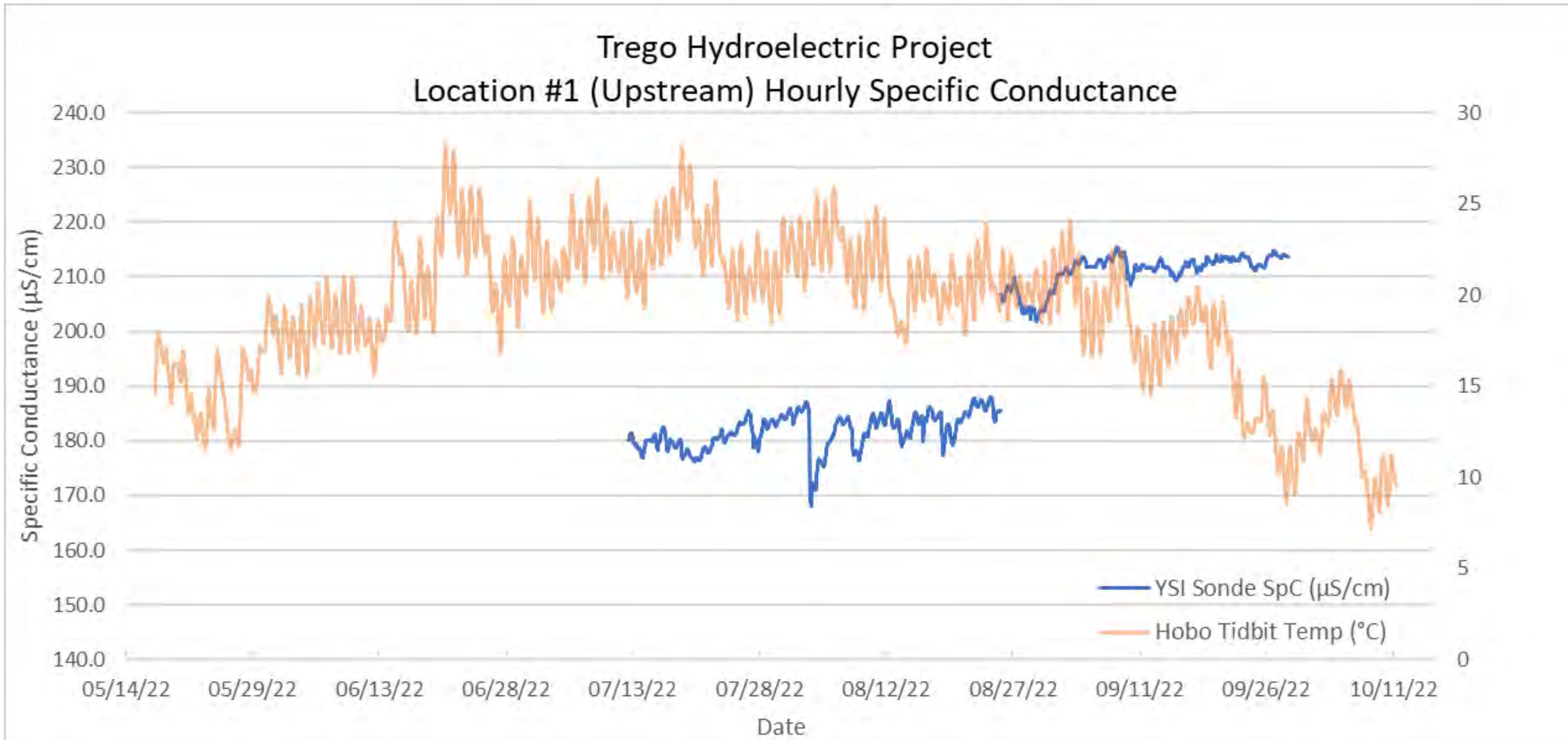
05/14/22
05/29/22
06/13/22
06/28/22
07/13/22
07/28/22
08/12/22
08/27/22
09/11/22
09/26/22
10/11/22
Date
YSI Sonde DO (mg/L)
WI DO Criteria (mg/L)
Hobo Tidbit Temp (°C)



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
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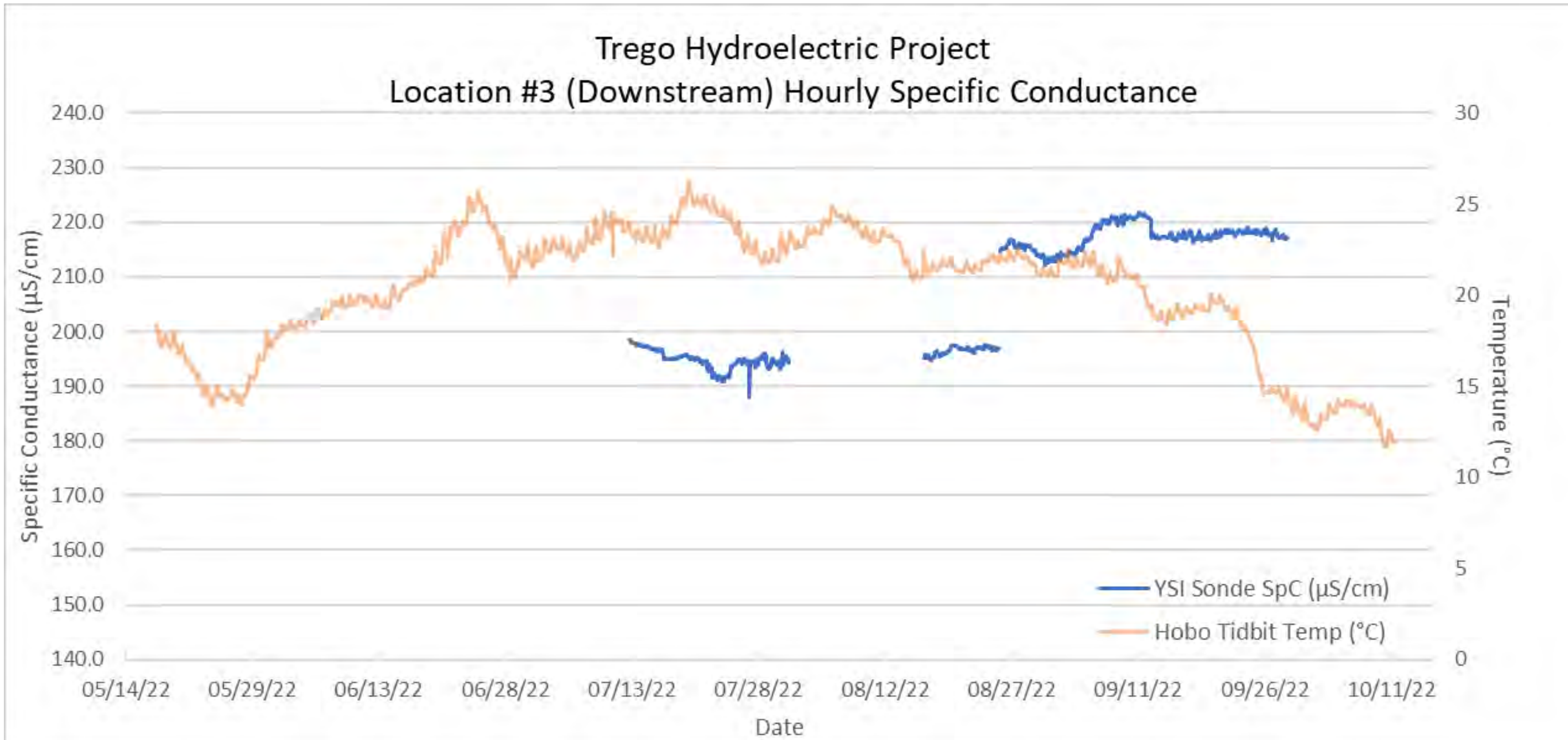
09/26/22
10/11/22
Date
YSI Sonde SpC (µS/cm)
Hobo Tidbit Temp (°C)


Trego Hydroelectric Project
Location #3 (Downstream) Hourly Specific Conductance
Specific Conductance (µS/cm)
240.0
230.0
220.0
210.0
200.0
190.0
180.0
170.0
160.0
150.0
140.0
Temperature (°C)
30
25
20
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05/14/22
05/29/22
06/13/22
06/28/22
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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)

APPENDIX E-9 **Lake Hayward Aquatic Plant Management Plan**

Aquatic Plant Management Plan

for

Lake Hayward
Sawyer County, Wisconsin

2023-2028

Plan approved April 26, 2023

Prepared for the Lake Hayward Property Owners Association
Funded in part by WDNR Surface Water Planning Grant AEPP67322

Prepared by Aquatic Plant and Habitat Services LLC
Sara Hatleli, Sarahatleli97@gmail.com, Taylor, WI 54659, 715-299-4604
Aquatic plant survey assistance provided by AEM Aquatic Consulting

All Photos from Cover Page were taken during the aquatic plant survey in 2021: 1) Shallow bay area with abundant spatterdock and bur-reed was surveyed by kayak, which was kindly provided by Heidi Martens. 2) Common bur-reed was found growing in many near-shore areas of the lake. 3) Sample rake full of submersed aquatic plants, mainly water celery. 4) Dragonfly nymph found among submersed aquatic plants on sample rake. 5) Eurasian / hybrid watermilfoil from Lake Hayward.

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Executive Summary

Lake Hayward is in the City of Hayward, Sawyer County, Wisconsin. Lake Hayward is 191 acres with brown-stained but clear (non-turbid) water, a maximum depth of 17 feet, and abundant vegetation. Lake Hayward is an impoundment of the Namekagon River and therefore lies along the upper portion or the St. Croix National Scenic Riverway. There is one public boat landing and the lake is popular for fishing. Lake Hayward is also the location for the annual Lumberjack World Championship and the ending segment of the annual American Birkebeiner, Kortelopet, and Prince Haakon ski races. As such, many partners have a stake in Lake Hayward and aquatic plant management. Partners include, but aren't limited to, Lake Hayward Property Owners Association (LHPOA), Sawyer County, Wisconsin Department of Natural Resources (WDNR), National Park Service, Xcel Energy (dam owner), City of Hayward, Lumberjack World Championships Foundation, and the American Birkebeiner Ski Foundation.

Eurasian watermilfoil (EWM) was first documented in Lake Hayward in 2011 and hybrid watermilfoil (HWM) was verified in 2012. Curly-leaf pondweed was documented in 2006. There was one 2,4-D herbicide treatment of 23 acres to control EWM & HWM in 2013. Herbicide monitoring results in 2013 suggested that 2,4-D did not reach target concentrations, which was likely due to natural flow of water through the impoundment. Even though there was no EWM control since 2013, the EWM/HWM was not found to be the species causing beneficial use impairment during an aquatic plant survey in 2021 (funded by LHPOA). There was, however, significant submersed native vegetation in near-shore areas of some bays.

Prompted by the beneficial use impairment issue, LHPOA partnered with Aquatic Plant & Habitat Services LLC to apply for a Planning Grant through the WDNR. The grant provided funding assistance for a public planning meeting in June 2022, a follow-up planning meeting in August 2022, and update to the aquatic plant management plan for Lake Hayward. A large component of this plan addresses the impairment issue currently associated with native plant species.

This management plan provides background information on Lake Hayward, identifies issues and need for management, reviews past management activities and presents management options. All these components contributed to a strategy that includes the goals listed below and in Section 5.0. The WDNR provides guidance and regulations for managing aquatic ecosystems. This management plan adheres to DNR guidance (specifically Chapters NR107, NR109, NR40 and Chapter 30/31) and proposed actions will be implemented in compliance with state laws and regulations.

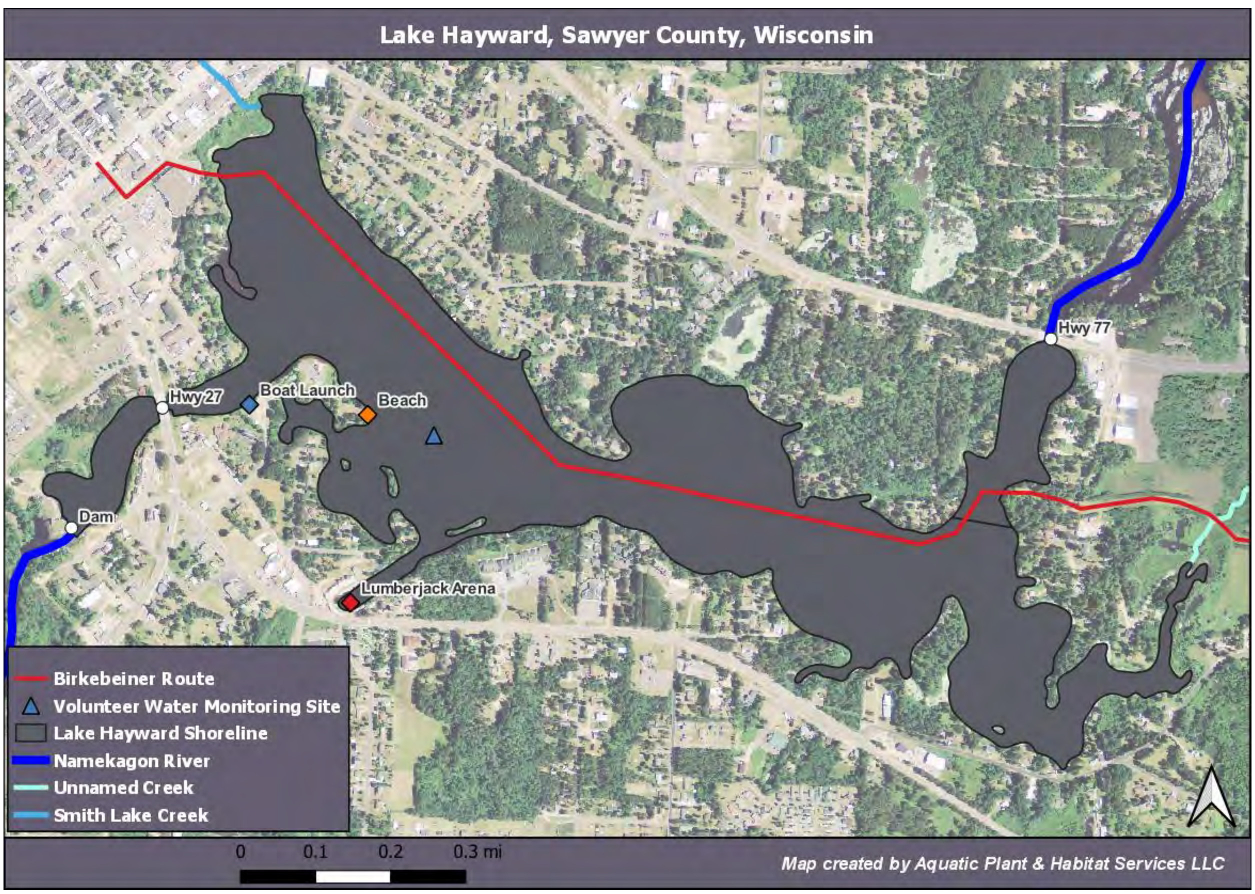
Goal 1 Provide educational opportunities pertaining to aquatic plants and aquatic invasive species.
Goal 2 Reduce beneficial use impairment caused by aquatic plants.
Goal 3 Protect native aquatic plants, organisms, and associated native mammal and fish populations.
Goal 4 Protect water quality.
Goal 5 - Prevent the introduction of additional aquatic invasive species.

1.0 Lake Hayward Background Information

1.1 Study Site

Lake Hayward (WBIC 2725500) is in the City of Hayward, Sawyer County. The lake has a surface area of 191 acres and maximum depth of 17 feet and mean depth of 5 feet. The lake is classified by the WDNR as a shallow lake meaning its maximum depth is less than 18 feet and does not thermally stratify. Lake Hayward is an impoundment of the Namekagon River formed by a dam at the far western shore. The dam is owned and operated by Xcel Energy as part of the Hayward Hydroelectric Project, which includes a powerhouse generator and spillway. The waters are tannin-stained, which impacts water clarity, but the overall water quality is considered good from a nutrient standpoint. More on this is described in Section 1.4. The lake is generally abundant in vegetation in near shore areas and in some areas up to 9 feet deep.

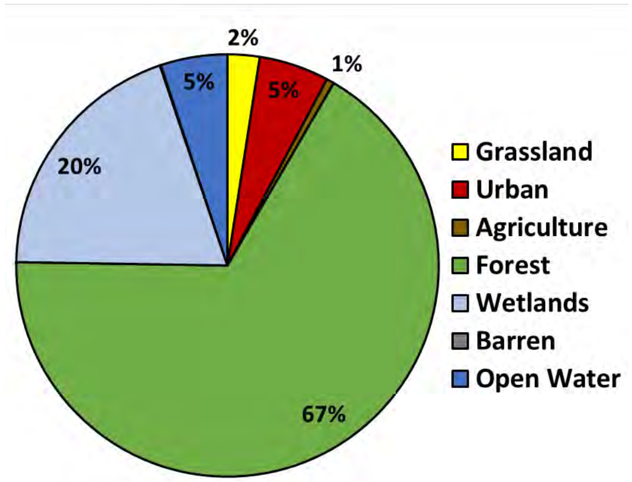
Figure 1 Lake Hayward, Stream Inlets, & Points of Interest



1.2 Watershed

Lake Hayward lies at the bottom of the Upper Namekagon watershed, which is 205 square miles and extends north into Bayfield County and slightly west into Washburn County (Figure 3). The most common land cover is forest at 137 sq. mi. (67%) followed by wetland at 40 sq.mi. (20%). The remaining land cover is urban, open water, grassland, and agriculture. Barren land cover is less than 1%.

Figure 2 Upper Namekagon Watershed Land Cover Chart



Data source CropScape nassgeodata.gmu.edu/CropScape

Figure 3 Upper Namekagon Watershed Map

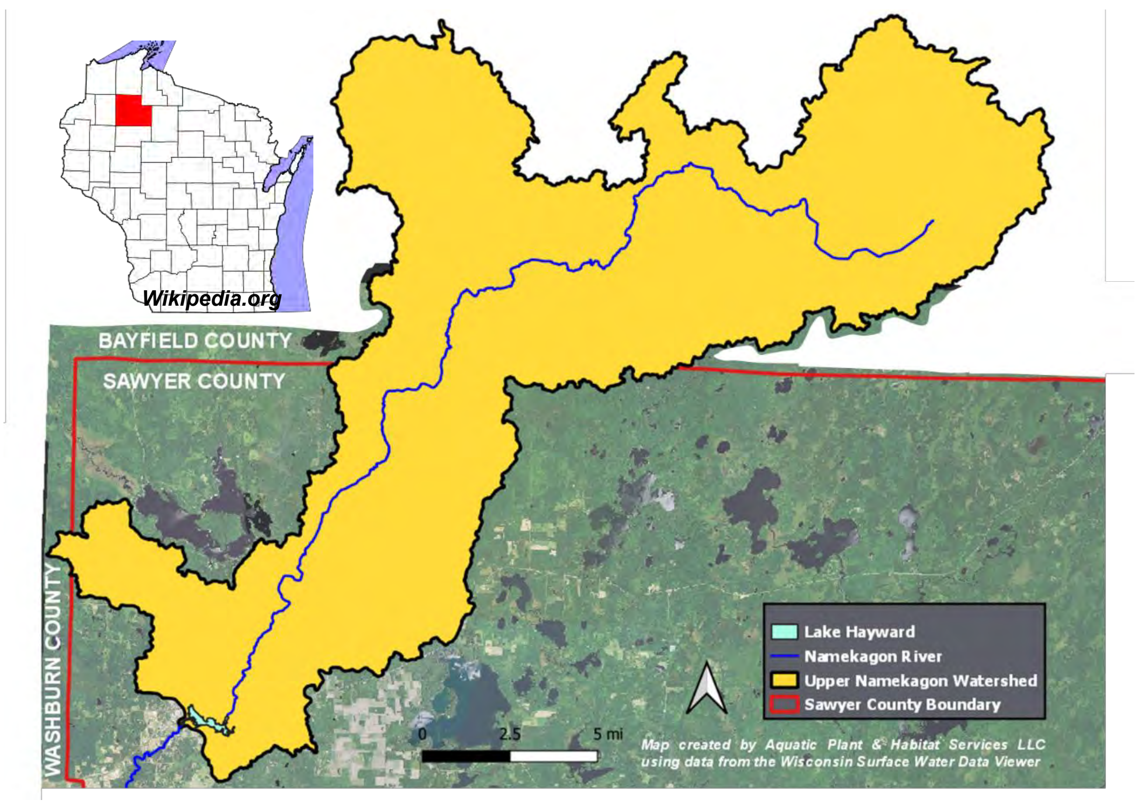
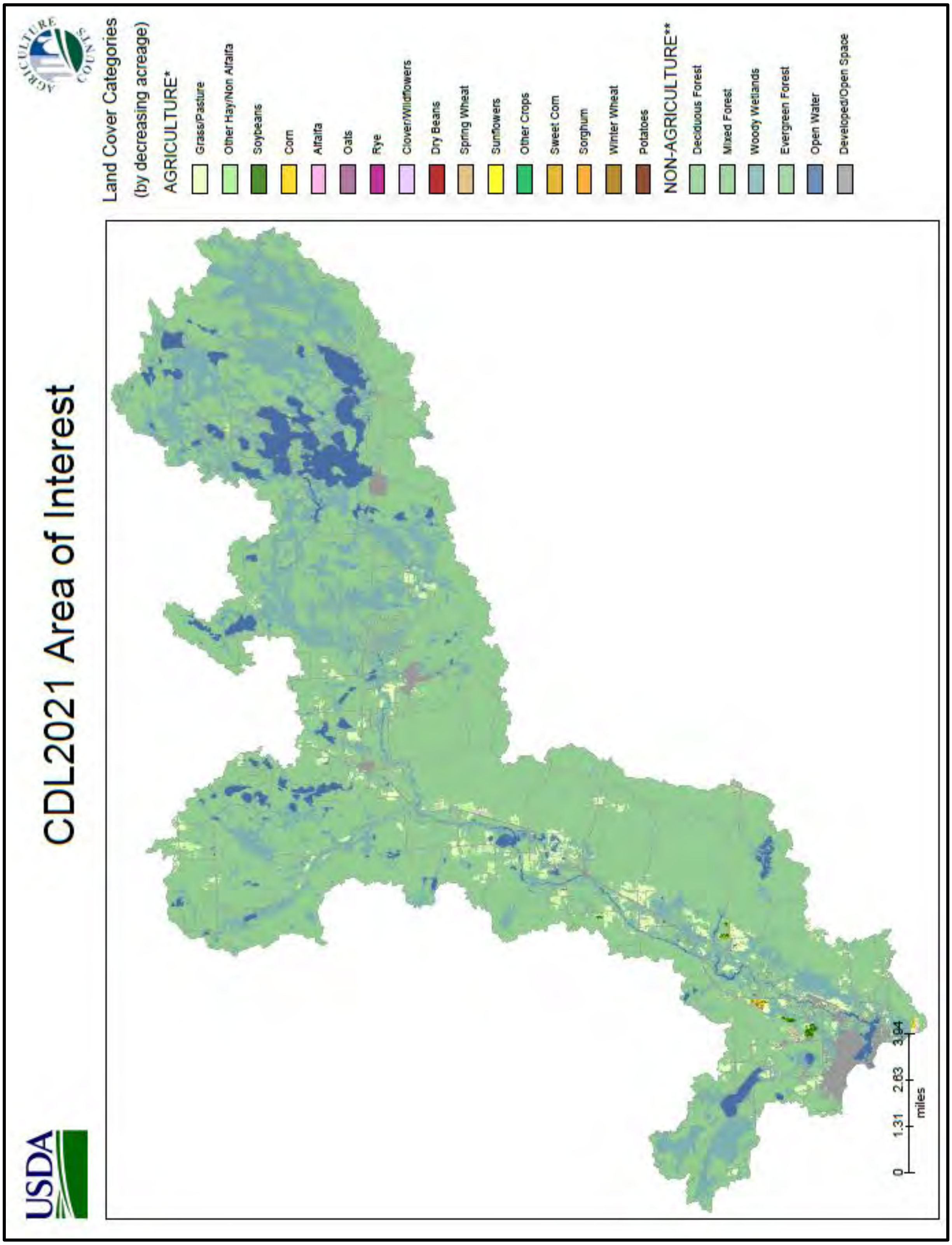


Figure 4 Upper Namekagon Watershed Land Cover Map



1.3 Shorelands & Water Quality Implications

The water quality of a lake, stream, or river is directly impacted by its watershed, which includes land that is directly adjacent to a lake. When waterfront land changes from forest-covered to a house, driveway, deck, garage, septic systems, lawns and sandy beaches, the water quality will be directly affected. It is the cumulative land cover change of many waterfront properties that leads to a decline in water quality.

Lake property owners are the last line of defense in protecting water quality from the impacts of human development.

For example, the amount of phosphorus entering a lake typically increases as land use changes from forested to residential (Panuska & Lillie, 1995 and Jeffrey, 1985). A developed site with a lawn will allow more runoff volume carrying phosphorus and nitrogen than a forested site (Graczyk et. al. 2003). Phosphorus is generally the key nutrient that leads to algae and nuisance aquatic plant growth. Phosphorus sources include human waste (failing septic systems), animal waste (farm runoff), soil erosion, detergents, and lawn fertilizers (Shaw et al. 2004). Detergents and lawn fertilizer are presumed less of an issue with recent laws. Developed sites have more impervious surface that does not allow precipitation to infiltrate into the soils. This precipitation becomes surface water runoff at warmer temperatures than at non-developed sites (Galli, 1988). The warmer water that flows into the lake can lead to increased lake water temperatures, and as water temperatures increase the amount of dissolved oxygen it can hold will decrease.

The combined impacts of increased water temperatures, lower dissolved oxygen, and higher phosphorus can all result from shoreland development.

1.4 Trophic State & Water Quality

Trophic state and water quality are often used interchangeably and while the two are related, they are not the same. Trophic state describes the biological condition of a lake using a scale that is based on measurable and objective criteria. Water quality is an objective descriptor of a lake's condition based on the observer's use of the lake. For example, clear-water lakes are often described as having good or excellent water quality, which may be true for swimmers or SCUBA divers. The same ultra-clear system may have low productivity and thus a limited fishery leading to an average water quality classification by an angler. This section describes the trophic state of Lake Hayward using Carlson's Trophic State Index (1996).

Water clarity, total phosphorus, and chlorophyll-*a* are variables used to determine the productivity or trophic state of a lake. The Carlson Trophic State Index (TSI) is frequently used to determine biomass in aquatic systems. The trophic state of a lake is defined as the total weight of living biological material (or biomass) in a lake at a specific location and time. Eutrophication is the movement of a lake's trophic state in the direction of more plant biomass. Eutrophic lakes tend to have abundant aquatic plant growth, high nutrient concentrations, and low water clarity due to algae blooms. Oligotrophic lakes, on the other end of the spectrum, are nutrient poor and have little plant and algae growth. Mesotrophic lakes have intermediate nutrient levels and only occasional algae blooms (Red ovals in Figure 5 represent ranges in Lake Hayward).

Figure 5 Trophic State Gradient adapted from Simpson & Carlson (1996)

TSI	Chlorophyll-a (ug/L)	Secchi Depth (ft)	Total Phosphorus (ug/L)	Attributes	Fisheries & Recreation
<30	<0.95	>26	<6	Oligotrophic: Clear water, oxygen throughout the year in the hypolimnion	Salmonid fisheries dominate
30-40	0.95 - 2.6	13 - 26	6 - 12	Oligotrophic: Hypolimnia of shallower lakes may become anoxic	Salmonid fisheries in deep lakes only
40-50	2.6 - 7.3	6.5 - 13	12 - 24	Mesotrophic: Water moderately clear; increasing probability of hypolimnetic anoxia during summer	Hypolimnetic anoxia results in loss of salmonids. Walleye may predominate
50-60	7.3 - 20	3 – 6.5	24 - 48	Eutrophic: Anoxic hypolimnia, macrophyte problems possible	Warm-water fisheries only. Bass may dominate.
60-70	20 - 56	1.5 - 3	48 - 96	Eutrophic: Blue-green algae dominate, algal scums and macrophyte problems	Nuisance macrophytes, algal scums, and low transparency may discourage swimming and boating.
70-80	56 - 155	0.75 – 1.5	96 - 192	Hypereutrophic: (light limited productivity). Dense algae and macrophytes	Rough fish dominate; summer fish kills possible
>80	>155	<0.75	192 - 384	Algal scums, few macrophytes	

1.4.1 Water Clarity

Figure 6 Secchi Disk

The depth to which light can penetrate, or water clarity, is a factor that limits aquatic plant growth. Water clarity is measured by lowering a black and white Secchi disk (8 inches diameter) in the water and recording the depth of disappearance. The disk is then lowered further and slowly raised until it reappears. The Secchi depth is the mid-point between the depth of disappearance and the depth of reappearance. Because light penetration is usually associated with nutrient levels and algae growth, a lake is considered eutrophic when Secchi depths are less than 6.5 feet. Secchi depths vary throughout the year, with shallower readings in summer when algae concentrations increase, thus limiting light penetration. Conversely, deeper readings occur in spring and late fall when algae growth is less. Although the Secchi disk is a useful, inexpensive, and widely used way to assess water clarity, it has limitations in lakes with tannin-stained water because the water color will affect the Secchi disk reading. Lake Hayward has water that is clear but brown due to tannins, or stain from decaying organic matter. This staining is natural and can be differentiated from suspended sediment because the water is brown but clear, similar to dark tea. Since tannins decrease light penetration in the water column, they can also be helpful in keeping algal growth at lower levels.

Lake Hayward was monitored in July & August in 1999 and 2014 at the deepest area of the lake illustrated in Figure 1. The average summer (July & August) Secchi depth in those two years was 6.5 feet, therefore classifying Lake Hayward as borderline **MESOTROPHIC-EUTROPHIC** system from a water clarity standpoint (Figure 5 & Figure 7).

1.4.2 Phosphorus

Phosphorus is an important nutrient for plant growth and is often the limiting nutrient for plant production in Wisconsin lakes. Therefore, adding small quantities of phosphorus to a lake can cause dramatic increases in plant and algae growth and should therefore be the focus of management efforts to protect or improve water quality.

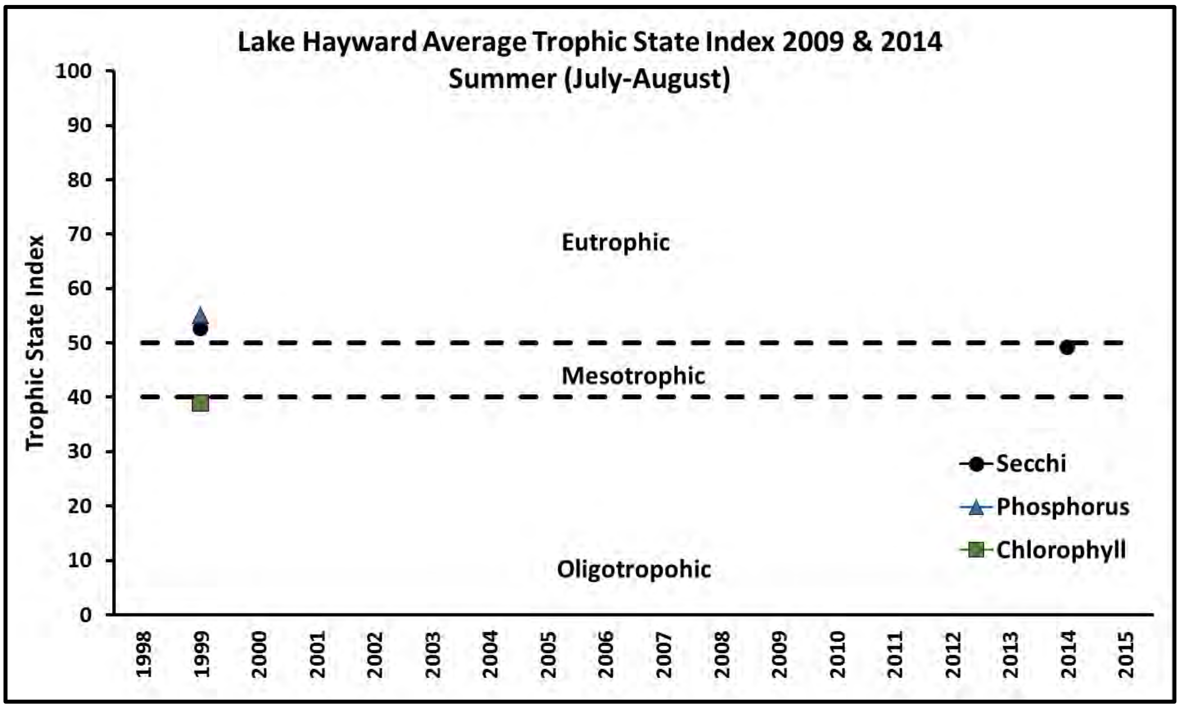
Total phosphorus was monitored in Lake Hayward twice in summer (July & August) 1999 using water samples from the surface (0-6 feet) at the citizen lake monitoring site illustrated in Figure 1. The average total phosphorus was 33µg/l, therefore classifying Lake Hayward as a **EUTROPHIC** system from a nutrient standpoint (Figure 5 & Figure 7).

1.4.3 Chlorophyll-a

Chlorophyll-*a* is the green pigment found in plants and algae. The concentration of chlorophyll-*a* is used as a measure of the algal population in a lake. For trophic state classification, preference is given to the chlorophyll-*a* trophic state index (TSI_{CHL}) because it is the most accurate at predicting algal biomass. The equations for calculating TSI are based on Carlson & Simpson (1996).

Chlorophyll-*a* was monitored in Lake Hayward twice in summer (July & August) 1999 using water samples from the surface (0-6 feet) at the citizen lake monitoring site illustrated in Figure 1. The average TSI_{CHL} was 39 therefore classifying Lake Hayward as a borderline **OLIGOTROPHIC-MESOTROPHIC** system from a biomass standpoint (Figure 5 & Figure 7).

Figure 7 - Trophic State Index Graph



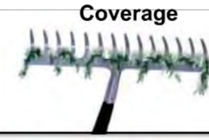
Data collected by volunteers and retrieved from the WDNR Lake Hayward webpage. Graphs created by Aquatic Plant & Habitat Services LLC.

1.5 Aquatic Plants

1.5.1 2021 Survey Methods

An aquatic plant survey of Lake Hayward was completed by Aquatic Plant and Habitat Services LLC July 27-29th, 2021 using the statewide standard protocol developed by Hauxwell et al. (2010). In Lake Hayward, the survey points were spaced 42 meters (~138 ft.) apart and there were 482 points total (Map in Appendix A). Plants were surveyed from a boat using a double-sided rake head on a telescopic pole or rope, depending on depth. Rake fullness was determined using guidelines in Figure 8.

Figure 8 Total Rake Fullness Illustration

Rating	Coverage	Description
1		Few plants
2		Plants cover length of the rake but not tines
3		Rake completely covered, tines not visible

Rake illustrations from Hauxwell et al. 2010

1.5.2 2021 Survey Results

The maximum rooting depth of plants was 15 feet and there were 432 sample points shallower than the maximum rooting depth. Most of those sites (344 or 80%) had vegetation present (Table 1, Figure 9). Diversity was high with a species richness of 45 species found on the rake (not including filamentous algae or freshwater sponge), another 5 species within 6ft of survey points but not on the rake (considered visual), and another 3 species found greater than 6ft from survey points. The Simpson Diversity Index was high with a value of 0.92 out of a maximum possible value of 1.00. The Floristic Quality Index was 38.4, which is higher than the average value of 28.3 for other impoundments in the same ecoregion. Overall, the aquatic plant community of Lake Hayward is diverse, heterogeneous, and indicative of low disturbance.

<u>Most Frequent Species</u>

Common waterweed, coontail, and flat-stem pondweed were the three most common species found in 2021 with littoral frequencies of 37%, 36%, and 28%, respectively (Table 2). Together, they accounted for 39% of the total relative frequency, which further supports the concept that Lake Hayward has a heterogeneous plant community. Maps of individual species are in Appendix B.

<u>Ne ara eae</u>

Aquatic plant biologists in Wisconsin are paying closer attention in recent years to a family of native macroalgae known as Characeae. Species in this family were likely present in Lake Hayward during past surveys, but were identified to genus level (i.e., Chara sp. And Nitella sp.) as was standard at the time. When possible, identification of Characeae was done at the species level in 2021. Mucronate nitella, Braun's stonewort, and globular stonewort were first listed in Lake Hayward in 2021. Due to uncertain identification, specimens of mucronate nitella were sent to the New York Botanical Garden for verification and determined to be correct identification based on morphology. Genetic analysis of the mucronate nitella will provide more information but results were not available at the time of finalizing this plan.

Table 1 Aquatic Plant Survey Results for Lake Hayward 2013 & 2021

	Summary Statistic		June 2013	Herbicide treatment of 23 acres, July 2, 2013	July 2013	July 2021
1	Total # of sites visited		478		478	454
2	Total # of sites with vegetation		349		341	344
3	Max. depth of plants (feet)		13.5		12.5	15.0
4	Total # of sites shallower than max. depth of plants		439		423	432
5	Frequency of occurrence at sites shallower than max. depth of plants (Littoral FOO)		79.50		80.61	79.63
6	Average # of species per site	a) Shallower than max. depth	2.56		3.37	2.60
		b) Vegetated sites only	3.21		4.18	3.27
		c) Native shallower than max. depth	2.10		3.21	2.50
		d) Native species at vegetated sites only	2.84		4.08	3.14
7	Species Richness	a) Total # species on rake at all sites	46		50	45
		b) Including visuals	46		55	50
8	Simpson's Diversity Index		0.92		0.93	0.92
9	Mean Coefficient of Conservatism		6.3		6.4	6.2
10	Floristic Quality Index		39.5		42.5	38.4
11	Eurasian/Hybrid Watermilfoil Littoral Frequency of Occurrence		12.3		12.5	9.5
12	Curly-leaf Pondweed Littoral Frequency of Occurrence		32.6		2.1	0.9

2013 – Surveys completed by Endangered Resource Services LLC
2021 – Survey completed by Aquatic Plant & Habitat Services LLC

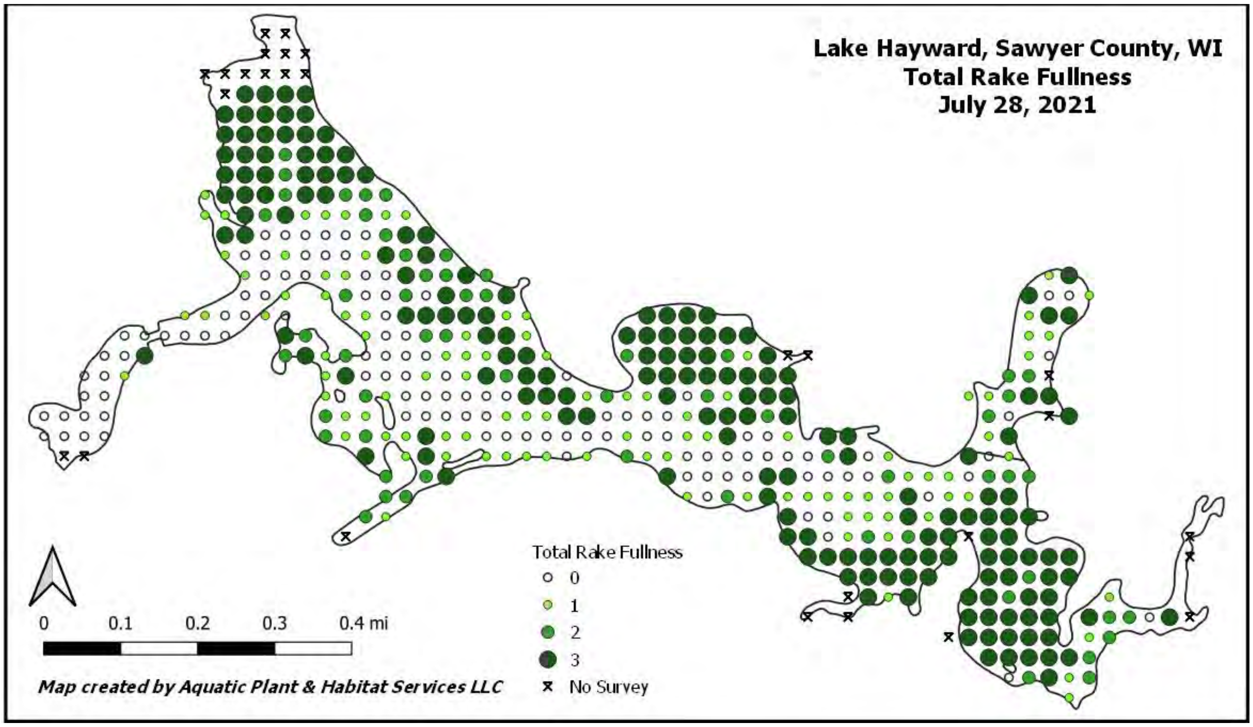
High Conservatism Species

There were three species found in 2021 with a high conservatism (C) value of 9 or 10, including blunt-leaf pondweed, small bladderwort, and wild calla (Table 2, Figure 9). The C value estimates the likelihood of that plant species occurring in an environment that is relatively unaltered from pre-settlement conditions. As human disturbance occurs, species with a low C value are more likely to dominate a lake. No species of special concern were found during the survey. Species of special concern are those believed to be of low abundance in Wisconsin and therefore listed in an advisory capacity before they become threatened or endangered. Maps of individual species are in Appendix B.

Eurasian / Hybrid Watermilfoil

Eurasian (EWM) or hybrid watermilfoil (HWM, hereafter implied as EWM) was found at 41 sites (9.5 littoral frequency) in 2021. This occurrence of EWM is lower than 2013 (Table 1). No beneficial use impairment caused specifically by EWM was apparent during the 2021 aquatic plant survey. EWM was found scattered throughout the lake (Figure 12) and most often accompanied by native species with much higher rake fullness ratings.

Figure 9 Lake Hayward Total Rake Fullness Species Richness Maps, 2021



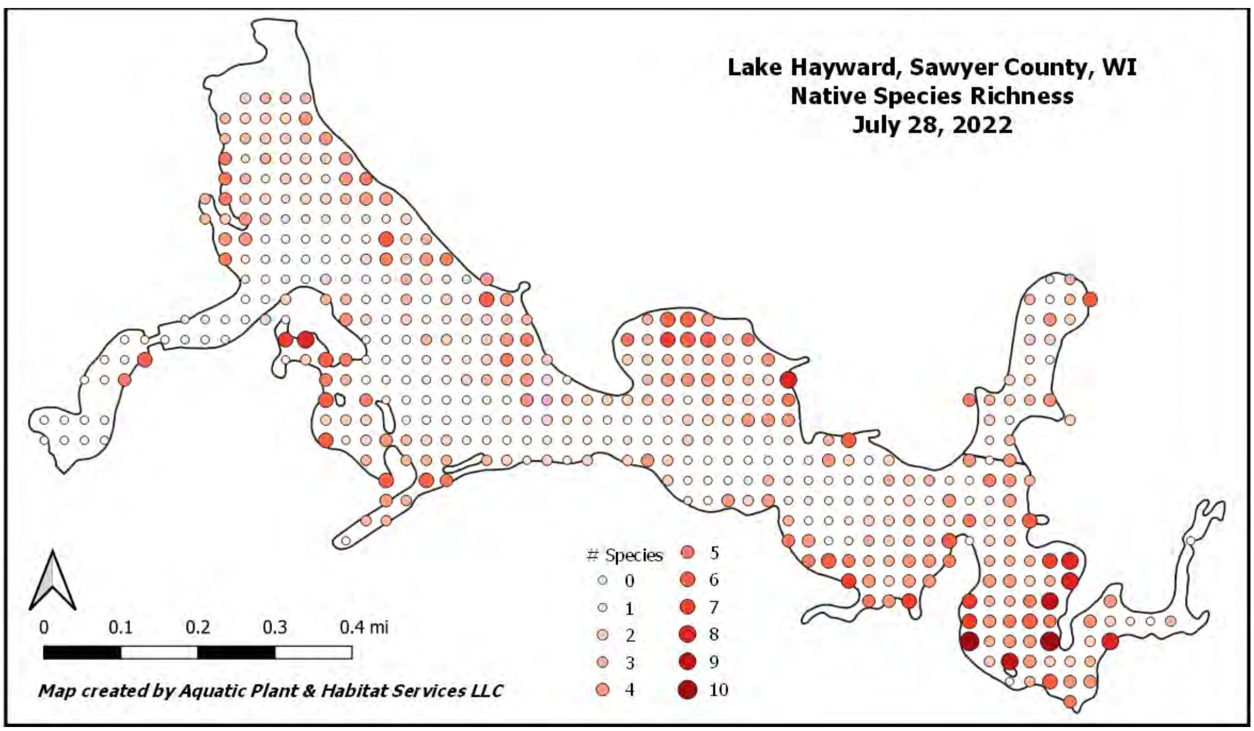


Table 2 Lake Hayward Individual Species Statistics, 2021

Common Name	Scientific Name	Frequency at Veg. sites (%)	Littoral Frequency (%)	Relative frequency (%)	# Sites where found	Avg. rake fullness	# Visual sites
Common waterweed	*Elodea canadensis*	46.80	37.27	14.32	161	1.58	2
Coontail	*Ceratophyllum demersum*	45.06	35.88	13.79	155	1.57	1
Flat-stem pondweed	*Potamogeton zosteriformis*	35.47	28.24	10.85	122	1.33	3
Wild celery	*Vallisneria americana*	33.72	26.85	10.32	116	1.59	1
Forked duckweed	*Lemna trisulca*	29.94	23.84	9.16	103	1.01	1
Fern pondweed	*Potamogeton robbinsii*	29.07	23.15	8.90	100	1.71	1
Filamentous algae		18.02	14.35	-	62	1.08	1
Eurasian water milfoil	*Myriophyllum spicatum*	11.92	9.49	3.65	41	1.17	0
White water lily	*Nymphaea odorata*	9.01	7.18	2.76	31	1.68	22
Small duckweed	*Lemna minor*	8.43	6.71	2.58	29	1.00	23
Large duckweed	*Spirodela polyrhiza*	7.27	5.79	2.22	25	1.00	17
Spatterdock	*Nuphar variegata*	6.98	5.56	2.14	24	1.79	10
Water star-grass	*Heteranthera dubia*	6.69	5.32	2.05	23	1.09	0
Common watermeal	*Wolffia columbiana*	6.10	4.86	1.87	21	1.00	11
Slender naiad	*Najas flexilis*	5.52	4.40	1.69	19	1.05	1
Nitella	*Nitella sp.*	4.94	3.94	1.51	17	1.12	0
Freshwater sponge		4.94	3.94	-	17	1.00	0
Small pondweed	*Potamogeton pusillus*	4.65	3.70	1.42	16	1.00	0
Mucronate nitella	*Nitella mucronata*	4.36	3.47	1.33	15	2.07	0
Water marigold	*Bidens beckii*	3.78	3.01	1.16	13	1.23	0
Clasping-leaf pondweed	*Potamogeton richardsonii*	3.78	3.01	1.16	13	1.08	1
Large-leaf pondweed	*Potamogeton amplifolius*	2.91	2.31	0.89	10	1.60	3
Braun's stonewort	*Chara braunii*	2.03	1.62	0.62	7	1.29	0
Muskgrasses	*Chara sp.*	1.45	1.16	0.44	5	1.00	0
Ribbon-leaf pondweed	*Potamogeton epihydrus*	1.45	1.16	0.44	5	1.20	0
Fries' pondweed	*Potamogeton friesii*	1.45	1.16	0.44	5	1.00	0
Bur-reed	*Sparganium sp.*	1.45	1.16	0.44	5	1.00	10
Sago pondweed	*Stuckenia pectinata*	1.45	1.16	0.44	5	1.00	2
Curly-leaf pondweed	*Potamogeton crispus*	1.16	0.93	0.36	4	1.00	0
Variable pondweed	*Potamogeton gramineus*	1.16	0.93	0.36	4	1.00	0
White-stem pondweed	*Potamogeton praelongus*	1.16	0.93	0.36	4	1.25	0
Arrowhead	*Sagittaria sp.*	1.16	0.93	0.36	4	1.00	1
Illinois pondweed	*Potamogeton illinoensis*	0.87	0.69	0.27	3	1.00	0
Needle spikerush	*Eleocharis acicularis*	0.58	0.46	0.18	2	1.00	0
Northern water-milfoil	*Myriophyllum sibiricum*	0.58	0.46	0.18	2	1.00	0
Leafy pondweed	*Potamogeton foliosus*	0.58	0.46	0.18	2	1.00	0
White water crowfoot	*Ranunculus aquatilis*	0.58	0.46	0.18	2	1.00	1
Sessile-fruited arrowhead	*Sagittaria rigida*	0.58	0.46	0.18	2	1.00	1
Watershield	*Brasenia schreberi*	0.29	0.23	0.09	1	3.00	2
Floating-leaf pondweed	*Potamogeton natans*	0.29	0.23	0.09	1	1.00	0
Blunt-leaf pondweed	*Potamogeton obtusifolius*	0.29	0.23	0.09	1	1.00	1
Spiral-fruited pondweed	*Potamogeton spirillus*	0.29	0.23	0.09	1	1.00	0
Common arrowhead	*Sagittaria latifolia*	0.29	0.23	0.09	1	1.00	0
Common bur-reed	*Sparganium eurycarpum*	0.29	0.23	0.09	1	1.00	1
Small bladderwort	*Utricularia minor*	0.29	0.23	0.09	1	1.00	0
Common bladderwort	*Utricularia vulgaris*	0.29	0.23	0.09	1	2.00	1
Globular stonewort	*Chara globularis*	0.29	0.23	0.09	1	1.00	0
Wild calla	*Calla palustris*	-	-	-	0	-	3
Water horsetail	*Equisetum fluviatile*	-	-	-	0	-	1
American bur-reed	*Sparganium americanum*	-	-	-	0	-	1
Branched bur-reed	*Sparganium androcladum*	-	-	-	0	-	1
Northern wild rice	*Zizania palustris*	-	-	-	0	-	1
Purple loosestrife	*Lythrum salicaria*	*	*	*	*	*	*
Purple iris	*Iris versicolor*	*	*	*	*	*	*
Softstem bulrush	*Schoenoplectus tabernaemontani*	*	*	*	*	*	*

** Not found at or near any sample points, but observed in Lake Hayward during the survey*

Non-native, invasive species | Species with a high coefficient of conservatism (9 or 10)

1.6 Fishery

The text in this section is copied from the 2022 Spring Fisheries Survey Summary by WDNR Fisheries Biologist, Max Wolter.

The Wisconsin Department of Natural Resources (WDNR) Hayward Fisheries Management Team conducted a fyke netting survey on Lake Hayward from April 17-19, 2022. The primary targets were northern pike and walleye, but useful data were also gathered on black crappie and yellow perch. Up to eight nets were set overnight for two total nights, which resulted in 16 total net-nights of effort. An electrofishing survey was conducted on June 1, 2022 to target largemouth bass and bluegill, and included two and a half miles of shoreline. Quality, preferred and memorable sizes referenced in this summary are based on standard proportions of world record lengths developed for each species by the American Fisheries Society.

The netting survey was well-timed for Walleye and Northern Pike, capturing the start of spawning activity for each species. Nets were set immediately after ice out and covered a variety of habitat types. Water temperature was below the ideal range for capturing Black Crappie and Yellow Perch, but results are still included in this report. Lake Hayward is a "Complex-Riverine" lake, based on the DNR Fisheries lake class system. "Complex" refers to the number of gamefish present in the fish community. Riverine systems present challenges for both surveying and managing populations since fish can move from lake to river habitats.

Northern Pike

Northern Pike catch rates (15 per net night) were exceptionally high in comparison to lakes in the same class as Lake Hayward. Pike were generally small (75% were under 21 inches), but top-end size was excellent. A 40-inch pike was captured in the survey, along with several others over 35 inches. Pike anglers in Lake Hayward should expect action from a lot of smaller pike, with a chance for a true trophy. There is no minimum length limit for Northern Pike and anglers may harvest up to five per day. Harvest of smaller pike is encouraged.

Walleye

Only two Walleye were captured in this survey, indicating low abundance of the species. This matches previous surveys of Lake Hayward. The Walleye population is supported almost exclusively through stocking, very little natural reproduction has been observed. However, stocked Walleye may not stay in Lake Hayward. Walleye have opportunities to leave Lake Hayward both upstream into Namekagon River and downstream over the dam. The Walleye regulation on Lake Hayward is a 15-inch minimum length limit, a 20-24-inch protected slot with only one fish over 24 inches, and a three daily bag limit.

Muskellunge

Muskellunge are present in Lake Hayward, and trophy-sized fish have been caught in past surveys and local Muskellunge tournaments. No Muskellunge were captured during this survey. Muskellunge may not have been shallow enough to be captured due to very cold water temperatures at the time of the survey. Future efforts will try to document the status of this population. Muskellunge are stocked periodically into Lake Hayward, but like Walleye, may move into the river.

Black Crappie

Black Crappie catch rate was below average when compared to lakes in the same class. Survey timing may have played a minor role in the catch rate, and higher rates may have been observed with a later netting survey. Still, Black Crappie in Lake Hayward have nice size, with about 1 in 3 being over 10 inches. The daily bag limit for panfish on Lake Hayward is 25 (all panfish species combined).

Yellow Perch

Yellow Perch catch rate was about average when compared to other lakes in this class. Yellow Perch in Lake Hayward have good size, with a large percentage of the survey catch being over 8 inches. The daily bag limit for panfish on Lake Hayward is 25 (all panfish species combined).

Largemouth Bass

Catch rate for Largemouth Bass in Lake Hayward was close to average when compared to lakes of the same class. Half of the Largemouth Bass captured in the survey were over 15 inches, offering a quality bass fishing opportunity for anglers focused more on size than catch rate. There is a 14-inch minimum length limit for bass and a 5-daily bag limit. Smallmouth Bass are present in Lake Hayward, but none were captured in this survey. Smallmouth Bass likely prefer the riverine areas upstream from Lake Hayward more than the lake itself.

Bluegill

Bluegill catch rate was above average when compared to other lakes in this class. Despite being relatively abundant, size of Bluegill was excellent. More than 10% of Bluegill captured were over 8 inches long. Lake Hayward has a strong reputation as a Bluegill fishery, both during open water and through the ice. The daily bag limit for panfish on Lake Hayward is 25 (all panfish species combined).

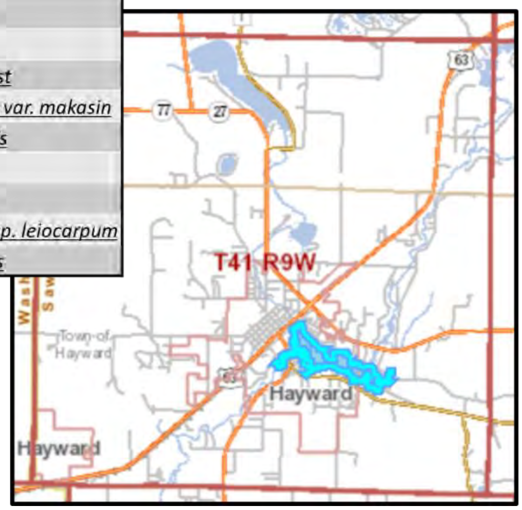
Other species present include: White Sucker, Northern Hogsucker, Pumpkinseed Sunfish, Rock Bass, several species of redhorse, Brown Trout, and various minnow species.

1.7 Wildlife

The Wisconsin Natural Heritage Inventory (NHI) lists species and natural communities that are known or suspected to be rare in Wisconsin. The species are legally designated as endangered or threatened or they may be listed in an advisory capacity of special concern. The NHI lists species according to township and range, which includes T41N 9W for Lake Hayward. There are 11 NHI species in the same township and range as Lake Hayward.

Table 3 Rare Plant & Animal Species in the Area

Common Name	Scientific Name
Blanding's Turtle	*Emydoidea blandingii*
Downy Willow-herb	*Epilobium strictum*
Elktoe	*Alasmidonta marginata*
Northern Flying Squirrel	*Glaucomys sabrinus*
Northern Wet-mesic Forest	*Northern wet-mesic forest*
Northern Yellow Lady's-slipper	*Cypripedium parviflorum var. makasin*
Prairie Skink	*Plestiodon septentrionalis*
Pugnose Shiner	*Notropis anogenus*
Round-leaved Orchis	*Amerorchis rotundifolia*
Russet Cotton-grass	*Eriophorum russeolum ssp. leiocarpum*
Bald Eagle	*Haliaeetus leucocephalus*



Wildlife Habitat

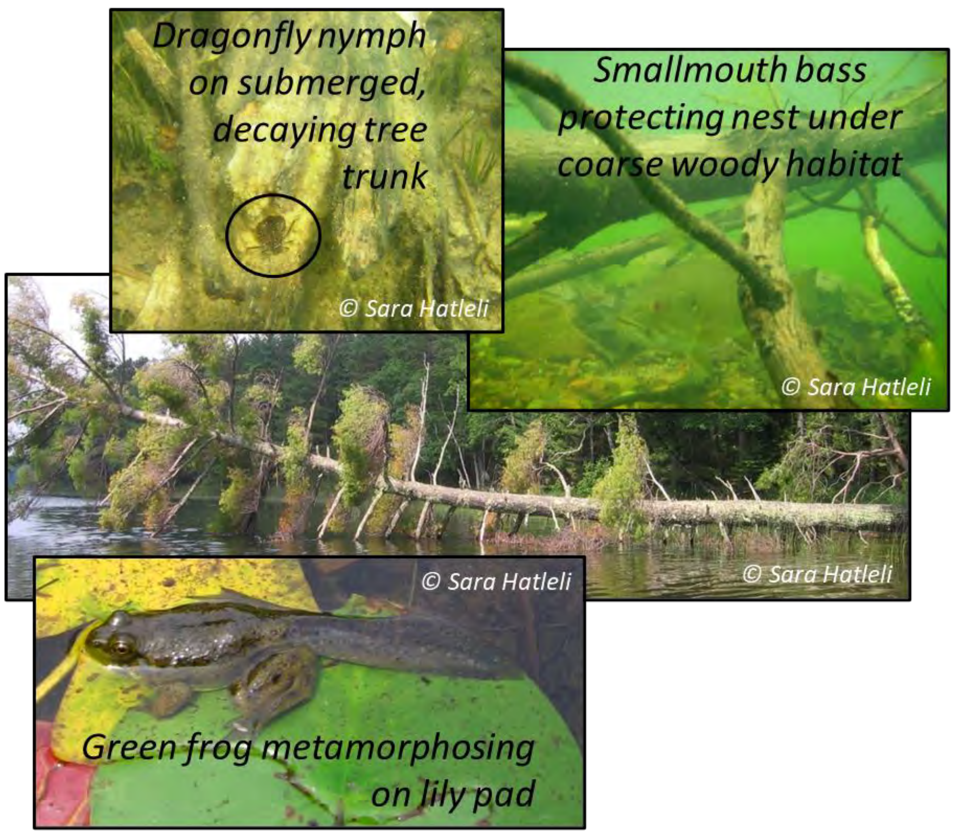
The zone within 100 feet of the lakeshore and into the shallows of the lake is a critical area for mammals, birds, reptiles, amphibians, and fish. Leaving trees, shrubs, and vegetation is one way to protect existing habitat. If a lakeshore has already been cleared and developed, habitat restoration can be as simple as mowing less area and/or planting native plants and landscaping. Protecting and restoring lakeshore buffers and natural shoreline also prevents issues with Canada geese that show preference for manicured lawns. Geese are attracted to a mowed lawns because of the visibility it affords. Geese avoid areas with taller plants to elude predators. The addition of taller native plantings along the lakeshore can help deter geese.

Figure 10 Photo of Mowed Lawn and Multiple Geese

Near shore vegetation in the lake creates habitat for frogs, turtles, furbearers, and waterfowl. Minimal clearing in this area will maintain critical habitat for these animals and important areas for fish spawning and development. Fallen trees along the lakeshore also provide structural habitat for wildlife and fish. Examples include turtles basking on these fallen trees and wood ducks and mallards loafing on them as well. Anglers often target fallen trees in lakes because they serve as structure for fish (Figure 11). There are grant funds and programs that promote placement of trees back in the water, but it is much easier to leave trees where they fall naturally whenever possible.

Moving away from the lakeshore and further upland, we know that land use impacts water quality and thus impacts which species of animals can thrive in and around the lake. And although this is important, the more critical concept is for lakeshore residents to be conscious of their practices near the lake.

Figure 11 Near Shore Habitat Photos



2.0 Issues and Need for Management

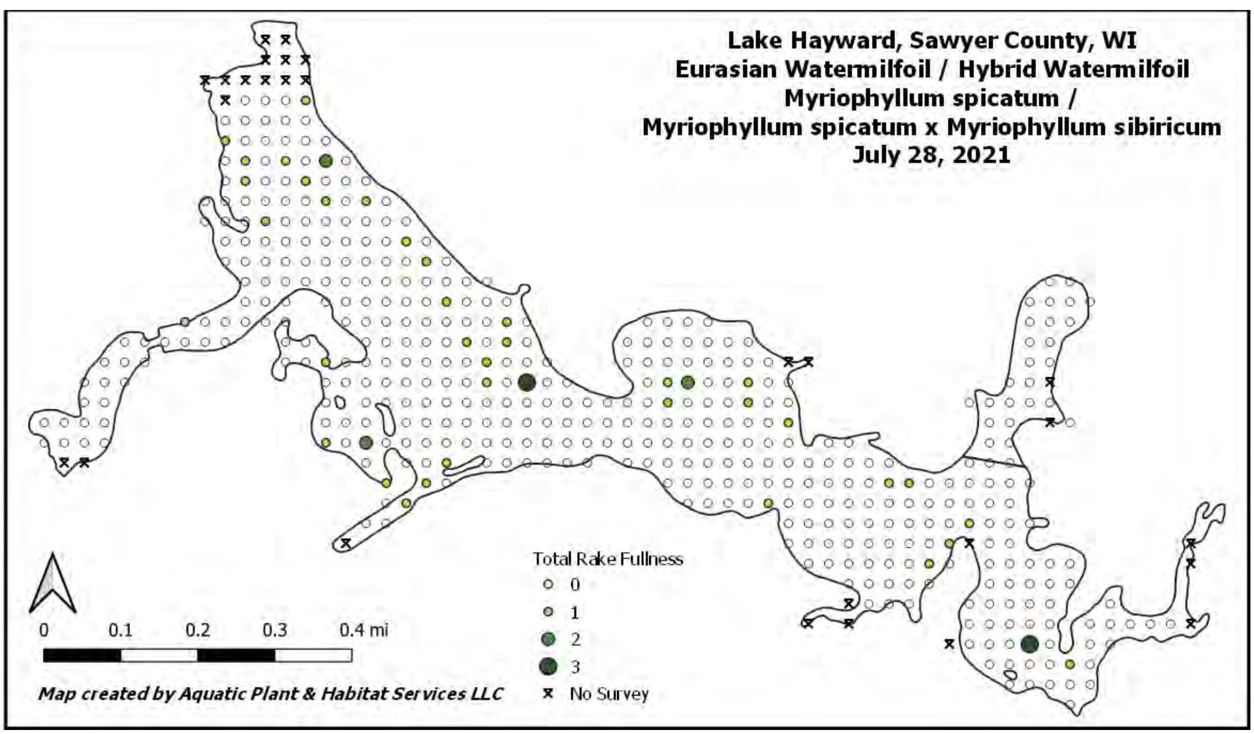
2.1 Aquatic Invasive Species

Aquatic invasive species (AIS) are defined by their tendency to out-compete native species thereby threatening the diversity and balance of plants and animals that are native to a particular system. The aquatic invasive plants of greatest concern in Lake Hayward are Eurasian & hybrid watermilfoil (*Myriophyllum spicatum & M. spicatum X sibiricum*) and curly-leaf pondweed (*Potamogeton crispus)*. Other non-native species in the lake include the Chinese mystery snail and purple loosestrife, which are not currently reportedly a serious threat to the lake ecosystem or recreation.

2.1.1 Lake Hayward Eurasian Watermilfoil / Hybrid Watermilfoil 2021

Hybrid watermilfoil (HWM) was verified in 2012 and Eurasian watermilfoil verified in 2011. Because the two species are only distinguishable from each other using genetic analysis, the reference to EWM throughout this management plan refers to both species. EWM had low-to-moderate littoral frequency from a lake-wide perspective during point-intercept (PI) survey in 2021 (9.5%) and only slightly higher occurrence in 2013 at 12.3% in June and then after 23 acres of herbicide treatment there was 12.5% in July 2013. EWM occurrence in 2021 was lower than 6 native species and it was spread throughout the lake. Although EWM is considered an aquatic invasive plant, its occurrence in 2021 was more like just another plant species in the lake. As such, there were no beds of dominant or highly dominant EWM in the lake.

Figure 12 EWM Map, 2021

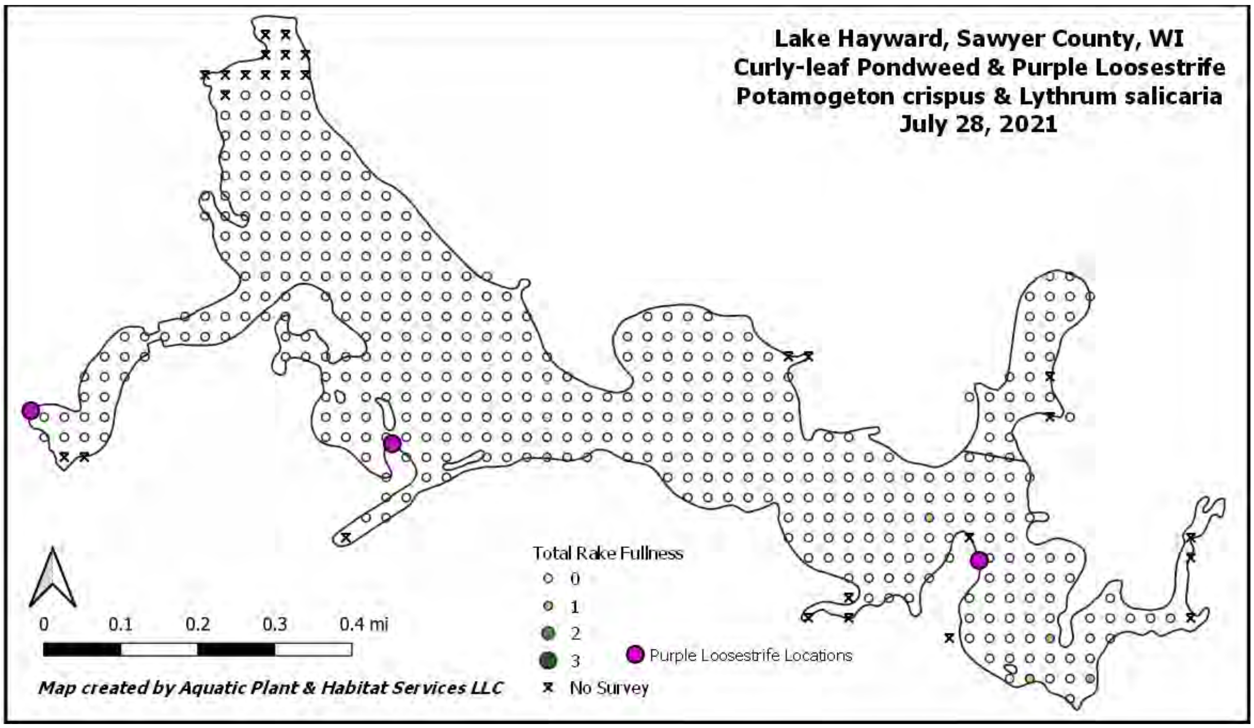


2.1.2 Lake Hayward Curly-leaf Pondweed & Purple Loosestrife 2021

Curly-leaf pondweed (CLP) was found at only 1% of littoral sites in July 2021 but this low occurrence is likely due to the early senescence of CLP in mid-summer. An early-season survey of CLP would be a better indication of occurrence, as was done in June 2013 when CLP was found at 33% of littoral sites.

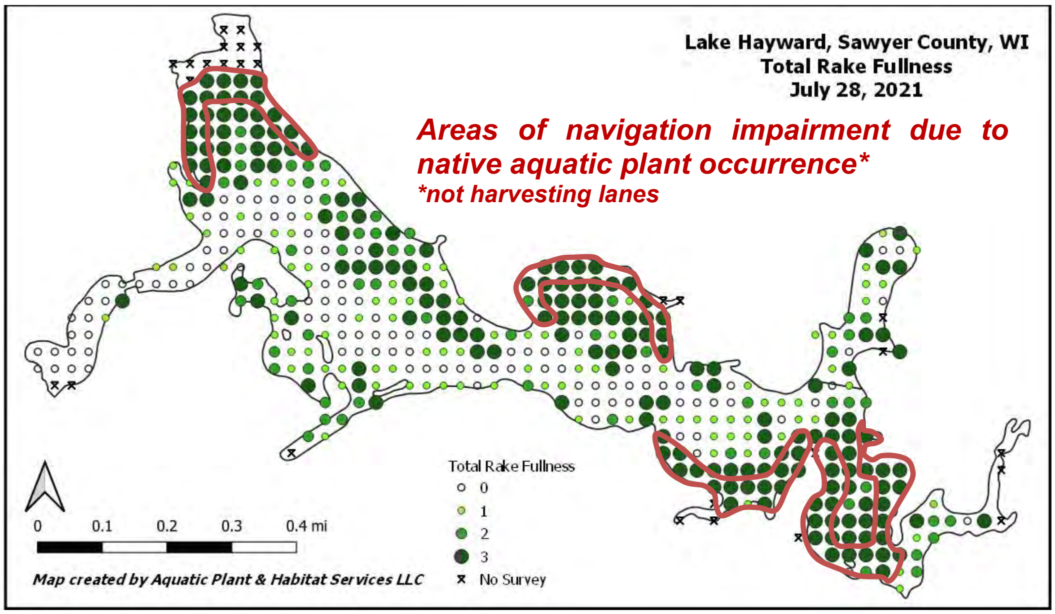
Purple loosestrife was found at 3 locations near sample sites. Although purple loosestrife can become highly invasive and outcompete native species in wetlands, it was found in only a few locations and not causing impairment. Anytime it is found, however, it should be removed with care so as not to spread seeds when the plant is flowering.

Figure 13 Curly-leaf Pondweed & Purple Loosestrife Map, 2021



2.2 Navigation Impairment

Results from the 2021 aquatic plant survey illustrate that Lake Hayward has a high abundance of native aquatic plants, especially at locations shallower than 10 feet deep. During the survey, there were some areas where navigation was difficult due to abundant emergent (bur-reed), floating-leaf (water lily, spatterdock), or submersed species (coontail, elodea). Although some of these areas are quiet back bay areas that do not require navigation, other areas of abundant plant growth hinder lake residents' ability to access the lake. These areas include the far northwest reach, Echo Bay along the north central shore, the bay along the south-central shore, and Barts Bay along the southeast shore.



2.3 Public Input & Planning

2.3.1 Public Meeting

A public meeting was held June 18, 2022 at the Weiss Public Library in Hayward to gather public input regarding aquatic plant management in Lake Hayward. There were approximately 25 people in attendance including presenters/natural resource professionals (Sara Hatleli, Aquatic Plant & Habitat Services LLC; Natalie Erler, Sawyer County). Information was presented on the 2021 aquatic plant survey results, aquatic invasive species occurrence, comparisons to previous year plant surveys, and management options. Also during the meeting, participants provided written comments about their concerns on a poster-sized map of Lake Hayward, an exercise that yielded the following 5 comments (Figure 14):

1. Algae bloom, excessive weeds, but lots of turtles & frogs. (placed in Echo Bay)
2. Bays are the biggest issue on the lake and need to start in those areas (Echo Bay)
3. Concerns regarding Lake Hayward Pond area (Echo Bay) which has been blocked from the lake by beavers and the destruction made (nothing more written)
4. Weeds so can kayak & motor craft (Echo Bay)
5. Navigable waters to fish (southeast area)

Figure 14   Public Meeting & Map Photos

Management Options

The main issue and reason for updating the APMP is due to the abundance of vegetation causing navigation impairment, especially in bays, of Lake Hayward. Although EWM and CLP are present, these invasive species were not abundant during the survey in 2021. As management options for alleviating navigation impairment were presented, participants were invited to weigh in on feasibility from social, economic, biological, and organizational capacity perspectives now (2022) or later (post-2022). The most feasible management options were manual removal near docks, mechanical harvest, herbicide treatment of AIS if they become problematic, and nutrient input control in riparian areas.

2.3.2 Follow-up Planning Meeting

A virtual meeting was held on August 18th from 2:00-4:00. Public input results were compiled and used to develop draft goals and objectives that were presented during this meeting. LHPOA committee members in attendance included Heidi Martens and Paul Van Natta. Sara Hatleli (APHS), Scott VanEgeren (WDNR), Andrew Zabel (WDNR), Natalie Erler (Sawyer County), Kristi Maki (American Birkebeiner & Lumberjack World Championships Foundation), and Caitlin Nagorka were also in attendance. Goals and objectives based on the public input meeting and this follow-up meeting are reflected in Section 5.0.

2.3.3 APMP Review and Comment

A first draft of this management plan was available to the LHPOA Aquatic Plant Committee December 28, 2022 through January 15, 2023. Only minor editorial changes were requested.

A second draft of the plan was sent to the WDNR, Sawyer County, National Park Service, Xcel Energy, American Birkebeiner Ski Foundation, Lumberjack World Championships Foundation, and the City of Hayward for another round of review. NPS made some inquiries about permit requirements for mechanical harvest due to the multi-jurisdictional status of Lake Hayward as an impoundment of the St. Croix National Scenic Riverway. The consultant confirmed with the US Army Corps of Engineers in Hayward WI on January 23, 2023 via email correspondence that USACE does not regulate mechanical harvest of aquatic vegetation.

Public Review and Comment

A third draft of the plan was available for public review and comment February 15 – March 8, 2023. A public notice was placed in the local Sawyer County Record on February 15th. A hard copy of the APMP was mailed to the Weiss Public Library in Hayward WI. No comments were received during the public review period.

Adoption by the Lake Hayward Property Owners Association

The LHPOA officers and Aquatic Plant Management Committee voted to adopt the plan via email on March 16th, 2023. LHPOA officers are Todd Martens, Heidi Martens, Lee Neuschwander, and James Miller. Aquatic Plant Management Committee members are Heidi Martens, Paul VanAtta, Paul Adler, and Allen Heinkel.

Approval by the DNR

The APMP was provided to the DNR on March 20, 2023 with the request for official approval. The wildlife biologist and fisheries biologist did not have concerns about the goals and objectives presented. The Northwest Region Ecologist also did not have any main concerns but provided a worthy suggestion that stormwater runoff from the city into Lake Hayward be considered. Stormwater carries nutrients which then help fertilize aquatic vegetation. If stormwater management could be explored during the next update of the APMP, it would provide useful management information. The reality of this initiative would depend on the LHPOA's organizational capacity to pursue stormwater analysis and work with the City of Hayward toward mitigation. The plan was officially approved by Scott Van Egeren, Water Resources Management Specialist, WDNR, on April 26, 2023 by email (see Appendix D).

3.0 Past Aquatic Plant Management Activities

3.1 Chemical Treatment

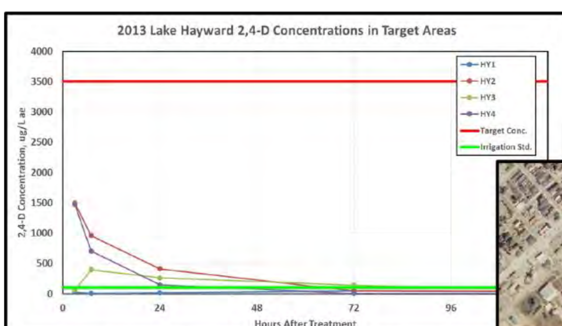
Chemical treatment of EWM in Lake Hayward at 0.5 acres was conducted July 13, 2011 and 23 acres on July 2, 2013. Pre-treatment and post-treatment aquatic plant surveys were done in 2013 to gauge the efficacy of the herbicide treatment and impact to native species. Herbicide concentration was also monitored after the July 2013 treatment to quantify exposure times.

3.1.1 2013 Pre-Post Treatment Surveys

Endangered Resource Services (ERS) LLC completed a pre-treatment aquatic plant survey in Lake Hayward on June 16-18, 2013. EWM was present at 54 points or 11.3% of the lake during the pretreatment survey with 13 points rating a total rakeness of 3 and 11 points rating a 2 . Herbicide treatment was completed July 2, 2013. ERS then completed a post-treatment survey on July 26-28, 2013 and found EWM was still present at 53 points or 11.1% (Figure 16). Although EWM plants showed evidence of chemical burn, many plants were not killed and changes in total plants nor individual rake fullness ratings were significant.

3.1.2 2013 Herbicide Treatment & Monitoring

During the 23-acre treatment on July 2nd, 2013, 2,4-D (DMA 4 IVM) was applied with a target concentration of 3500 ug/L. There were 7 locations in the lake that were monitored for herbicide concentrations. Samples were collected from those 7 sites at time intervals of 3, 7, 24, 72, and 120 hours after treatment. Peak concentrations of 2,4-D from sites HY1, HY2, HY3, and HY4 ranged from 48 to 1496 ug/L, which is lower than the target concentration for control of 3500 ug/L. Sites HY5, HY6, and HY7 also had herbicide concentrations much lower than the target 3500 ug/L for the duration of sampling (Figure 15).



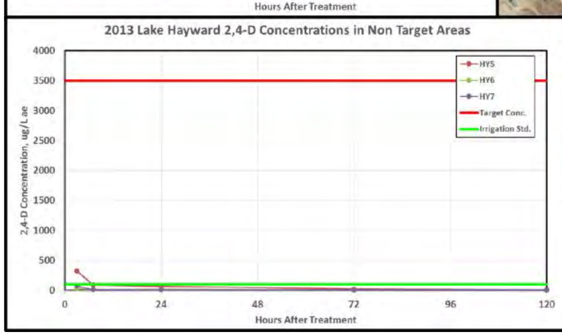
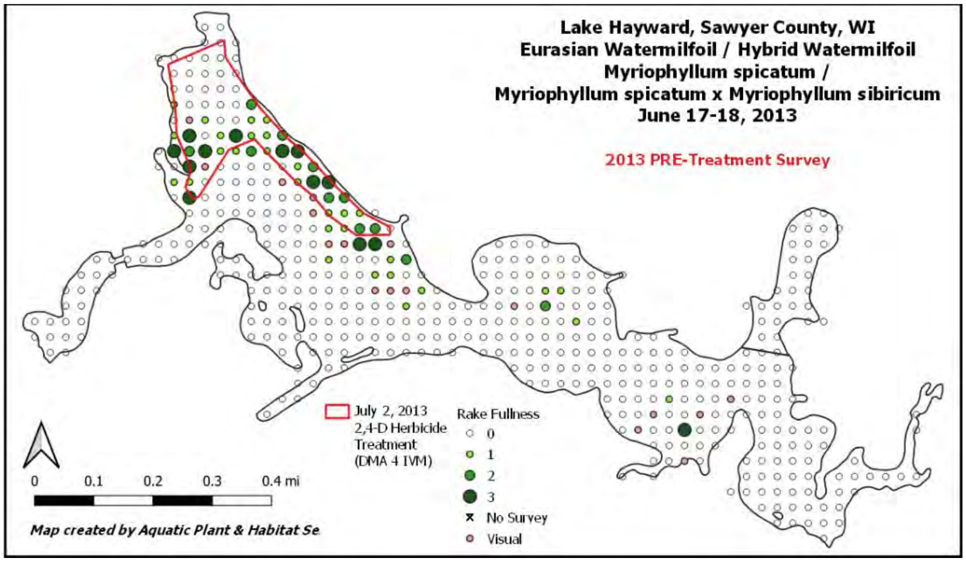
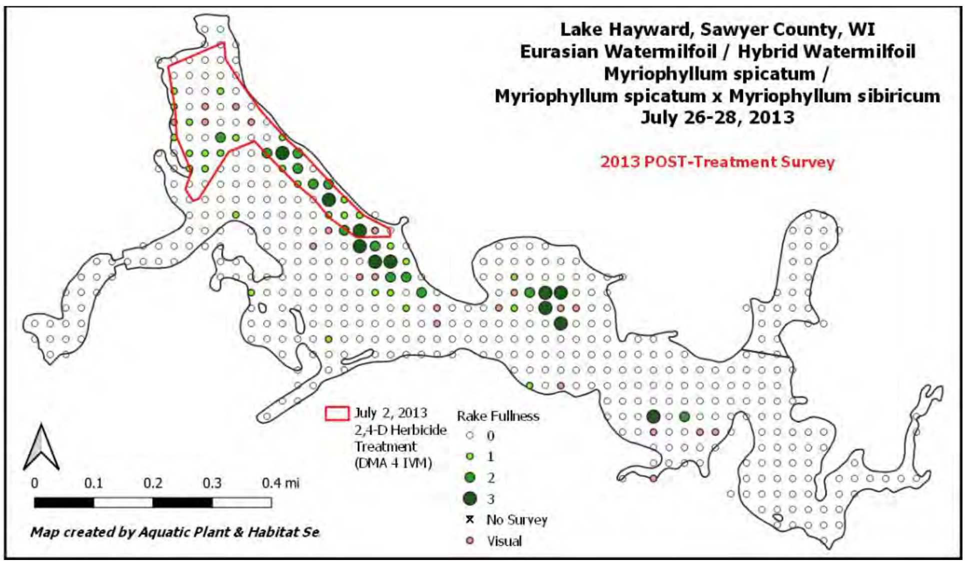


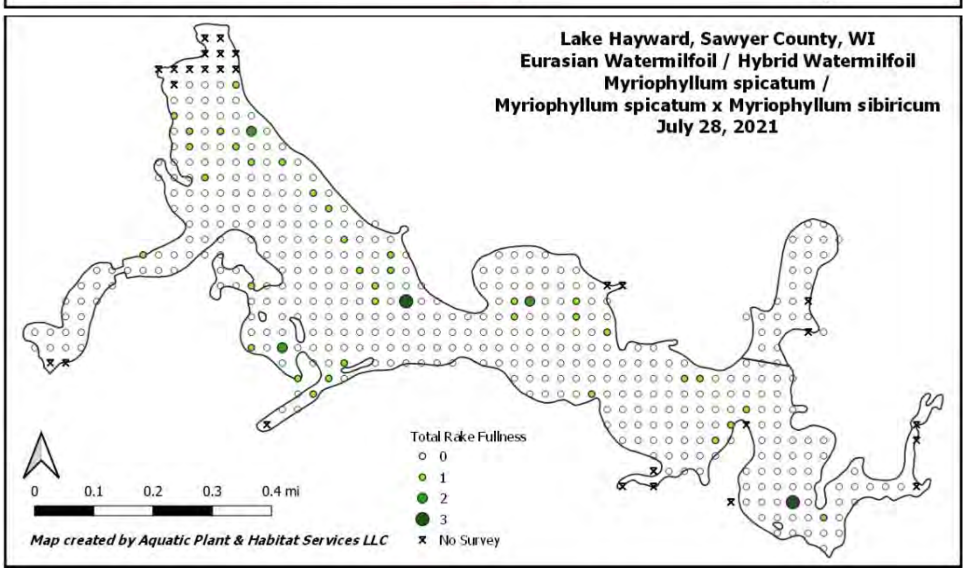
Figure 15 Herbicide Monitoring Locations & Graphs

Graphs & map copied from 2015 APMP

Figure 16 EWM/HWM Maps Pre-post Treatment 2013 & 2021







3.2 2021 Aquatic Plant Survey

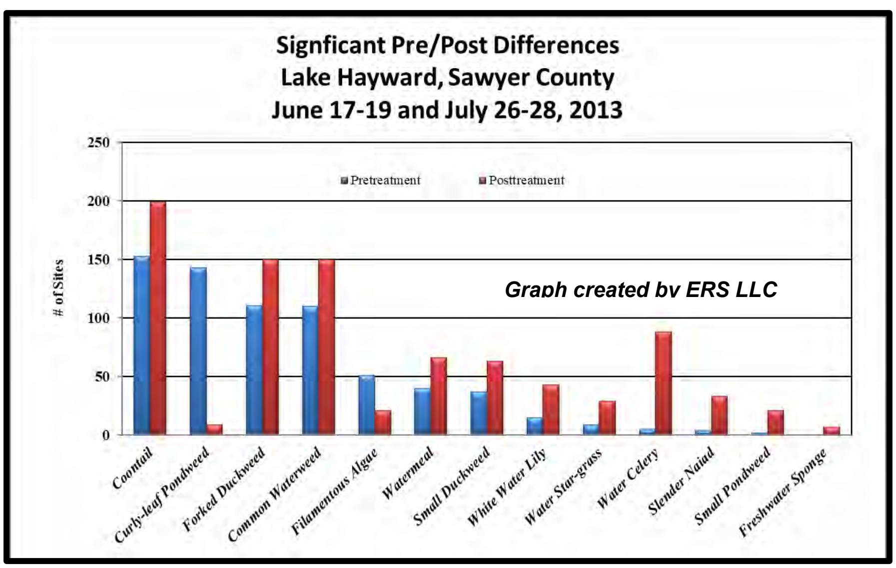
Aquatic Plant & Habitat Services (APHS) LLC completed an aquatic plant survey in Lake Hayward July 27-29, 2021. EWM was found at 41 sites or 9.5% frequency of occurrence with 35 of those sites having rake fullness rating of 1 . EWM was found spread throughout the lake and mainly in no greater frequency or density than native species. Therefore, it was concluded in 2021 that EWM was not a species that was *alone* causing beneficial use impairment (Figure 16).

3.3 Chi-square Tests

ERS completed a chi-squared test of plant occurrence to compare plant species before and after herbicide treatment in 2013. The statistical test helps determine whether there is a significant difference between two data sets by comparing the number of sites a particular plant species was found in two different years. The alpha, or Type I error rate was set at 0.05, meaning there is a 5% chance of claiming there is a significant change when no real change has occurred.

The following results are from Endangered Resource Services LLC. *When considering only the lake's native vegetation before and after herbicide treatment in 2013, coontail, forked duckweed, common waterweed, and fern pondweed were the most common species before and after herbicide treatment with no significant changes in their occurrence. Curly-leaf pondweed (non-native) was the only species with a significant decline after herbicide treatment, which would have been due to natural senescence and not the herbicide treatment. White water lily, water star-grass, wild celery, slender naiad, and small pondweed all showed highly significant increases; and coontail, forked duckweed, common waterweed, common watermeal, small duckweed, and freshwater sponges moderately significant increases. These gains were likely the result of normal growing season expansion as most of these plants are later growing species that germinate from seeds, annually regrow from overwintering buds, or reproduce by vegetative budding/cloning.*

Figure 17 Pre-Post Herbicide Treatment Graph



4.0 Plant Management Options

4.1 Options List

The best way to manage aquatic plants will be different for each lake and depends on the plant community, the species that require control, whether AIS are present, the level and type of human use of the system, and various other background information presented in this management plan. Aquatic plant management rules can be found in Wisconsin Administrative Codes, Chapters NR107 (chemical), NR109 (manual/mechanical), NR40 (invasive species) and Chapter 30/31 (waterways). Many management activities require a permit.

There are five broad categories for aquatic plant management:

- **No active management,** which means nothing is done to control plant growth, but a strong monitoring and education component may be included.
- **Manual & mechanical removal of plants**, which includes hand pulling, raking, using plant harvesters, and diver assisted suction harvest.
- **Chemical treatment**, which is the use of herbicide to kill aquatic plants.
- **Physical habitat alteration,** which means plants are reduced by altering variables that affect growth such as sediment, light availability, or depth.
- **Biological control**, which includes the use of living organisms, such as insects, to control plant growth.

4.2 Feasibility Factors

In order for a control method to be appropriate, it must be feasible from a biological, social, financial, and organizational capacity perspective. Biological feasibility infers the control action will not cause significant harm to other aspects of lake ecology. Socially feasible actions are those that have support from project partners, meet regulatory requirements, and will likely be permitted by regulatory agencies. Financial feasibility simply implies that any control action is affordable for the LHPOA and partners providing cost share. Organizational capacity refers to LHPOA's ability to carry out proposed goals and objectives. Some actions are accompanied by risks and potential impact to non-target aspects of a lake, but the benefits must outweigh those risks and potential detriments.

4.3 No Active Management

Sometimes the best course of management is to take no immediate action. There are many benefits including the lack of disturbance to desirable native species and the lake system, there is no financial cost (aside from possibly survey costs), there are no unintended consequences active control, and no permit is required. Disadvantages to this approach include the potential for existing issues to become larger and more challenging to control later. This approach often includes a strong monitoring and educational component.
Refraining from active management is not realistic at this time. The impetus for updating this APMP resides in LHPOA's interest in addressing navigation impairment caused by aquatic plants.

4.4 Manual & Mechanical Control

Manual and mechanical control includes pulling plants by hand or by using harvesting machines or devices. Permits are required for some activities and there are a variety of options under this type of control. Mechanical control is regulated under Chapter NR 109[1].

4.4.1 Manual Plant Removal

Figure 18 Manual Removal Photo

Shore land property owners are allowed to manually remove a 30-foot-wide section of native aquatic plants parallel to their shoreline without a permit. This can only occur in a single area and there must be piers, boatlifts, swim rafts, or other recreational or other water use devices within that 30-foot zone. This method can only be employed where other plant control methods are not being used and cannot be used in designated sensitive areas. At present there are no designated sensitive areas on Lake Hayward. Property owners considering this method for recreational purposes are encouraged to contact their local WDNR Lakes Coordinator[2] if they have any questions or need clarification on native plant removal at their particular site. There are no limits on raking loose plant material that accumulates along the shoreline. AIS can be selectively removed by manual means anywhere along shore or in open water area without a permit. Regulations require that the native plant community is not harmed during manual removal of AIS. Benefits of these techniques include little damage to the lake and plant community, the removal can be highly selective, and can be very effective in a small bed of AIS. On the other hand, this method can be very labor intensive. Furthermore, EWM that fragments during removal can root and grow elsewhere, so all of the plant must be removed.

Manual removal of EWM or native plants in a 30-ft wide section parallel to shore is feasible for small-scale control as a way for lake residents to keep EWM occurrence low in front of their property and to allow watercraft travel to/from shallow docking areas.

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[1] Chapter NR 109 https://docs.legis.wisconsin.gov/code/admin_code/nr/100/109.pdf.

[2] At the time of writing, the appropriate contact is Scott Van Egeren, 715-471-0007, scott.vanegeren@wisconsin.gov

4.4.2 Diver Assisted Suction Harvest (DASH)

Figure 19 DASH Photo

This form of mechanical control involves the use of suction tubes connected to pumps mounted on a barge or pontoon. The suction tubes reach to the bottom of the lake and SCUBA divers manually uproot EWM to be sucked through the tubes, up to the barge, and strained. Vegetation fragments from harvesting can grow new plants in the lake and it is therefore important for DASH workers to minimize fragmentation as much as possible. DASH is also selective toward EWM so it can help in protecting native and low frequency species and can be highly effective. DASH is labor intensive and costly at $2,500 per day and removal rate depends on the density of EWM on-site, the height of EWM, and the number of different locations that need to be targeted for removal. Construction of a DASH unit costs range from $9,000 if purchasing used components up to $25,000 for new construction. Annual operating costs for two divers over 13 weeks, insurance, fuel, permits, and materials are approximately $31,000 (Greedy, 2016). It is difficult to generalize results across different lakes and results may be lake-specific or even site-specific (Gajewski, 2016).

Using DASH for EWM control in Lake Hayward is not a realistic approach based on 2021 aquatic plant survey results. This method is best employed at small & dense infestation sites, possibly after herbicide treatment as a way to keep EWM occurrence low.

4.4.3 Mechanical Harvest

This method includes mowing of aquatic plants down to depths of 5 feet and then collecting the plants and removing them from the lake. Mechanical harvest is only permitted in water depths of 3 feet or greater to prevent the harvester paddle wheels from scouring the lake bottom and/or resuspending sediment. Harvesting is most appropriate for lake systems with large-scale or whole-lake aquatic plant issues. Mechanical harvesters provide immediate results and usually cause minimal impact to lake ecology while removing some, albeit likely minimal, nutrients from the lake via plant biomass reduction. Harvesting lanes in dense plants beds can improve growth and survival of some fish species. A disposal site for harvested plants is a necessary part of a harvesting plan. Hiring a mechanical harvester to work on the lake would cost $2,500 per day. The purchase of a brand new harvester is highly variable and depends on the type of harvester purchased. Cutting harvesters begin at $100,000. With a cutting harvester, a shore conveyor (starting at $35,000) is needed to offload the plants into a truck or dumpster for transport to a disposal site. A Recreational Boating Facilities Grant may help pay for up to 50% of eligible costs associated with purchasing harvesting equipment. Annual costs include paying an operator, storage of the harvester, insurance, and maintenance. As an example, Blake Lake's (Polk County) 2018 harvesting budget was $27,700[3].

It is feasible for LHPOA to hire a mechanical harvester to open navigation channels in bays where aquatic plants are causing navigation impairment and water depth is 3 feet or greater. If pursued, harvested areas should be monitored to ensure there is no increase in EWM growth in the harvested lanes.

Figure 20 Mechanical Harvester Photos

[3] 2018 Annual Harvesting Budget Blake Lake: $2,500 APM Coordinator, $1,500 Lakes Convention, $475 Dues, $8,500 Harvester Labor & Expenses, $4,500 Insurance, $4,525 Administration, $5,700 Lake Management Plan.

4.5 Chemical Control

Chemical control is regulated under Wisconsin Administrative Code Chapter NR 107[4]. The amount of time required to control plants depends upon the specific product, whether it is a systemic or contact herbicide, formulation (granular or liquid) and concentration used. Herbicides must be applied in accordance with label guidelines and restrictions. Contact herbicides such as endothall or diquat do not circulate within the plant, kill plant tissue on contact, and are therefore not selective for certain types of plants. Systemic herbicides such as 2,4-D, fluoridone, and the newer ProcellaCOR must be absorbed by the plant tissue, take longer than contact herbicide for control action, and can be selective depending on the herbicide type.

For EWM control, an herbicide generally known as 2,4-D is often used because it is supposed to be selective to broadleaf plants such as EWM. The benefits of using 2,4-D are its effectiveness in controlling EWM, impact to monocots and other native species are supposed to be minimal, altering concentrations and timing allow it to be more selective in killing EWM, and it is widely used. On the other hand, 2,4-D can impact native dicots (such as water lilies, coontail, and bladderworts). The ester formulation of 2,4-D is toxic to fish and invertebrates such as water fleas (*Daphnia sp.)* (WDNR, 2012). Dehnert (2020) found the amine formulation of 2,4-D to impact the embryonic and/or larval stages of walleye, perch, fathead minnow, white sucker, northern pike, white crappie, and largemouth bass.

Herbicide treatment history is discussed in Section 3.1. Aquatic plant survey results and herbicide monitoring from 2013 suggest that herbicide concentrations did not reach target levels and therefore did not result in EWM reduction. This could have been due to the nature of Lake Hayward as an impoundment and the natural flow of water through the lake system may have diluted the herbicide shortly after application.

Impacts to native aquatic plants are an important factor when deciding whether to use chemical control. If the native plants are reduced by repeated chemical control, there is more area for EWM to grow. There were no statistically significant reductions in native plant species after treatment. Even so, if the duration of EWM or CLP control only lasts for one or two growing seasons, it is important to weigh the financial costs combined with impacts to native plants versus the relatively short-lived control. ***Although herbicide treatment may be a feasible option for EWM or CLP control in the future, it is not an appropriate control tool at this time. It is also important to consider the possibility of herbicide dilution before effective control can take place. Following up any herbicide treatment with other forms of EWM control is highly recommended.***

Figure 21 Chemical Treatment Photo

[4] Chapter NR 107 is available at *https://docs.legis.wisconsin.gov/code/admin_code/nr/100/107.pdf*.

4.6 Physical Habitat Alteration

Various physical habitat alterations exist and most are not appropriate for consideration in Lake Hayward. Many of these alterations require a Chapter 30 permit.

4.6.1 Bottom Barriers

Bottom barriers prevent light from reaching aquatic plants, but kill all plants, and some allow for gas accumulation under the barrier and subsequent dislodging, they can impact fish spawning and food sources, and an anaerobic environment below the barrier could cause nutrient release from the sediment. Bottom barriers are appropriate for public swimming areas near beaches, but not recommended in front of private properties for EWM or native plant control in Lake Hayward.

4.6.2 Dredging

Dredging includes the removal of plants along with sediment and is most appropriate for systems that are extremely impacted with sediment deposition and nuisance plant growth. Impoundments are often faced with issues associated with sedimentation, especially in shallow bays. This is a normal process for a river or stream to carry sediment in faster moving water until the river channel widens, sediment then settles, and overtime reduces water depth. Although Lake Hayward is an impoundment, the use of dredging to control aquatic plants would not be appropriate. There may be a time when dredging is explored to address sedimentation, but this activity would be beyond the scope of an APMP. In any case, dredging is not currently recommended.

4.6.3 Dyes

The use of dyes is for reducing water clarity thereby reducing light availability to aquatic plants. This is only appropriate for very small water bodies with no outflow and is therefore not recommended for Lake Hayward.

4.6.4 Non-point Source Nutrient Control

No permit is required for this type of nutrient management, which reduces the runoff of nutrients from the watershed. As a result, fewer nutrients enter the lake and are therefore not available for plant growth. This approach is beneficial because it attempts to correct the source of a nutrient problem and not just treat the symptoms. Controlling non-point source pollution is always recommended as are continued communications that encourage lake residents to reduce surface water runoff into Lake Hayward.

4.6.5 Drawdown

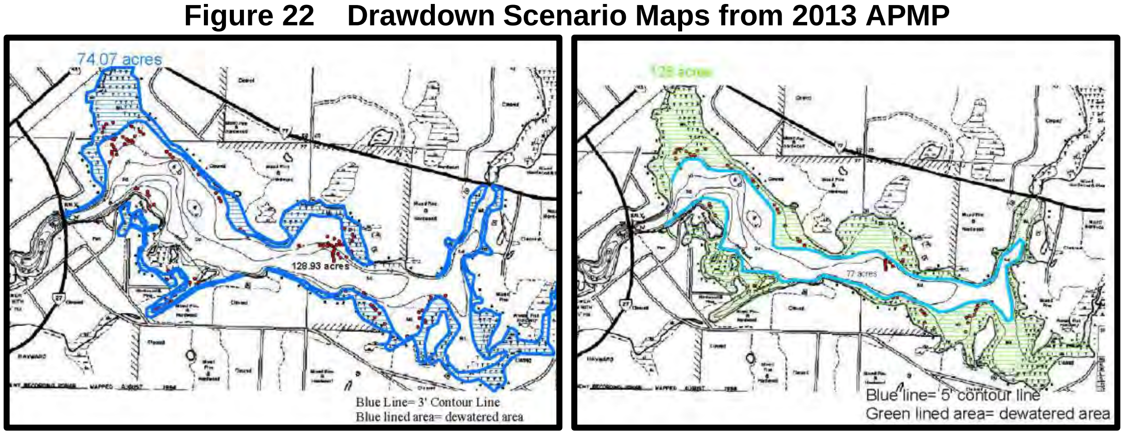
This control technique involves the lowering of water levels and with the existence of the dam and powerhouse, Lake Hayward could potentially be drawn down to control aquatic plant growth. If this method where pursued, a drawdown would lower the water elevation to a pre-determined level in the late summer/early fall and allow exposed sediments dry and freeze during the winter. This would in turn freeze plant root structures, effectively killing the plants. Snowfall before a hard freeze may insulate the sediment thus not exposing the roots and rhizomes to harsh freezing conditions.

Long before a drawdown would occur, there would be considerable planning required and the development of a drawdown management plan (DMP), which would require information listed below and approval by Federal Energy Regulatory Commission (FERC).

- Drawdown need
- Rate of water level decrease
- Schedule & depth of drawdown
- Required minimum downstream flows and pond level elevation
- Impacts to fish, reptiles, amphibians, insects, crayfish, mussels, and other animals in the lake that overwinter in the lake bed sediments
- Meetings with partners (Xcel Energy, National Park Service, U.S. Fish and Wildlife Service, WI Department of Natural Resources, American Birkebeiner Ski Foundation, Lumberjack World Championships Foundation, City of Hayward, snowmobiling clubs, LHPOA, Sawyer County
- Environmental / recreational concerns & protective measures
- Public notification

A 3' drawdown was done in April of 2004 for maintenance purposes. According to the 2013 APMP for Lake Hayward, a drawdown at this level would allow for adequate water to flow through the dam and downstream (8 cubic feet per second required to go through the dam and downstream). A drawdown of 3' would not cause any icing concerns to the dam structure or cause a shutdown of the power generating equipment.

Figure 22 Drawdown Scenario Maps from 2013 APMP



Images copied from 2013 APMP

4.7 Biological Control

4.7.1 Insects

A native insect commonly known as the milfoil weevil (*Euhrychiopsis lecontei*) is a reasonable biological control agent for EWM. The native weevils lay eggs in the tips of milfoil plants. When the larvae hatch, they feed on the tips of the stem and burrow into the stem. Furthermore, adult weevils feed on leaves of milfoil plants. The weevils are native to Wisconsin and normally feed on northern watermilfoil (*Myriophyllum sibiricum*) but have demonstrated preference for EWM, even when native milfoil species are present (Solarz & Newman, 2001). It is not known whether native populations of weevils already exist in Lake Hayward. Stocking weevils has been done on other lakes, but whether they effectively control EWM depends on the ability for the weevil to survive in the introduced lake. They require natural shorelines for overwintering and seem to survive best in shallow milfoil beds (Jester, 1999). Furthermore, predation can be a major limiting factor in weevil survival, especially when high populations of sunfish (*Lepomis sp.,* including bluegill) are present (Ward & Newman, 2006). The 2021 electrofishing survey suggest that bluegill are relatively abundant and of good size with more than 10% over 8 inches long. Lake Hayward has a strong reputation as a bluegill fishery. Even so, it is entirely possible that native weevils are already present in the lake. If that is true, they may have been the reason for the fall in EWM density between 2013 and 2021. ***Using weevils to control EWM/HWM in Lake Hayward is possible. The first step would be to determine whether the native weevils are naturally present.***

Figure 23 Milfoil Weevil

5.0 Management Strategy 2023-2027

5.1 Goal 1 – Provide educational opportunities pertaining to aquatic plants and aquatic invasive species.

Objective 1a: Organize two educational sessions that focus on AIS identification, manual removal, and/or APM in Lake Hayward.

- Include funding for educational events if grant applications are pursued for other activities. The grant funding request would need to occur the year before the education session.
- Work with Sawyer County AIS Coordinator, WDNR, and/or private consultant to provide instruction and presentations.

Objective 1b: Use the LHPOA website to disseminate information.

- Recruit a volunteer from LHPOA to serve as webmaster for the website.
- Post the updated APMP on the website.
- Include announcements pertaining to educational events and meetings.
- Post information about manual removal of aquatic plants. See language from Obj. 2a, which pertains to manual removal.

Table 4 Goal 1 Implementation

Implementation of Goal #1								
Goals, Objectives, and Action Items		Entities Involved	2023	2024	2025	2026	2027	Surface Water Grant Eligible
1. Provide educational opportunities pertaining to aquatic plants and aquatic invasive species.								
1a	**Organize two educational sessions that focus on AIS identification, prevention, manual removal, and/or APM in Lake Hayward.**							Grant application costs not grant eligible. Costs for educational activities are grant eligible.
	Include funding for educational events as needed.	LHPOA, RP	X	X				
	Work with resource professional to provide instruction and presentations.	LHPOA, RP		X	X	X	X	Yes
1b	**Use the LHPOA website to disseminate information.**							Yes, volunteer time can be used as match.
	Recruit a volunteer from LHPOA to serve as webmaster.	LHPOA	X	X	X	X	X	
	Post updated APMP, announcements, & information about manual removal of plants.	LHPOA	X	X	X	X	X	Yes, volunteer time can be used as match.

LHPOA = Lake Hayward Property Owners Association. RP = Resource Professional. WDNR = Wisconsin Dept. of Natural Resources.

5.2 Goal 2 – Reduce beneficial use impairment caused by aquatic plants.

Although EWM was not causing beneficial use impairment in 2021, it was an issue in the past. Currently, beneficial use impairment is caused by native aquatic plants, mainly coontail and elodea.

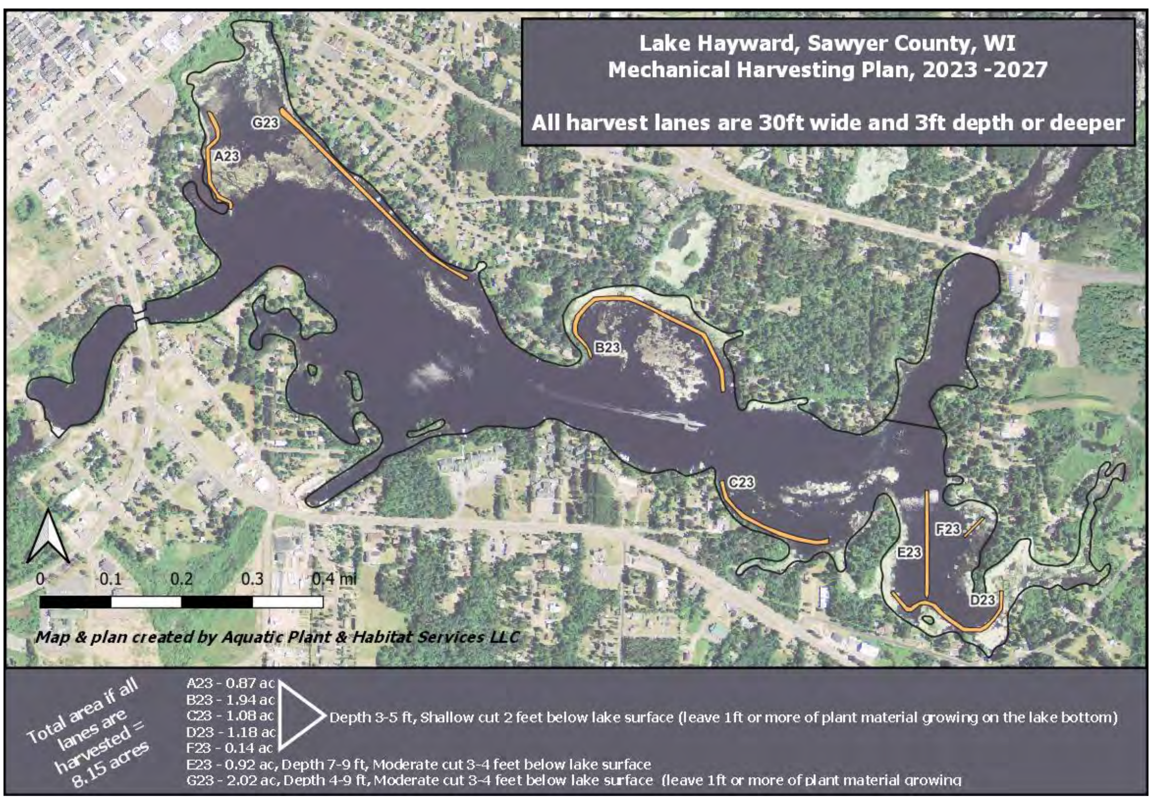
Objective 2a: Balance the manual removal of aquatic plants around docks with the goal of protecting the native plant community (Goal 3).

- Per Chapter NR109, native plant removal is allowed without a permit but limited to a single area with a maximum width of no more than 30 feet measured along the shoreline. All installed piers, boatlifts, swim rafts, and/or other recreational devices must be located within that 30-foot area. Property owners may remove the plants manually (not mechanically or chemically). This should only be done at a minimal level to meet the goal of protecting native plant species while also allowing for recreational use around docks (fishing, swimming, navigation). See Appendix C for tips on manual removal.

Objective 2b: Use mechanical harvest to open channels in bays with navigation impairment.

- Contact harvesting company to coordinate dates and contract details.
- Apply for a mechanical harvest permit from the WDNR in spring 2023. The harvesting company will assist or complete this task. The harvesting permit application must include, nonrefundable application fee $30 per acre up to $300 (to be paid by LHPOA), map of waterbody and control area (Figure 24), aquatic plant management plan, description of impairments caused by plants that are going to be harvested, description of plants to be removed, type of

Figure 24 Mechanical Harvest Map



equipment and methods for removal, why harvesting was chosen, location of plant disposal, and name of harvesting company hired. Once a *completed* permit application is submitted, the WDNR has 15 days to decide on the permit application.

- Confirm navigation impairment in the harvest lanes mapped in Figure 24. This can be done by a LHPOA volunteer or resource professional. This step ensures LHPOA is only paying for harvesting in areas where it is truly needed.
- After permit approval, conduct harvesting during the summer of 2023.
- Disposal of plants will occur at the Town of Hayward shop building located at 15460W State Road 77E, Hayward, WI 54843. The main contact for questions or concerns is the Town of Hayward Road Supervisor.[5]
- Trained volunteer or resource professional should survey harvest areas for EWM occurrence.
- Mechanical harvest in 2023 should be considered a pilot project. If the following criteria are met after the 2023 harvesting pilot, the process can be considered for future years as needed (another possibly multi-year permit would be necessary).
    - Navigation impairment was alleviated for the summer.
    - Inspection by trained volunteers or natural resource professional suggests there is no increase in EWM growth in the harvested lanes.

Objective 2c: Consider the use of herbicide treatment if aquatic invasive plant occurrence is high and causing navigation impairment. Herbicide treatment is not an option for controlling native plants.

- This objective is activated ***only*** if EWM (or CLP) are causing beneficial use impairment. Determination of beneficial use impairment would occur with a bed survey of EWM and using criteria in Figure 25. Impairment by CLP is less likely and the survey would occur in late spring or early summer.
- Late August / early September EWM bed mapping survey would identify location, density, average depth, and surface area of EWM beds.
- LHPOA would coordinate a planning meeting in winter to identify which beds, if any, should be treated based on results of the bed mapping survey, which herbicide should be used, and strategy to prevent herbicide dispersal and dilution that occurred in 2013 (see Section 3.1.2). Partners would be invited.
- Apply for herbicide treatment permit if appropriate based on the meeting.
- Pre-treatment sub point-intercept survey of beds to be treated would occur within a week before treatment.
- Herbicide treatment would likely occur in late spring.
- Post-treatment sub point-intercept survey to measure efficacy of treatment would occur in late summer or early fall.

[5] At the time of writing this plan, the contact is Brett Briggs, tohroadsup@cheqnet.net, 715-634-5410.

Figure 25 Eurasian Watermilfoil Control Guidance

Criteria for Prioritizing Eurasian Watermilfoil Control

SIZE	DENSITY	TRAFFIC	IMPAIRMENT	HABITAT	SURVEY DATA
•Is the bed size >0.25 acres (10,890 sq ft)?	•Is EWM considered dominant or highly dominant? •Is EWM rake fullness >2 on average?	•Is the EWM in an area of high boat traffic where fragmentation of the EWM is a concern?	•Is this bed of EWM causing beneficial use impairment? (aquatic plants prevent activities such as angling, boating, swimming, or other navigation /recreation)	•Is EWM the dominant species to the detriment of native plant species? •Would the proposed treatment have limited impact on native plants.	•Has an EWM bed survey been completed to document location, size, density, and height? •Are pre-post treatments planned? •Is herbicide monitoring planned?

HOW TO USE THESE CRITERIA – Answer the 6 questions for a particular bed of EWM or the entire lake depending on EWM occurrence. If the answer is "yes" for most questions (ideally 4 or more), then that bed of EWM may be considered high priority for control actions. For beds of EWM with fewer "yes" answers, control actions can still be considered but perhaps that area is not the highest priority. This graphic is meant to help the LHPOA prioritize where control actions should take place in any given year. Areas that do not receive attention in a given year may be considered higher priority the following year.

Objective 2d - The LHPOA will coordinate a planning meeting each winter relating to plant control and monitoring.

- Because the harvesting of native aquatic plants is a new activity for Lake Hayward, the LHPOA will meet annually, ideally in winter, to determine monitoring and control efforts needed for the next growing season based on results of monitoring and control efforts from the last growing season. This meeting can be virtual.
- Partners will be invited to the annual meeting. (WDNR, Sawyer Co., City of Hayward, American Birkebeiner Ski Foundation, Lumberjack World Championships Foundation, Xcel Energy, and National Park Service).
- Annual monitoring of harvested lanes by trained volunteers or natural resource professionals will help guide future management efforts. If there is greater EWM growth in harvested lanes, continued use of mechanical harvest should be reevaluated.

Objective 2e Plan for future surveys.

- Whole-lake aquatic plant surveys are recommended every five years. The next survey would be in 2026. The plant survey cost in 2021 was $4,355.
- If there are issues related to curly-leaf pondweed causing navigation impairment in late spring or early summer, an early-season whole-lake survey would be needed to plan for management of CLP which could include mechanical harvest and possibly herbicide treatment although the latter is less likely.
- For the aquatic plant survey in 2026, allocate funding to look for native weevil occurrence (likely $500 or less). If native EWM weevils are present, it might help explain the natural decline of EWM density that occurred between 2013 and 2021. Furthermore, protecting native weevils and their habitat would be recommended as a no-cost and lasting control method for EWM.

Table 5 Goal 2 Implementation

	Goals, Objectives, and Action Items	Entities Involved	2023	2024	2025	2026	2027	Surface Water Grant Eligible
Implementation of Goal #2								
2. Reduce beneficial use impairment caused by aquatic plants.								
2a	**Balance the manual removal of aquatic plants around docks with the goal of protecting the native plant community.**							Manual removal of native aquatic plants not eligible for surface water grants.
	Manually remove aquatic plants at a minimal level to allow for recreation around docks but also protect native plant species.	LHPOA	X	X	X	X	X	
2b	**Use mechanical harvest to open channels in bays with navigation impairment.**							Mechanical harvest of native aquatic plants not eligible for surface water grants. Cost of survey is grant eligible. Volunteer time can be used as match.
	Contact harvesting company and apply for harvesting permit.	LHPOA, HC	X	X	X	X	X	
	Confirm navigation impairment exists in areas planned for mechanical harvest.	LHPOA	X	X	X	X	X	
	Resource professional or trained volunteer survey harvested areas for increased EWM growth.	LHPOA, RP	X	X	X	X	X	
	Continue mechanical harvest after 2023 if navigation impairment is alleviated and EWM does not increase in harvested lanes.	LHPOA or RP		X	X	X	X	
2c	**Consider the use of herbicide treatment if EWM is in high occurrence and causing navigation impairment.**							
	Confirm beneficial use impairment is being caused primarily by EWM.	RP, WDNR, or CO	Years when EWM is thought to be the primary cause of impairment.					Any monitoring and planning activities contracted out will be grant eligible. Control activities may be grant eligible depending on the type of activity.
	Late summer EWM bed mapping survey.	RP, WDNR, or CO						
	Coordinate planning meeting in winter.	LHPOA (invite partners)						
	Apply for herbicide treatment permit if appropriate.	LHPOA						
	Complete pre-post treatment surveys and herbicide treatment.	RP						
2d	**The LHPOA will coordinate an annual planning meeting relating to plant control and monitoring.**							
	Meet annually to evaluate mechanical harvest activities that summer. Invite partners.	LHPOA	X	X	X	X	X	Yes
2e	**Plan for and conduct future surveys.**							
	Plan for a whole-lake aquatic plant survey in 2026 and look for native weevil occurrence during that survey.	LHPOA, RP	X	X	X	X	X	Yes

LHPOA = Lake Hayward Property Owners Association. RP = Resource Professional. HC = Harvesting Company. WDNR = Wisconsin Dept. of Natural Resources. CO = Sawyer County

5.3 Goal 3 – Protect native aquatic plants, organisms, and associated native mammal and fish populations.

Objective 3a: Avoid impacts to native plants when controlling AIS.

- Follow the herbicide label for concentration if herbicide control is used. A licensed herbicide applicator is required and will understand these guidelines.
- Work closely with the WDNR to target treatment timing that will be least impactful to native aquatic plant species and fish, particularly fish in the embryonic and larval life stages.
- Do not treat an area more than once every 2+ years. Repeat treatments in the same site exacerbate the threat to non-target native plants and organisms and therefore should not be considered.

Objective 3b: Minimize the manual removal of native plants for navigation and recreation.

In some instances, native aquatic plants can hinder recreational activities along shore. Property owners can remove some native plants but there are restrictions under Wisconsin Administrative Code, Chapter NR109 and more detail on this code is described in Section 4.4.1 and Objective 2a.

- This should only be done at a minimal level to meet the goal of protecting native plant species while also allowing for recreational use around docks (fishing, swimming, navigation). See tips on manual removal in Appendix C.

Table 6 Goal 3 Implementation

Implementation of Goal #3								
Goals, Objectives, and Action Items		Entities Involved	2023	2024	2025	2026	2027	Surface Water Grant Eligible
3. Protect native aquatic plants, organisms, and associated native mammal and fish populations.								
3a	**Avoid impacts to native plants when controlling AIS.**							NA
	Follow the herbicide label guidelines for concentration.	RP	If herbicide is ever used to control EWM					
	Use herbicides when they are least impactful to native aquatic plants and fish in the embryonic and larval life stages.	HLPOA, RP, WDNR	If herbicide is ever used to control EWM					NA
	Do not treat an area more than once every 2+ years.	HLPOA, RP, WDNR	If herbicide is ever used to control EWM					NA
3b	**Minimize the manual removal of native plants for navigation and recreation.**							NA
	Property owners may remove the plants manually (not mechanically or chemically) at a minimal level to meet the goal of protecting native plant species.	Riparians	As needed					

LHPOA = Lake Hayward Property Owners Association. RP = Resource Professional. WDNR = Wisconsin Dept. of Natural Resources.

5.4 Goal 4 – Protect water quality.

Trophic state and water quality are used interchangeably and while the two are related, they are not the same. Trophic state describes the biological condition of a lake using a scale that is based on measurable criteria. Water quality is a more subjective descriptor of a lake's condition based on the observer's use of the lake (see Section 1.4 for more detail). The clear, brown-stained, water is a result of low-to-moderate nutrient levels in the lake and maintaining this level is important.

Objective 4a: Launch citizen-based water quality monitoring.

There are only 2 years of water quality monitoring (1999 and 2014). Ongoing water quality monitoring is needed.

- LHPOA recruit a volunteer to become trained with the Citizen Lake Monitoring Network of Wisconsin. This volunteer will measure water clarity and take water samples for phosphorus and chlorophyll three or more times each year.

Objective 4b: Promote riparian practices that protect water quality.

Lake water quality/clarity can be linked to property values. Water clarity is directly impacted by surface water runoff of lakeshore properties (see Section 1.3 for more information).

- Educate lakeshore residents about shoreland practices that protect the lake and about Healthy Lakes grant opportunities. Post a link to the Healthy Lakes program on the LHPOA website.
- The LHPOA will aim to recruit 5 lake residents to install Healthy Lakes Practices on their property. Practices could include allowing a 10- foot vegetative buffer to grow along the shoreline, a 350 square-foot native plant shoreline buffer, water diversion, rock infiltration, or rain garden. Detailed fact sheets and technical guidance at https://healthylakeswi.com/best-practices/.

Table 7 Goal 4 Implementation

Implementation of Goal #4								
Goals, Objectives, and Action Items		Entities Involved	2023	2024	2025	2026	2027	Surface Water Grant Eligible
4. Launch Citizen-based Monitoring in Lake Hayward.								
4a	**Launch citizen-based water quality monitoring.**							NA
	Recruit a volunteer to become trained and active in the Citizen Lake Monitoring Network.	LHPOA	X	X	X	X	X	
4b	**Promote riparian practices that protect water quality.**							Yes
	Educate lakeshore residents about shoreland practices that protect the lake and about Healthy Lakes grant opportunities to help fund these projects.	LHPOA	X	X	X	X	X	
	Aim to have lakeshore residents complete restoration practices on their shoreline.	LHPOA	X	X	X	X	X	Yes

LHPOA = Lake Hayward Property Owners Association.

5.5 Goal 5 – Prevent the introduction of additional aquatic invasive species.

Objective 5a. Conduct watercraft inspections.

- Apply for grant funds annually to hire watercraft inspectors.
- Participate in the Drain Campaign around Memorial Day weekend. Watercraft inspectors share the message with anglers to drain livewells and ice their catch, which helps prevent the spread of invasive species. Transporting water can contribute to the spread of invasive species because some disease, animals and plants can get caught in motors, livewells and buckets. The WDNR offers education materials to help share the message.
- Participate in the Landing Blitz, which is a statewide effort every fourth-of-July weekend to remind boaters to stop the spread of aquatic invasive species.

Objective 5b: Install and maintain a decontamination station to support the Sawyer County Decontamination Ordinance.

- Apply for grant funds to install a decontamination station at the boat landing. A decontamination station means a device provided at a public or private lake access to remove all potential invasive species. It may consist of high temperature water applied with a pressure washer, a recommended chemical solution applied with a low-pressure washer, or other techniques or devices. The primary reason for decontamination is to reduce the risk of transporting the zebra mussel larvae.
- Recruit a volunteer to maintain the station with bleach solution.

Table 8 Goal 5 Implementation

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Implementation of Goal #5								
Goals, Objectives, and Action Items		Entities Involved	2023	2024	2025	2026	2027	Surface Water Grant Eligible
5. Prevent the introduction of additional aquatic invasive species.								
5a	**Conduct watercraft inspections.**							LHPOA pays for grant application if contracted out.
	Apply for Clean Boats Clean Waters grant.	LHPOA	X	X	X	X	X	
	Workers/volunteers become trained for watercraft inspections.	LHPOA, CO						
	Participate in the Drain Campaign and Landing Blitz.	LHPOA	X	X	X	X	X	Yes
5b	**Install and maintain a decontamination station to support the Sawyer County Decontamination Ordinance.**							
	Apply for grant funds to install a decontamination station at the boat landing.	LHPOA	X	X				LHPOA pays for grant application if contracted out.
	Recruit a volunteer to maintain the station.	LHPOA	X	X	X	X	X	Volunteer time can be used as grant match.

LHPOA = Lake Hayward Property Owners Association. CO = Sawyer County

6.0 References

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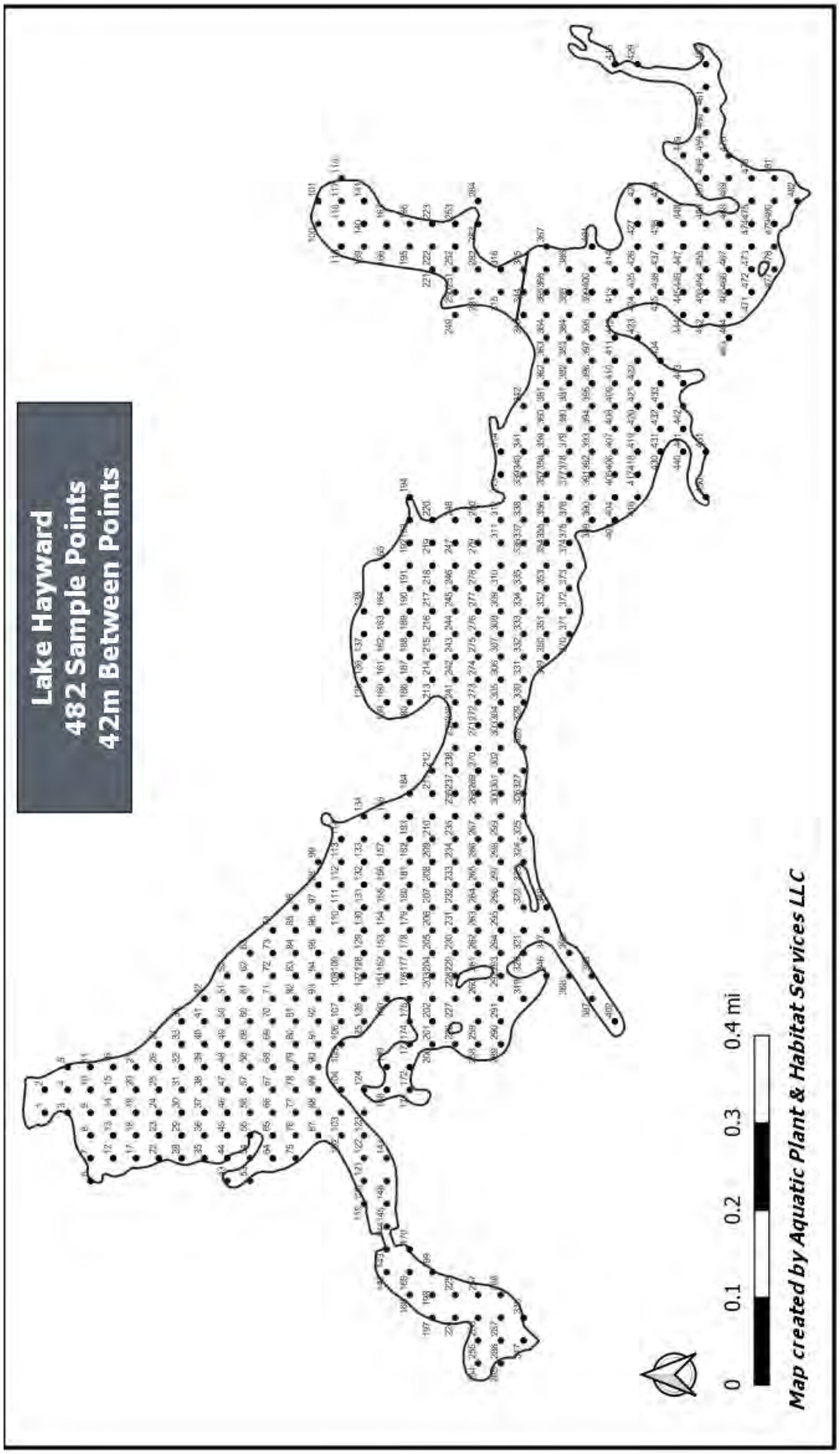
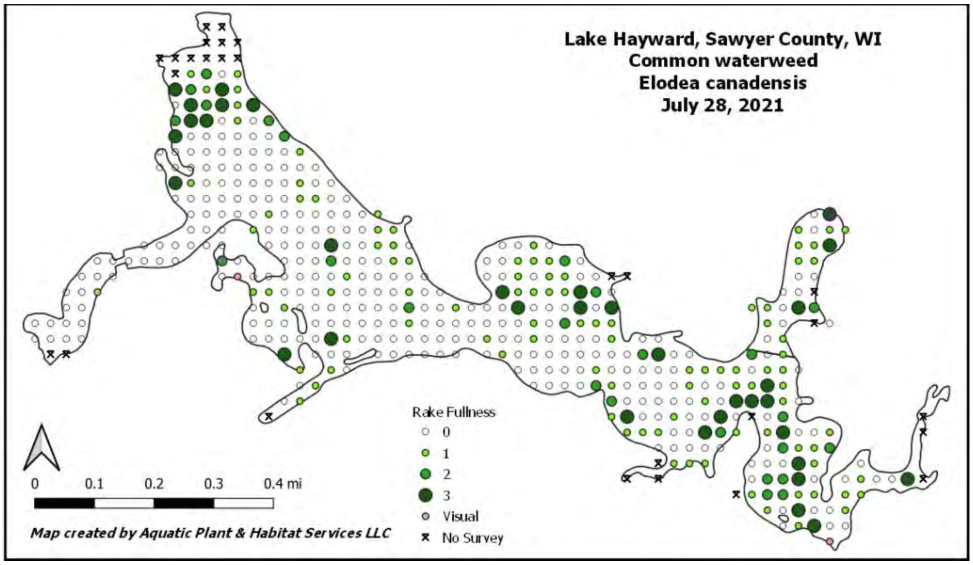
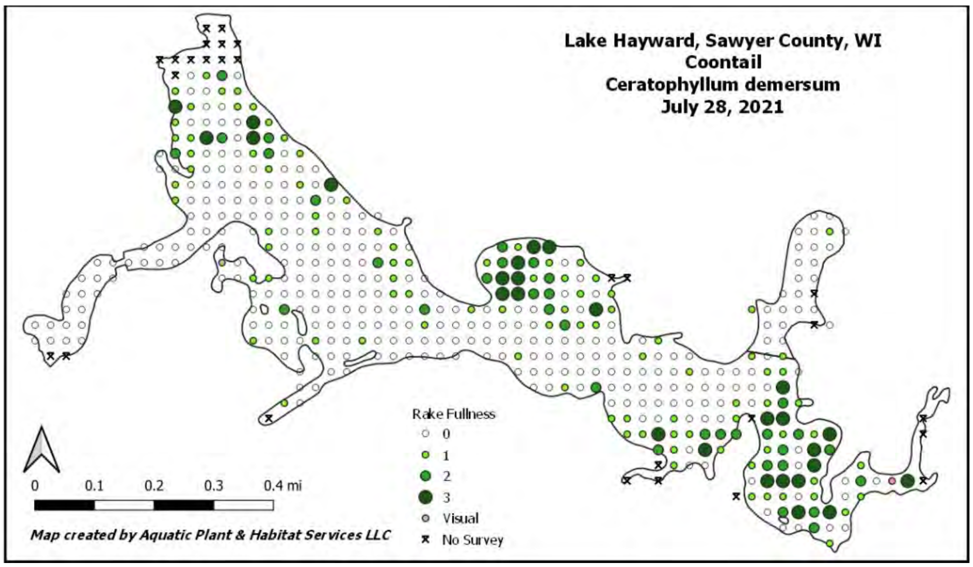
7.0 Appendix

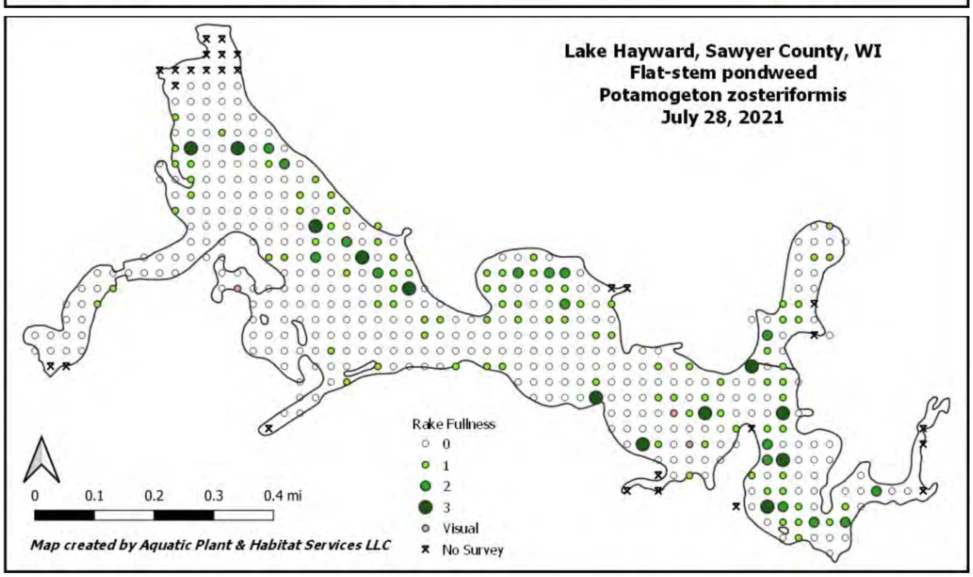
7.1 Appendix A – Lake Hayward Aquatic Plant Survey Grid

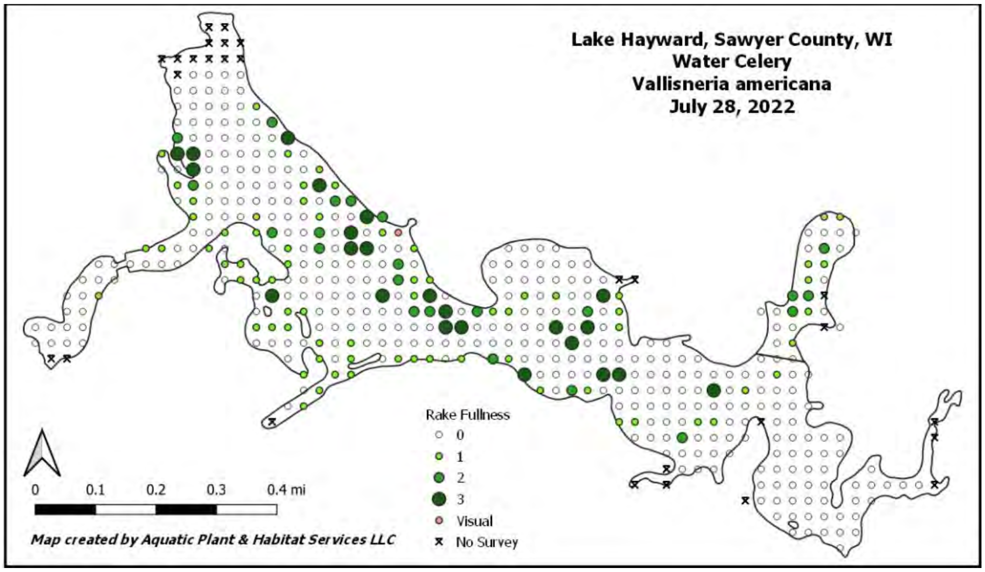


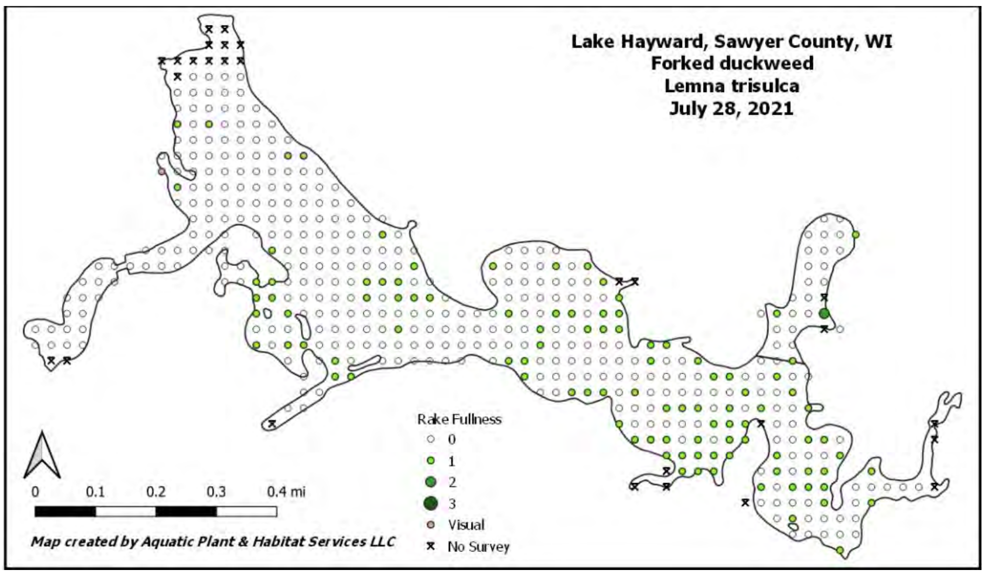
7.2 Appendix B – Lake Hayward Aquatic Plant Species Maps

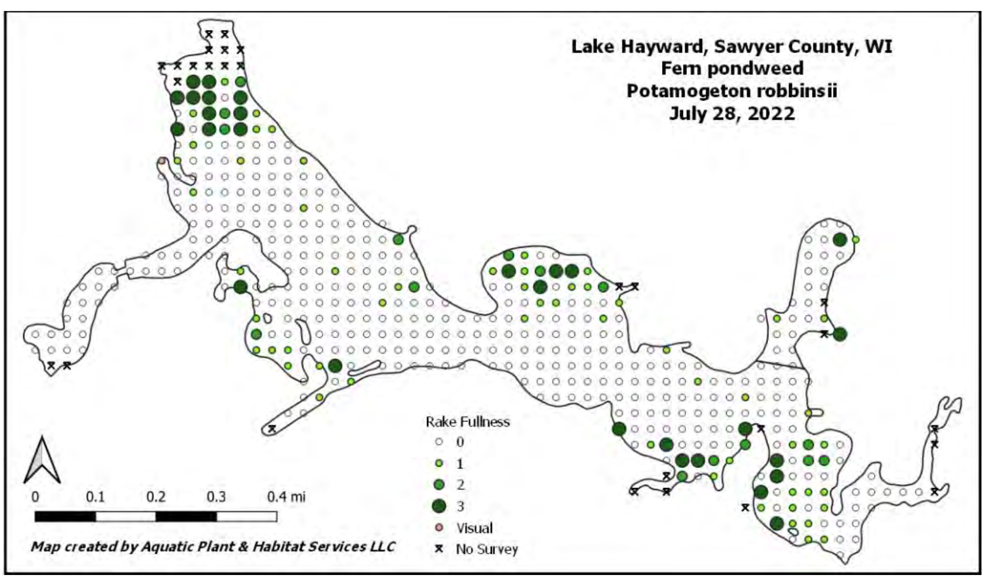


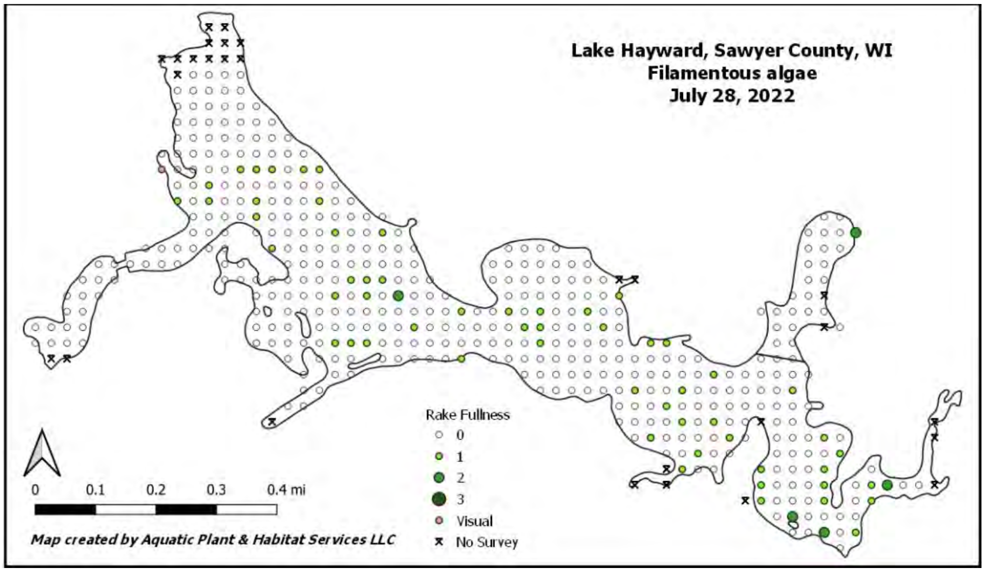





Lake Hayward, Sawyer County, WI
Water Celery
Vallisneria americana
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC


Lake Hayward, Sawyer County, WI
Forked duckweed
Lemna trisulca
July 28, 2021
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC


Lake Hayward, Sawyer County, WI
Fern pondweed
Potamogeton robbinsii
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC


Lake Hayward, Sawyer County, WI
Filamentous algae
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
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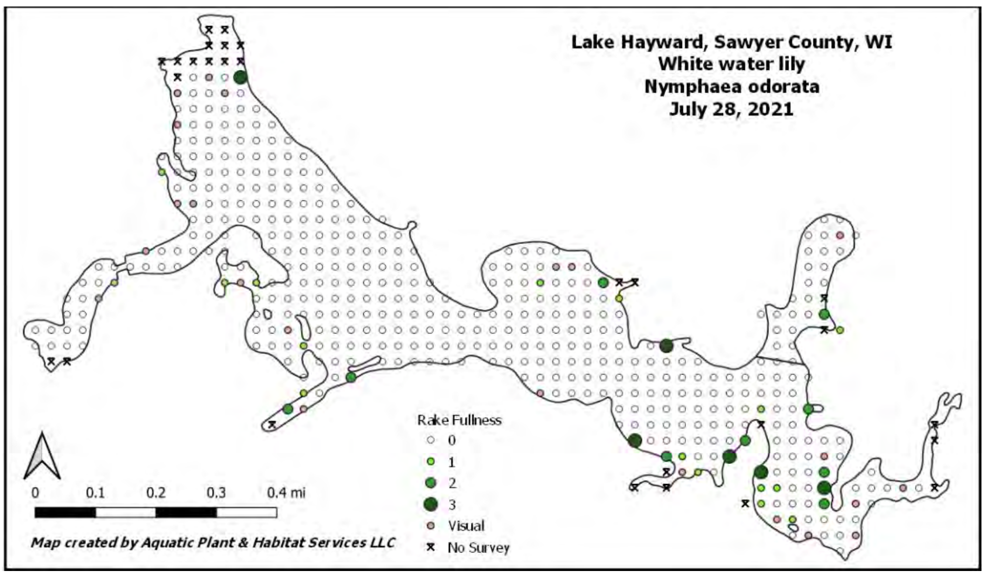
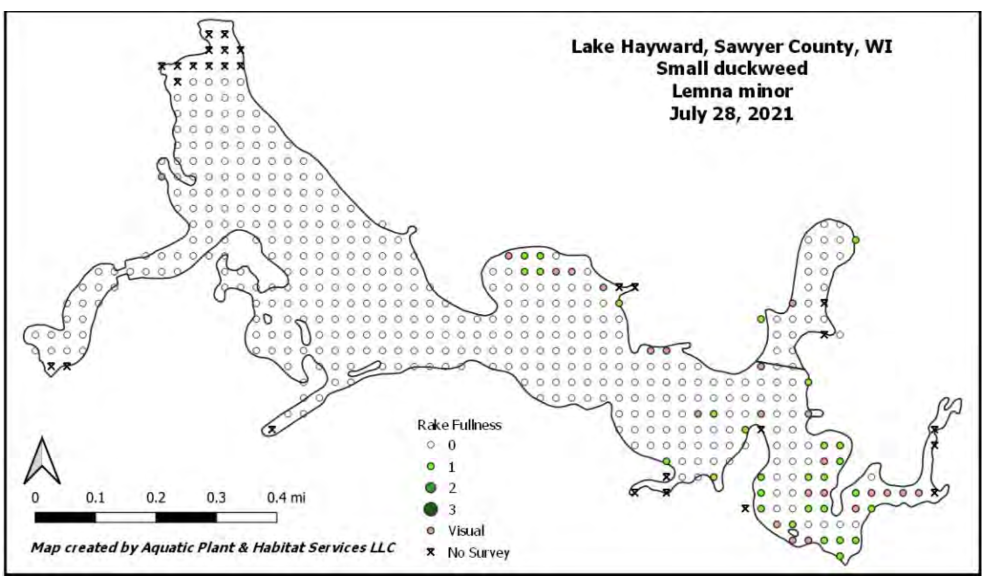
Map created by Aquatic Plant & Habitat Services LLC


Lake Hayward, Sawyer County, WI
White water lily
Nymphaea odorata
July 28, 2021
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC


Lake Hayward, Sawyer County, WI
Small duckweed
Lemna minor
July 28, 2021
Rake Fullness
0
1
2
3
Visual
No Survey
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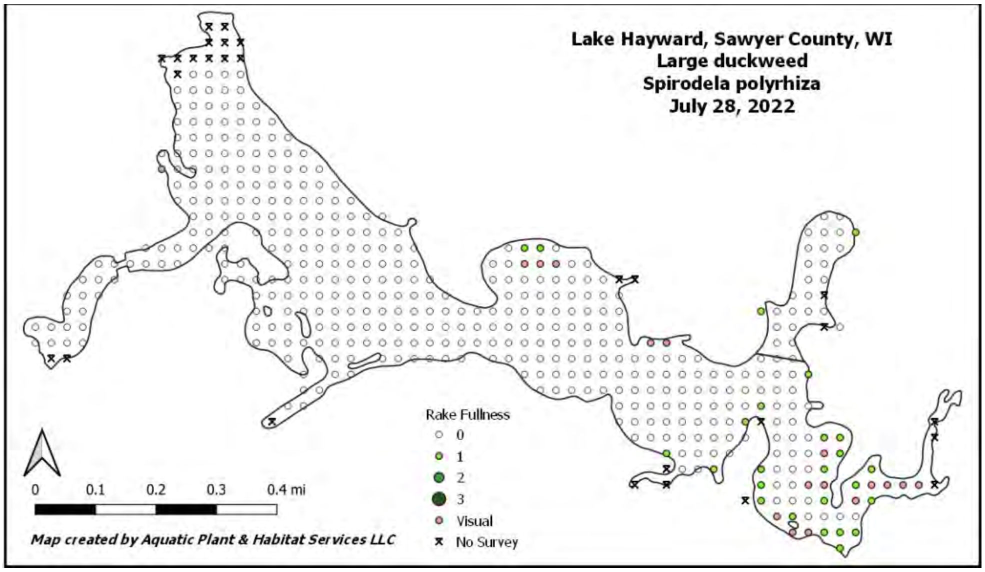
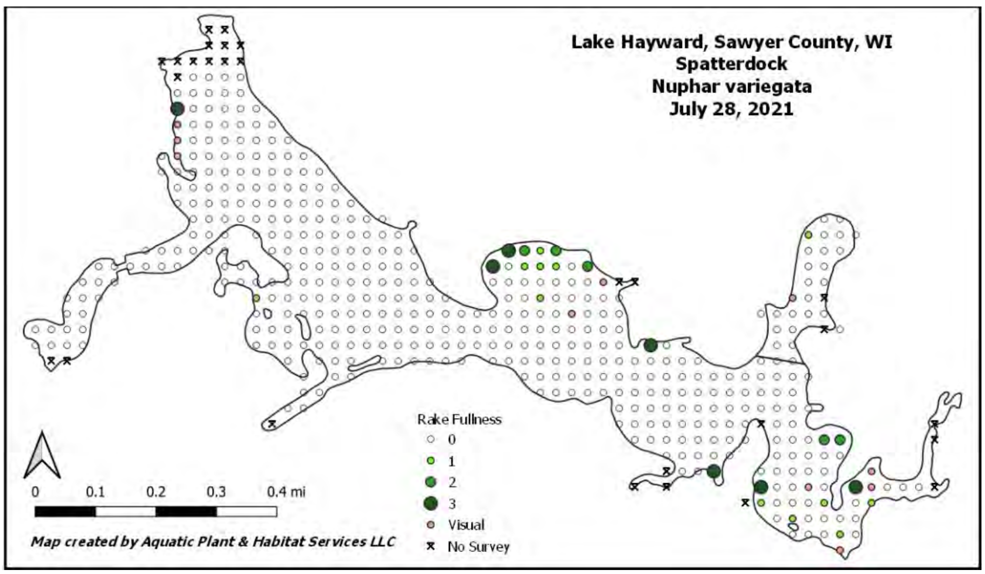
Map created by Aquatic Plant & Habitat Services LLC


Lake Hayward, Sawyer County, WI
Large duckweed
Spirodela polyrhiza
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC


Lake Hayward, Sawyer County, WI
Spatterdock
Nuphar variegata
July 28, 2021
Rake Fullness
0
1
2
3
Visual
No Survey
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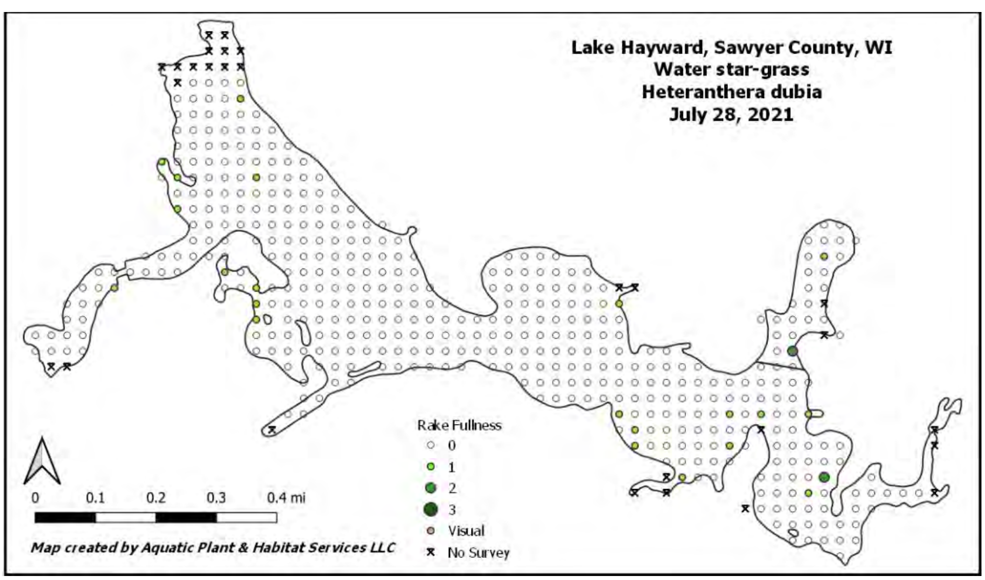
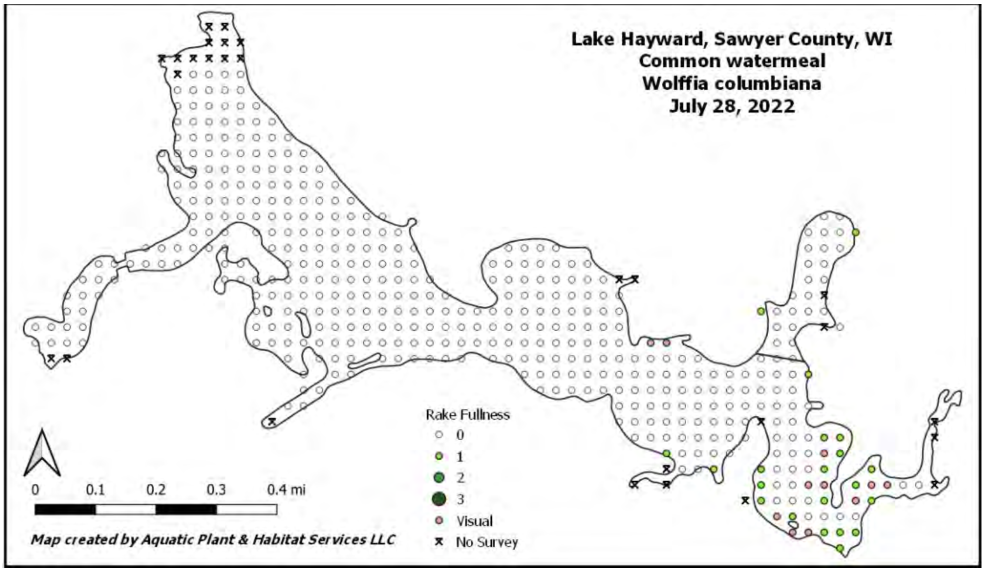
Map created by Aquatic Plant & Habitat Services LLC


Lake Hayward, Sawyer County, WI
Water star-grass
Heteranthera dubia
July 28, 2021
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC



Lake Hayward, Sawyer County, WI
Common watermeal
Wolffia columbiana
July 28, 2022
Rake Fullness
0
1
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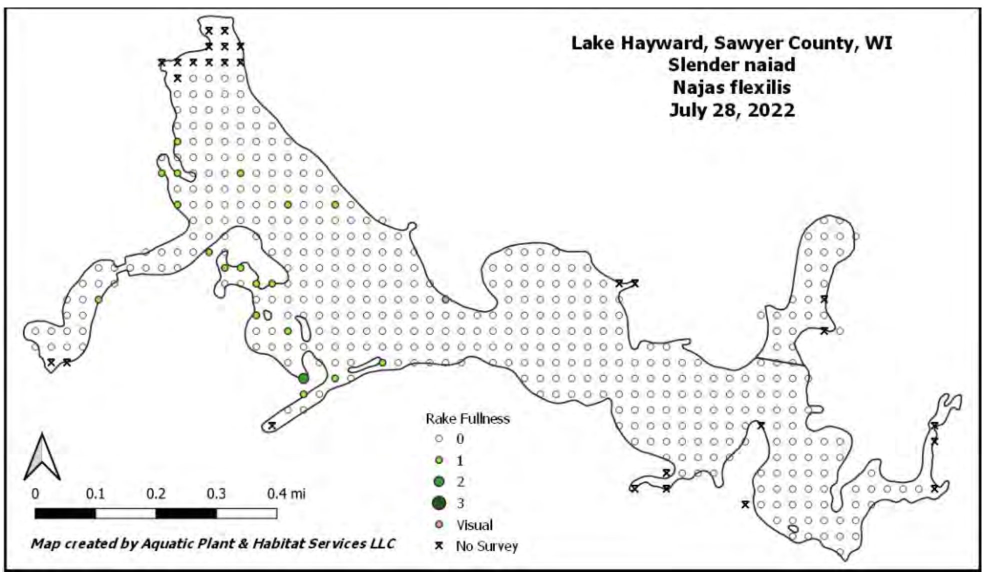
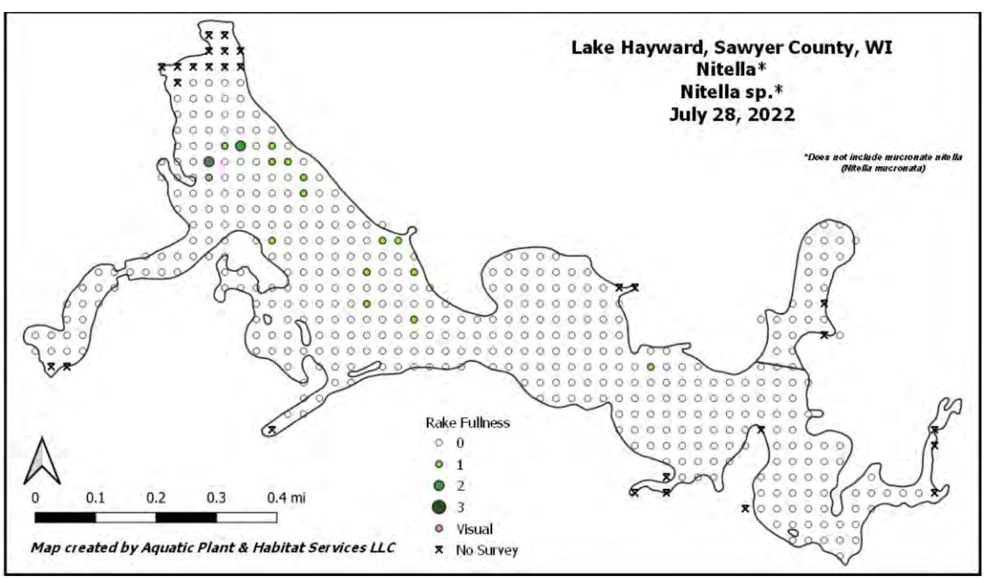
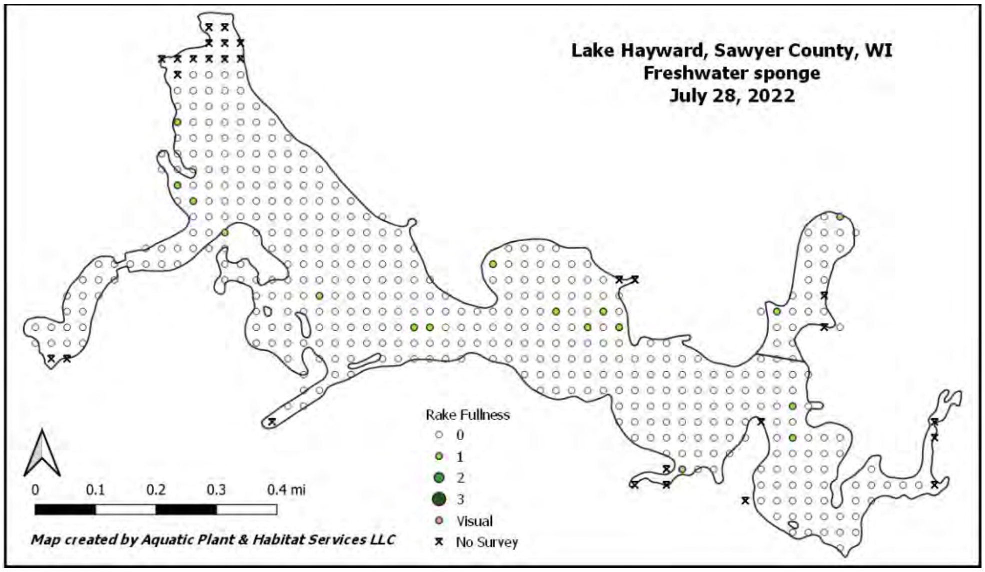
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC



Lake Hayward, Sawyer County, WI
Slender naiad
Najas flexilis
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC



Lake Hayward, Sawyer County, WI
Nitella*
Nitella sp.*
July 28, 2022
*Does not include mucronate nitella
(Nitella mucronata)
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC


Lake Hayward, Sawyer County, WI
Freshwater sponge
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
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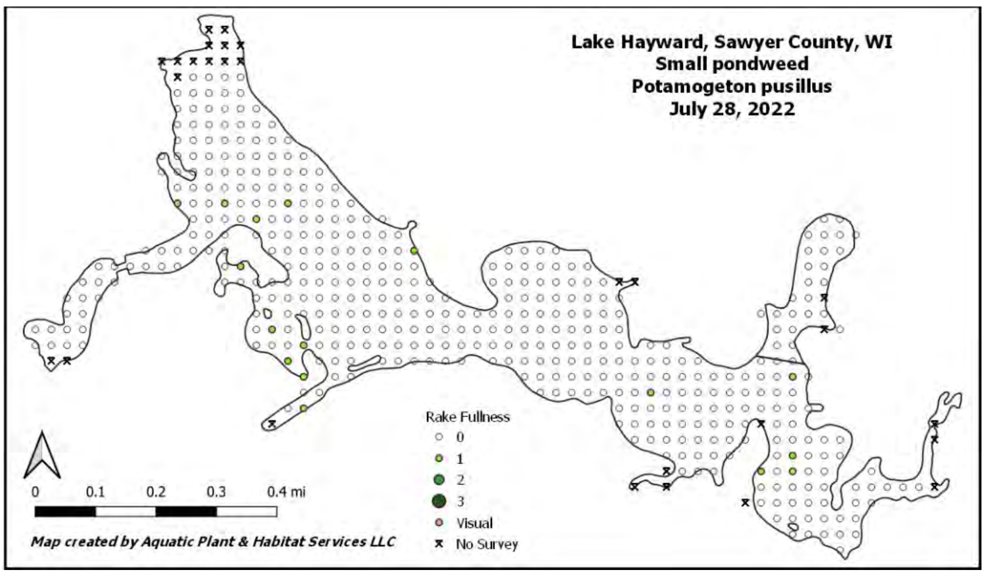
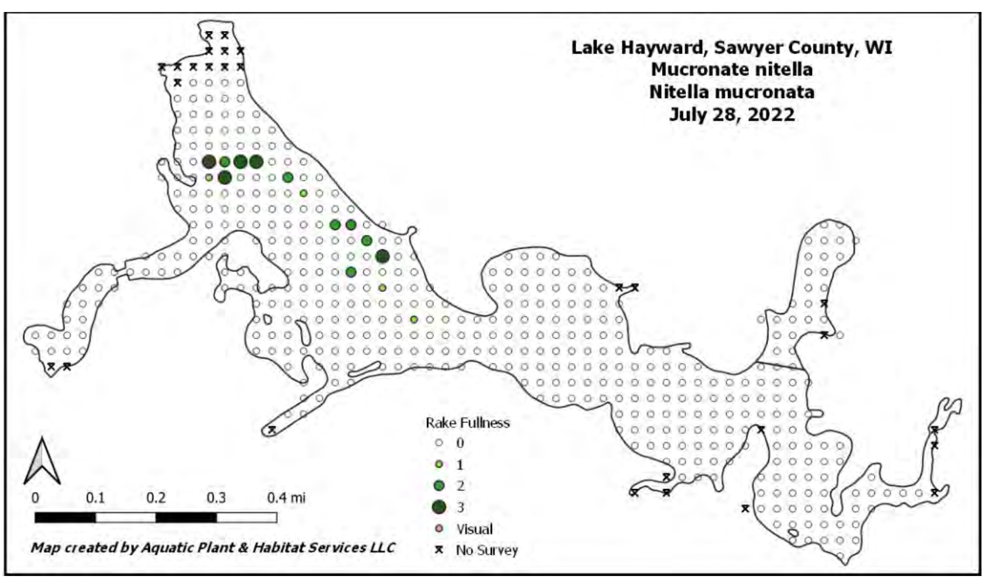
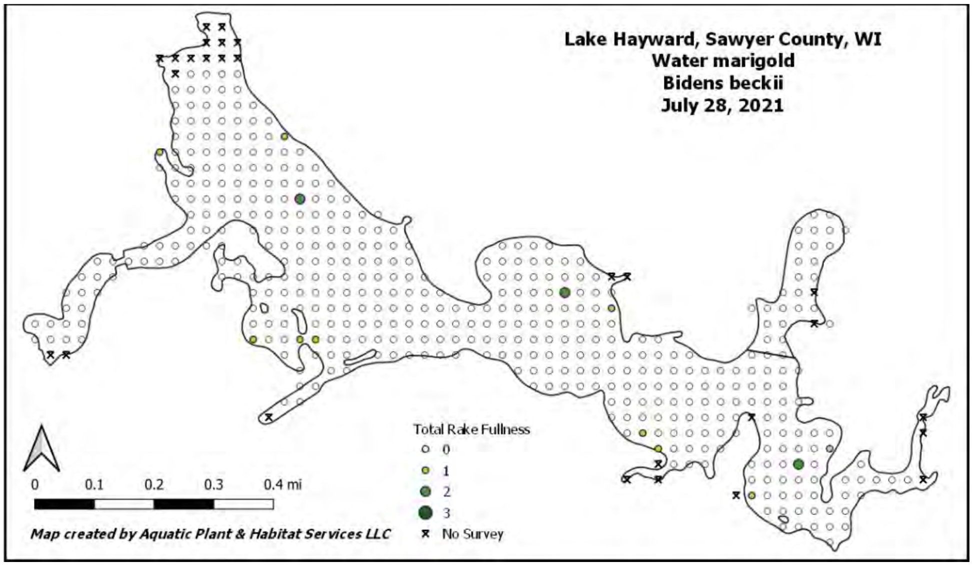
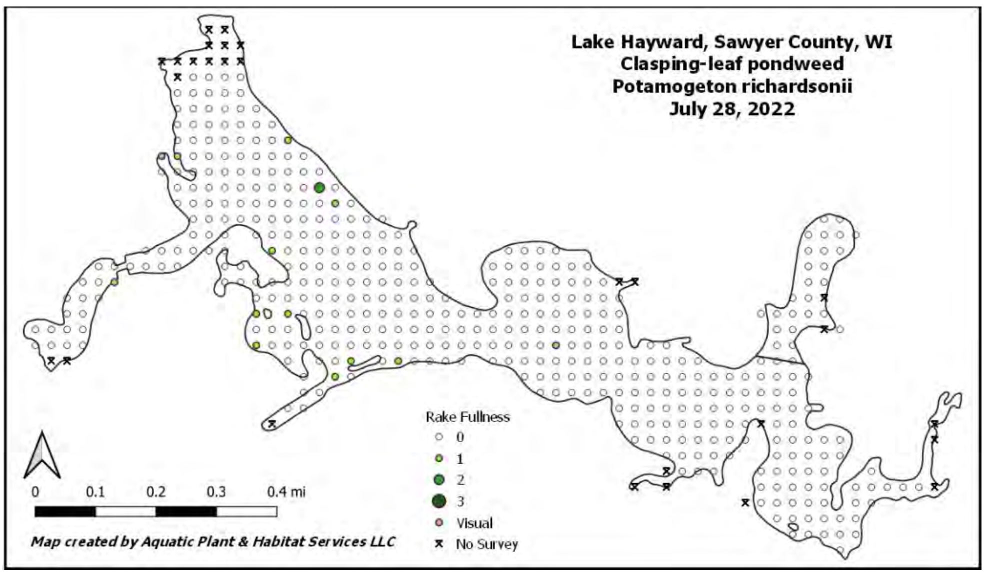
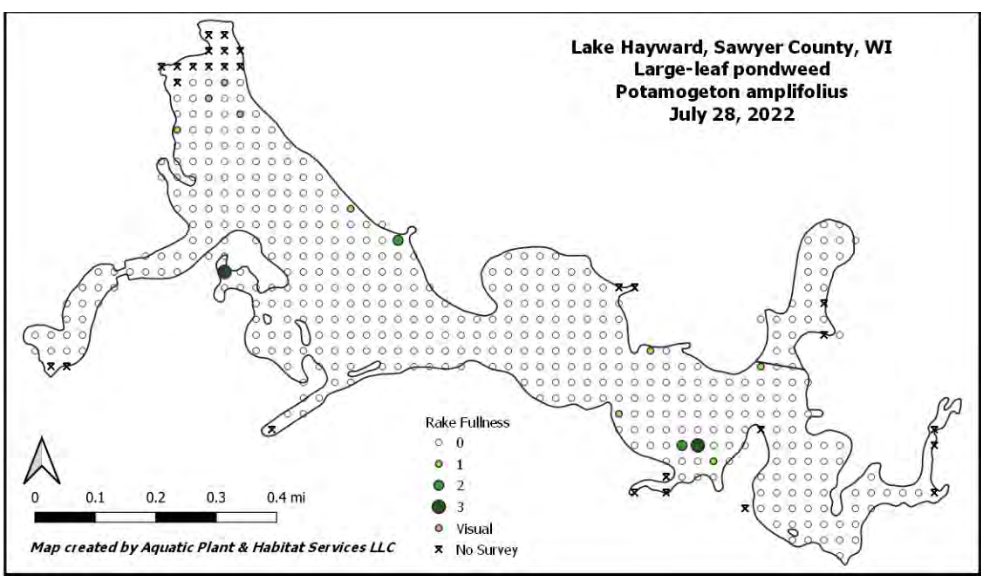
Map created by Aquatic Plant & Habitat Services LLC

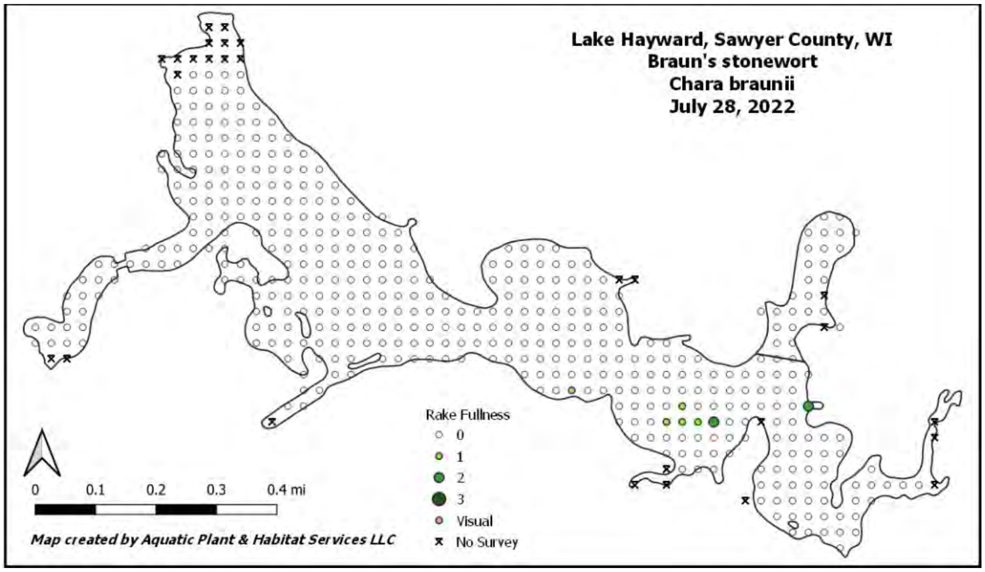

Lake Hayward, Sawyer County, WI
Small pondweed
Potamogeton pusillus
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC

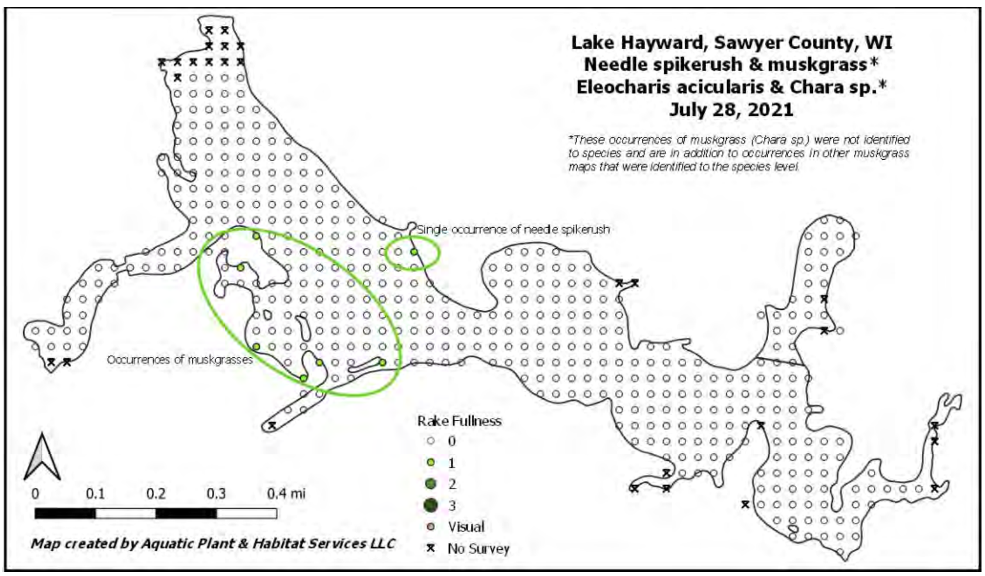

Lake Hayward, Sawyer County, WI
Mucronate nitella
Nitella mucronata
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC

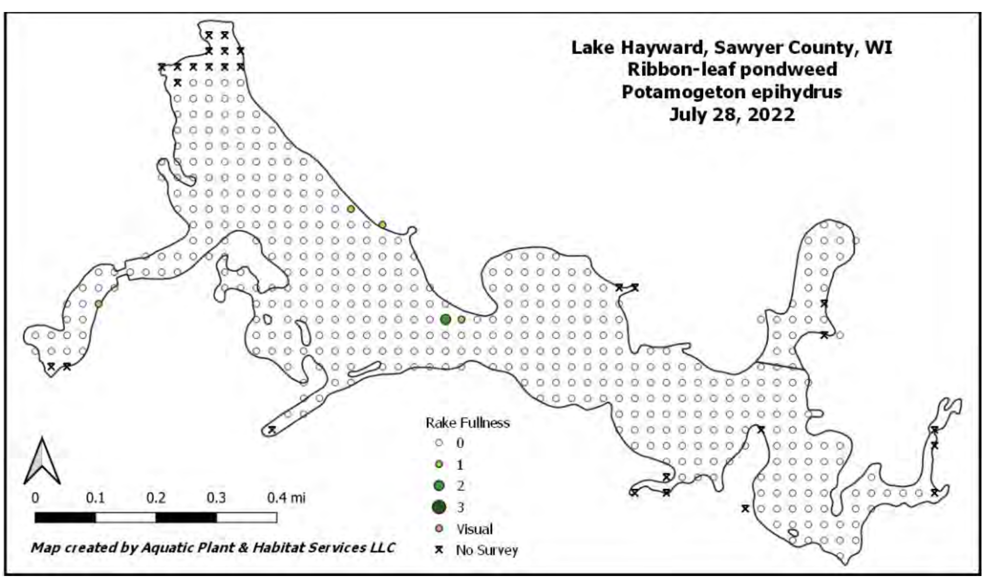

Lake Hayward, Sawyer County, WI
Water marigold
Bidens beckii
July 28, 2021
Total Rake Fullness
0
1
2
3
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC

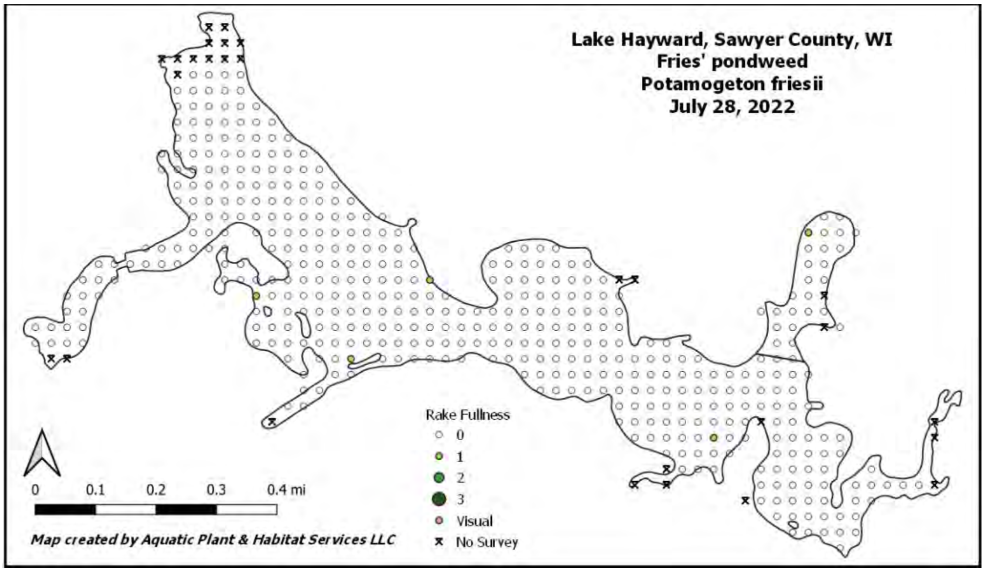

Lake Hayward, Sawyer County, WI
Clasping-leaf pondweed
Potamogeton richardsonii
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC

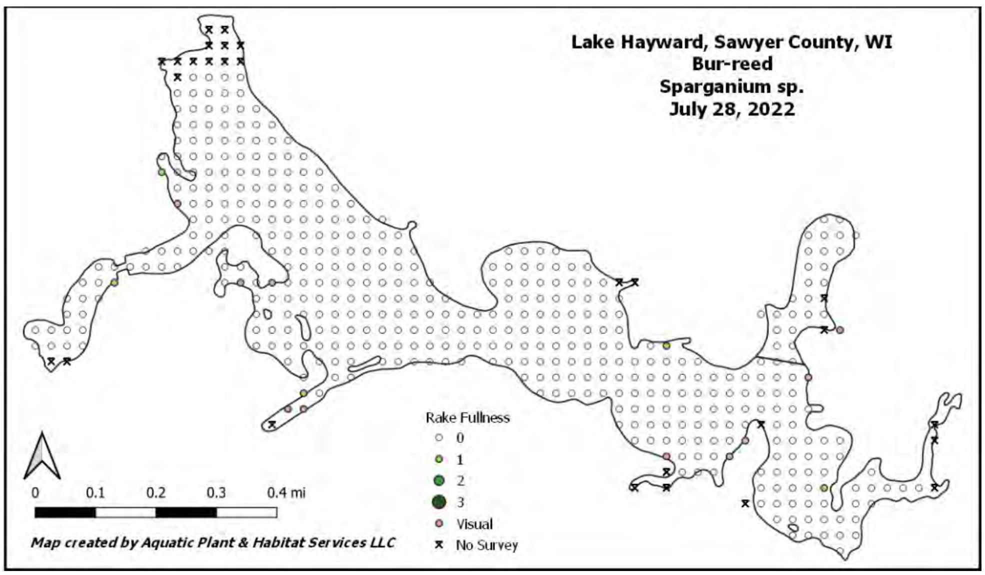

Lake Hayward, Sawyer County, WI
Large-leaf pondweed
Potamogeton amplifolius
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC

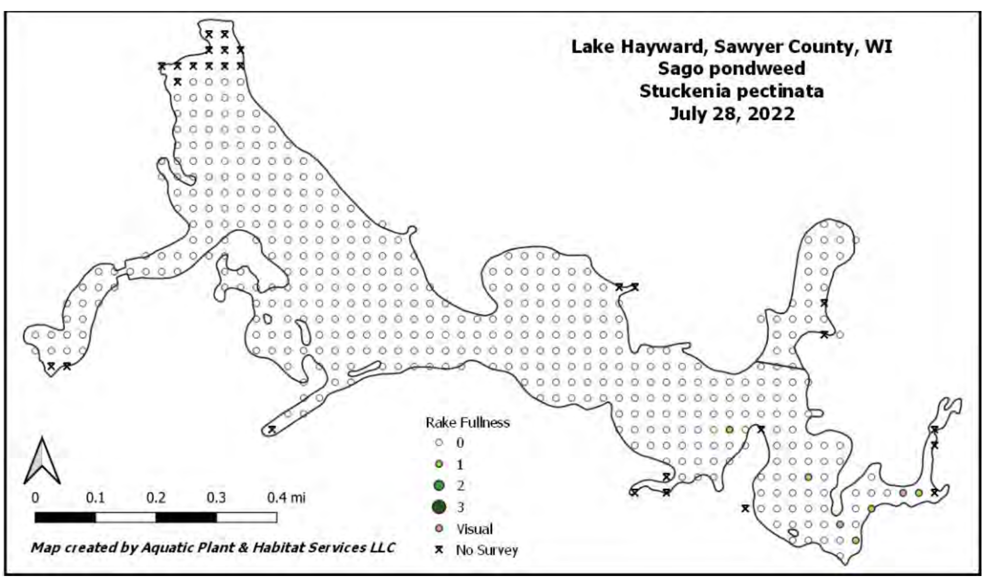

Lake Hayward, Sawyer County, WI
Braun's stonewort
Chara braunii
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC

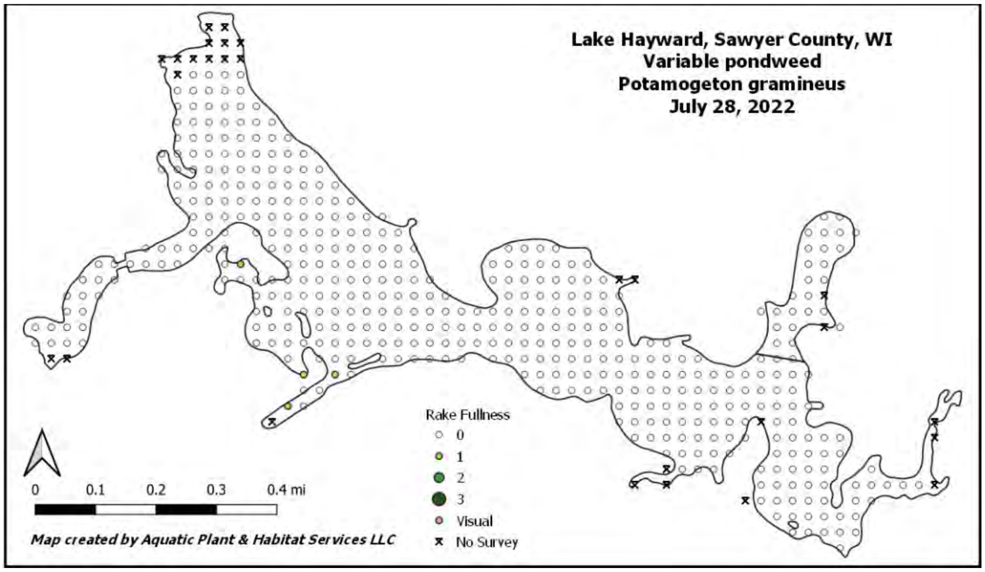

Lake Hayward, Sawyer County, WI
Needle spikerush & muskgrass*
Eleocharis acicularis & Chara sp.*
July 28, 2021
*These occurrences of muskgrass (Chara sp.) were not identified to species and are in addition to occurrences in other muskgrass maps that were identified to the species level.
Single occurrence of needle spikerush
Occurrences of muskgrasses
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC

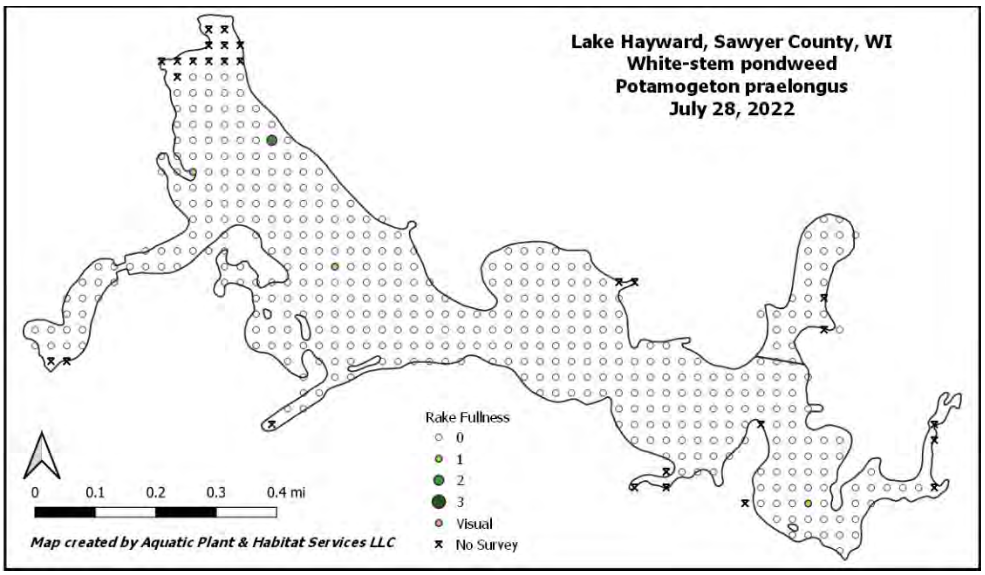

Lake Hayward, Sawyer County, WI
Ribbon-leaf pondweed
Potamogeton epihydrus
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC

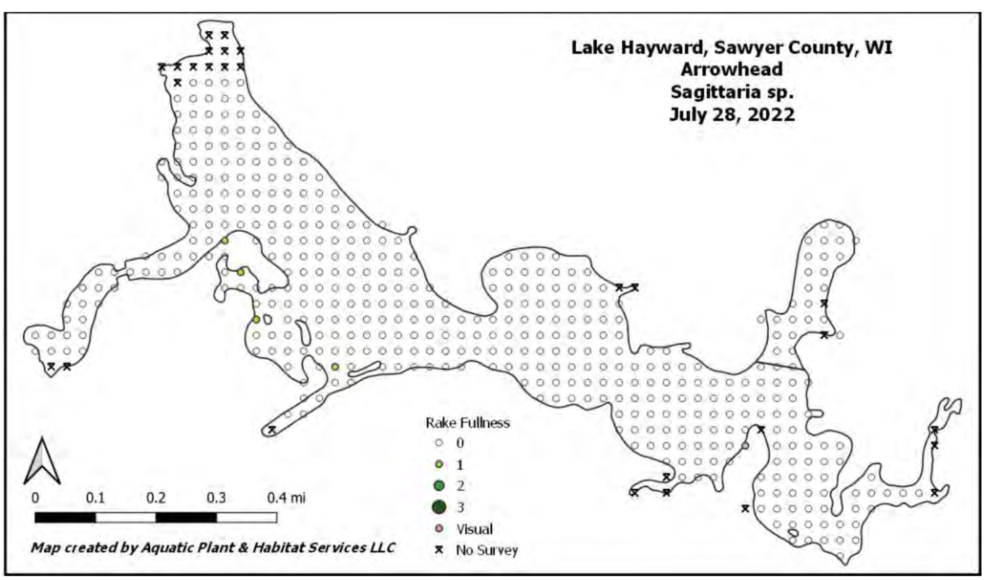

Lake Hayward, Sawyer County, WI
Fries' pondweed
Potamogeton friesii
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC

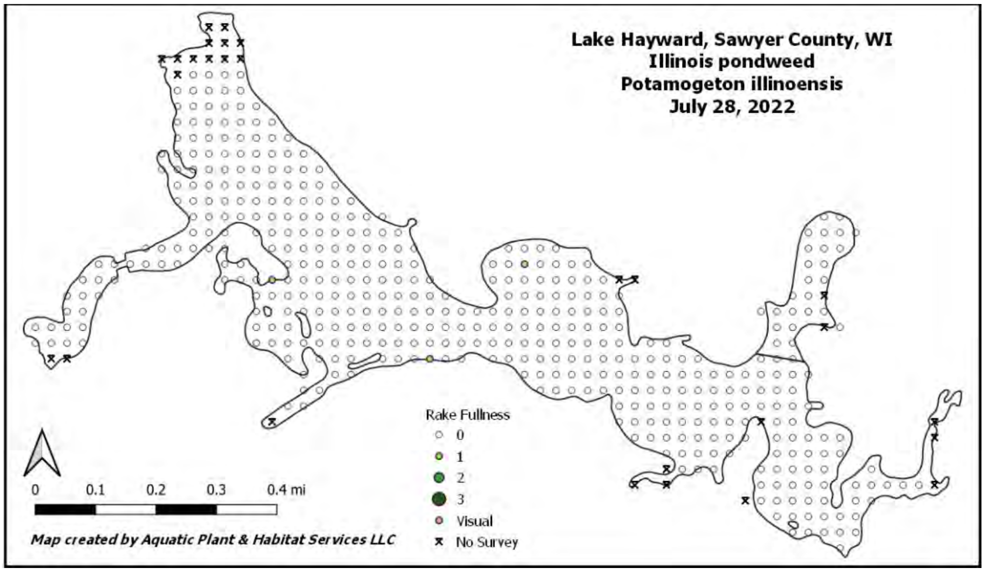

Lake Hayward, Sawyer County, WI
Bur-reed
Sparganium sp.
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC

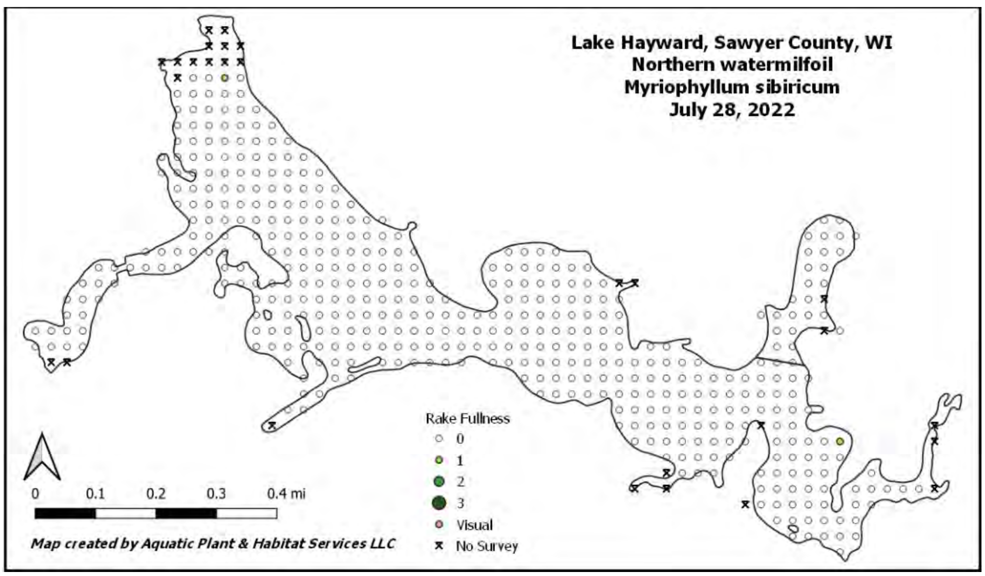

Lake Hayward, Sawyer County, WI
Sago pondweed
Stuckenia pectinata
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC

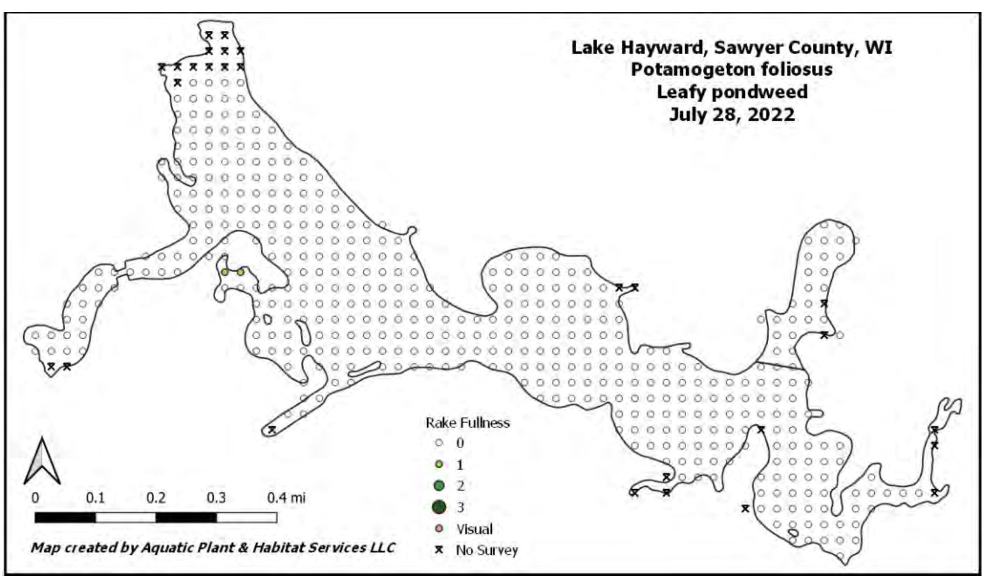

Lake Hayward, Sawyer County, WI
Variable pondweed
Potamogeton gramineus
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC


Lake Hayward, Sawyer County, WI
White-stem pondweed
Potamogeton praelongus
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC

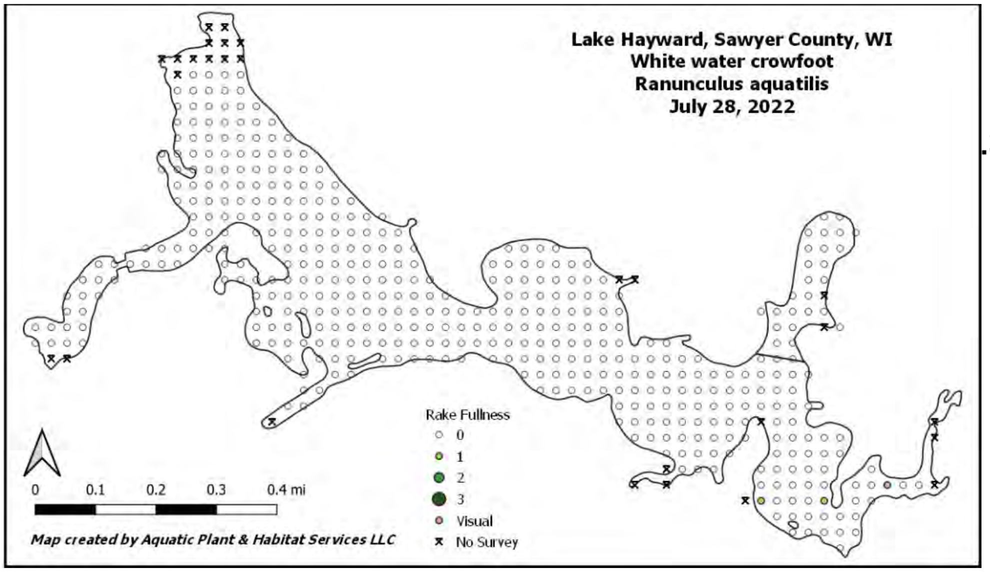

Lake Hayward, Sawyer County, WI
Arrowhead
Sagittaria sp.
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC

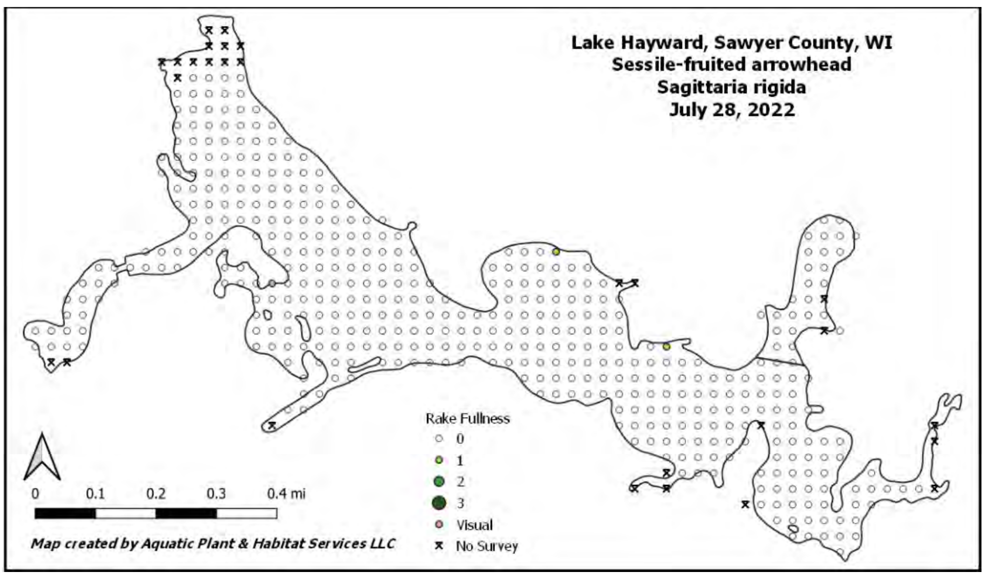

Lake Hayward, Sawyer County, WI
Illinois pondweed
Potamogeton illinoensis
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC

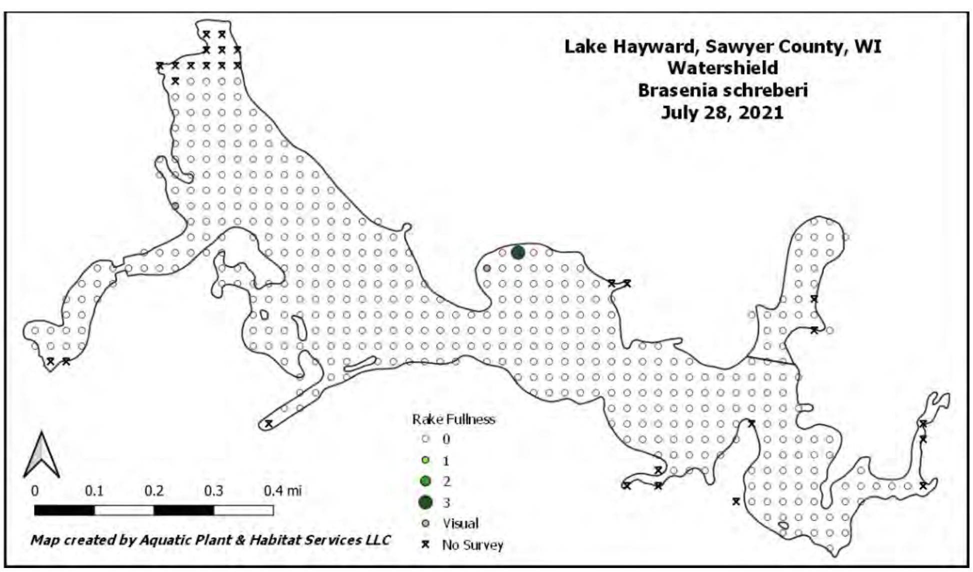

Lake Hayward, Sawyer County, WI
Northern watermilfoil
Myriophyllum sibiricum
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC

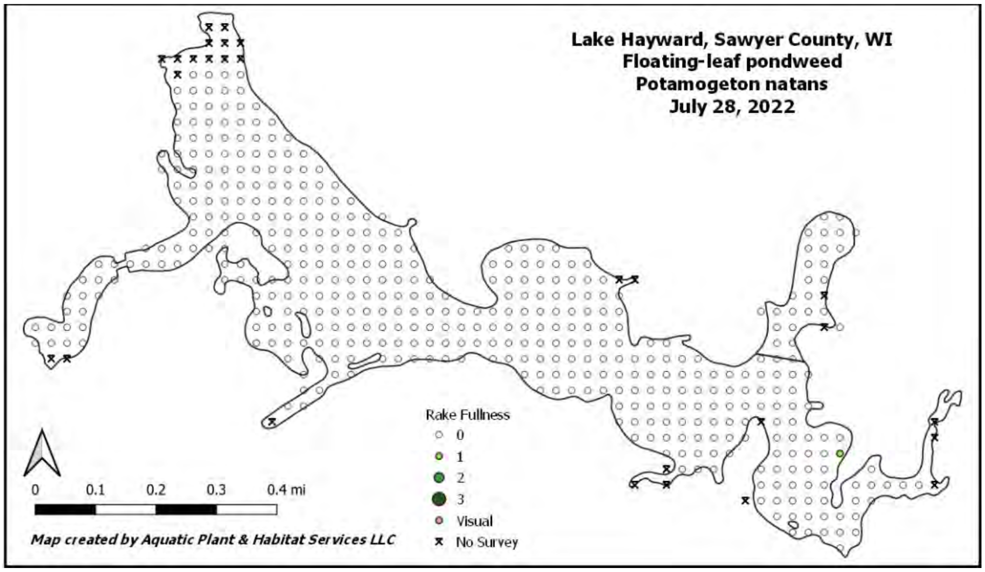

Lake Hayward, Sawyer County, WI
Potamogeton foliosus
Leafy pondweed
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC

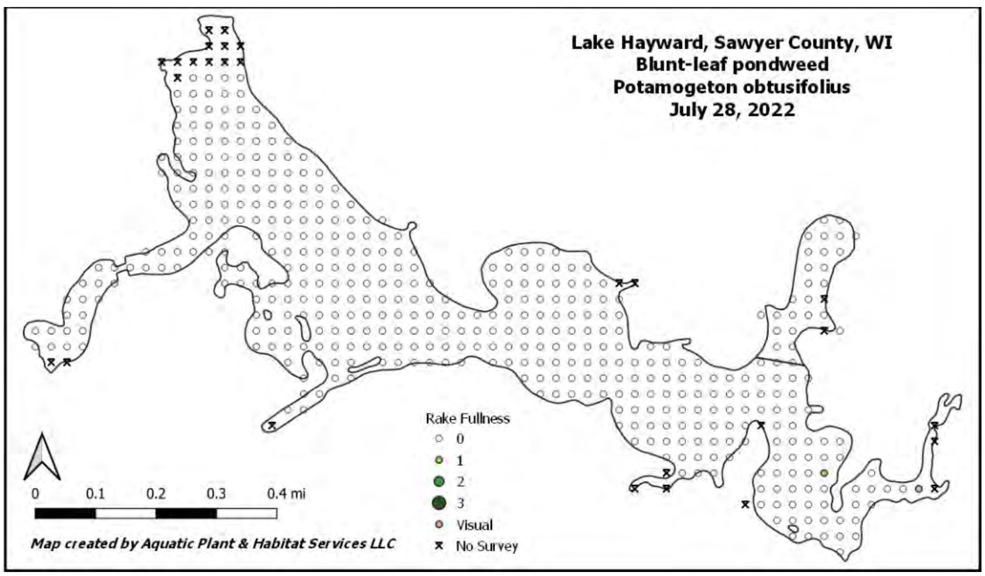
.3

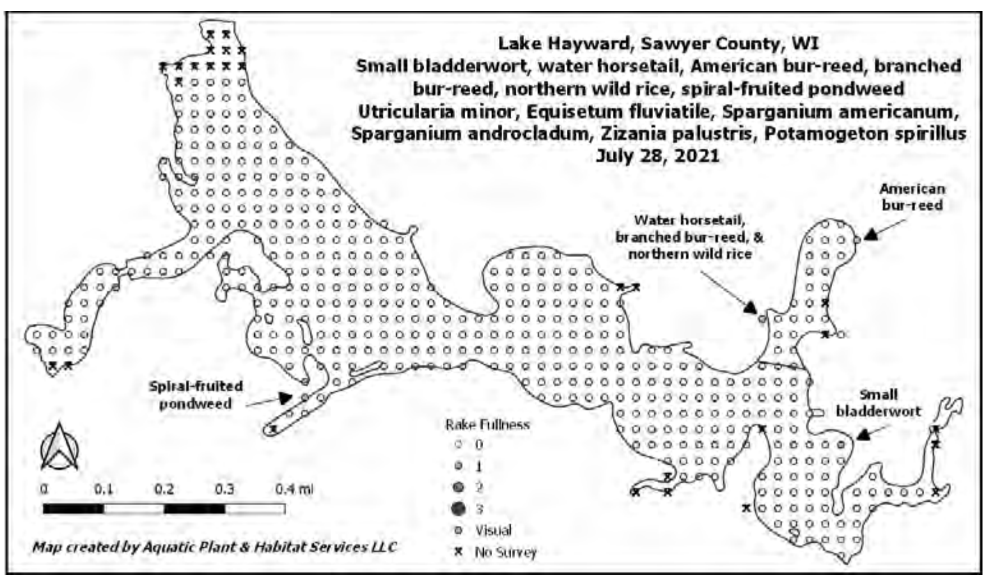

Lake Hayward, Sawyer County, WI
White water crowfoot
Ranunculus aquatilis
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC

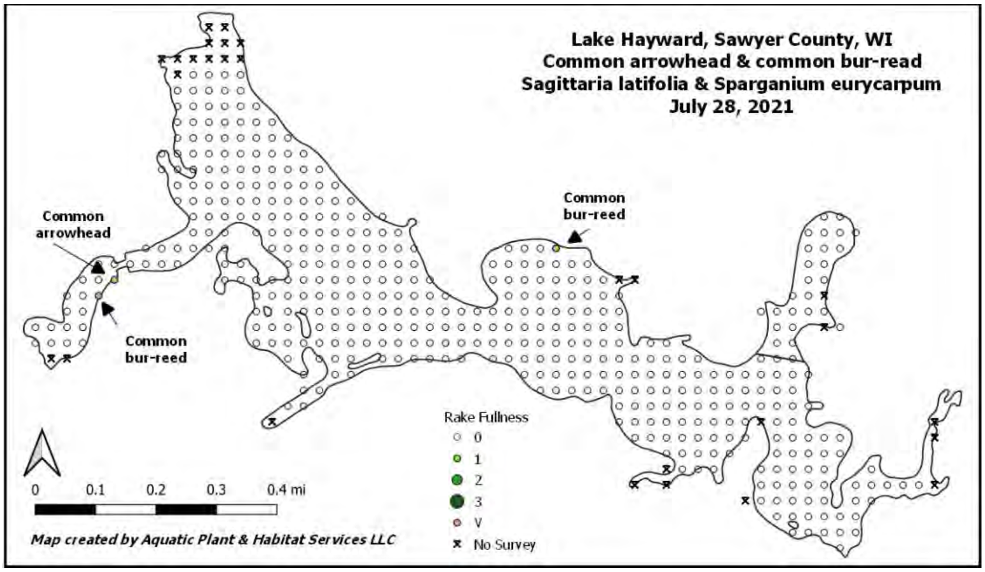

Lake Hayward, Sawyer County, WI
Sessile-fruited arrowhead
Sagittaria rigida
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC

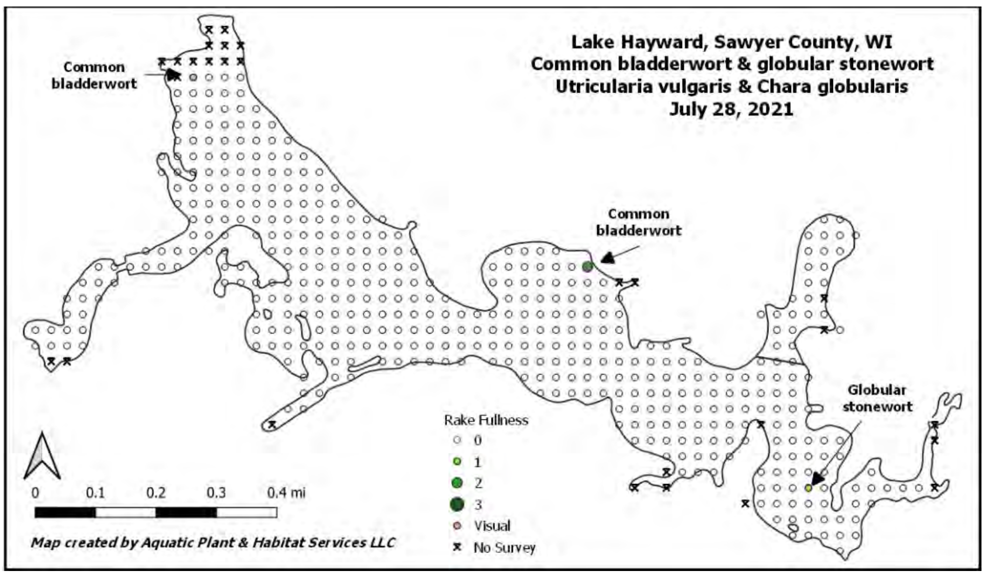

Lake Hayward, Sawyer County, WI
Watershield
Brasenia schreberi
July 28, 2021
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC

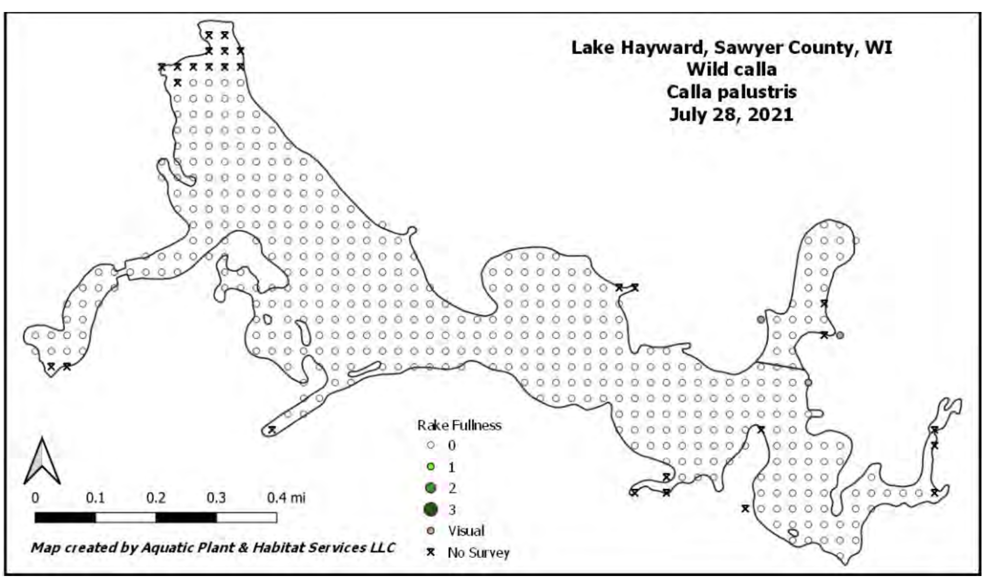

Lake Hayward, Sawyer County, WI
Floating-leaf pondweed
Potamogeton natans
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC


Lake Hayward, Sawyer County, WI
Blunt-leaf pondweed
Potamogeton obtusifolius
July 28, 2022
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC


Lake Hayward, Sawyer County, WI
Small bladderwort, water horsetail, American bur-reed, branched bur-reed, northern wild rice, spiral-fruited pondweed
Utricularia minor, Equisetum fluviatile, Sparganium americanum, Sparganium androcladum, Zizania palustris, Potamogeton spirillus
July 28, 2021
American bur-reed
Water horsetail, branched bur-reed, & northern wild rice
Small bladderwort
Spiral-fruited pondweed
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC


Lake Hayward, Sawyer County, WI
Common arrowhead & common bur-read
Sagittaria latifolia & Sparganium eurycarpum
July 28, 2021
Common arrowhead
Common bur-reed
Common bur-reed
Rake Fullness
0
1
2
3
V
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC


Lake Hayward, Sawyer County, WI
Common bladderwort & globular stonewort
Utricularia vulgaris & Chara globularis
July 28, 2021
Common bladderwort
Common bladderwort
Globular stonewort
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC


Lake Hayward, Sawyer County, WI
Wild calla
Calla palustris
July 28, 2021
Rake Fullness
0
1
2
3
Visual
No Survey
0 0.1 0.2 0.3 0.4 mi
Map created by Aquatic Plant & Habitat Services LLC

Appendix C – EWM Manual Removal Brochure

Frequently asked questions

What do I do if I find EWM?

Collect a sample and mark the location where the specimen was found. Contact your local DNR and/or AIS Coordinator to assist in verifying the EWM, and offer advice before any action is taken. They can also inform you of other experts that are available.

How do I preserve the specimen?

Place the specimen in a zipper-style bag with a moist paper towel. Keep the specimen refrigerated until it is delivered or mailed to your local DNR Water Resource Specialist or AIS Coordinator.

What is manual removal? Is it legal? Do I need a permit?

Manual removal is pulling by hand or with hand-held devices that do not use external or auxiliary power sources (e.g. small rakes). It is legal if the native plant population is not excessively harmed. No permit is needed when following these guidelines. Contact with the local DNR is always recommended before starting.

What if EWM is mixed in with native plants, what should I do?

Try to target only the EWM. If native plants are accidently removed, dispose of them with the EWM. This prevents losing any EWM fragments that might be mixed in with the native plant material. The more native plants you can leave, the better chance they will spread and help prevent any EWM from becoming reestablished in that area.

Where do I dispose of EWM?

Contacting your local DNR Water Resources Specialist prior to the project is always recommended for the latest approved procedures. Transport the material away from the water body so that no parts escape, and dispose of it in a manner that prevents the establishment, introduction, or spread of the plants. All pulled EWM must be disposed of above the ordinary high water mark, preferably in a flat, vegetated area so the EWM fragments cannot wash back into a nearby water body. Compost piles, farm fields, gardens, and landfills are good places.

What kind of equipment do I need?

- (Optional) snorkeling gear: mask, fins, snorkel (a dive flag is needed if more than 150 feet from shore)
- Small rake, trowel or similar tools
- Container to put harvested EWM for transport & disposal (have a predetermined disposal place)
- Bag made with small mesh or burlap to put collected EWM while working away from the watercraft
- Watercraft to work out of & place harvested EWM
- Long-handled, small-mesh net for catching fragments
- Wetsuits aren't necessary but do keep divers warmer & allows them to work longer with more comfort
- Trailer or truck to haul the harvested EWM to a disposal site
- Record progress & what works best so information can be shared. Record time & people working for future reference & to document needed volunteer hours towards grant match funds.

EWM Collection

Making EWM Collection Bags

Materials:

- Mesh bags and/or burlap sacks
- 10 - 12 inch zip ties (amount varies on size of bag)
- Foam water noodles (wacky noodles)

Directions:

- Cut the foam water noodle to the diameter of the bag or sack being used.
- Making a circle with the foam, place the foam inside the bag at the open end and attach with the zip ties to create a floating lip at the opening of the bag (see above pictures). You now have a floating collection bag for the EWM that lets the water strain out when it is time to dispose of the EWM.

Sponsored by Lumberjack Resource Conservation & Development (RC&D) Council, Inc. & Golden Sands RC&D Council, Inc.
With assistance from the WDNR AIS Grants Program and UW Extension Lakes Program
Photos by Chris Hamerla, Paul Skawinski, Russ Robinson, & Tiffany Lyden

Identify and responding quickly to EWM is essential. On new, small colonies and scattered plants, hand removal can be a simple, effective way to control EWM. EWM is distinguished from northern water milfoil by having 12 to 21 pairs of leaflets on each leaf (see milfoil leaf pictures far right). Typically, EWM also has limp, pinkish stems, while northern water milfoil tends to have whitish stems, and leaves with 4 to 12 pairs of leaflets.

Manage EWM in spring. Generally, EWM will grow quicker than native plants so it is easier to locate and remove. At this time, most native plants are still dormant, so the EWM is more visible. Also, the plants are younger and stronger, so they don't break apart as easily as later in the season. Eliminating fragmentation is a top priority.

Mark EWM locations after finding it from a boat or by snorkeling so it can be found again quickly for removal. A GPS unit works great, as does a map of the lake marked with EWM locations. Mapping also helps for future reference to see if EWM is showing up in different places and how effective past removal efforts have been. This map can also assist a lake consultant brought in to perform more in-depth surveying.

Remove EWM carefully. All portions of the plant, including roots and pieces that break off, need to be removed. Grabbing numerous stems on the same plant reduces breaking from the roots. Bigger plants or firmer sediment require the person to work their fingers/hands into the sediment to help loosen the plant. Slowly remove the plant from the sediment and gently shake it to reduce sediments clouding the water. Carefully wind the plant around a hand to help eliminate lost fragments, and make for easier transition to the container.

In shallow water, a stable watercraft can be used to work from and minimize sediment disruption, especially when dealing with soft substrates like silt, mud, or marl. The removed plants can be transferred right into the watercraft or other container.

Snorkeling is a good option in shallow water. Using a watercraft is still helpful as it gives the diver a place to deposit removed EWM and to rest. The people in the watercraft can point out plants to the diver and help retrieve fragments (long-handled nets with a fine mesh work well).

The diver can put plants into a mesh or burlap bag that keeps fragments from escaping, or bring the plants directly to the watercraft. To maximize the time spent harvesting EWM, a bag or similar floating container should stay with the diver for depositing plants. Once it is full, it can be taken to the watercraft to be emptied. The watercraft needs to remain at a safe distance to give the diver room to work. Non-motorized watercraft work well since they aren't as likely to disrupt the sediment, and there isn't the danger from the propeller.

Calm, sunny days offer the best working conditions regardless of the removal technique. Visibility is greater, plus boat positioning and control is much easier.

Disposal of harvested plants should be planned in advance. Gardens, flower beds, and farm fields are great places, as aquatic plants make good fertilizer. Care needs to be taken to prevent escape and introduction of fragments into new areas. Drain excess water to reduce weight during transport.

Eurasian water milfoil

Watercraft assistants

Making a difference!

Eurasian water milfoil (left)
Northern water milfoil (right)

Additional Information:

Lumberjack RC&D Chris Hamerla
(715) 362-3690
Chris_h@frontier.com

Golden Sands RC&D Paul Skawinski
(715) 343-6278
Skawinsp@co.portage.wi.us

Wisconsin Department of Natural Resources
www.dnr.wi.gov/invasives

UW Extension Lakes Program
www.uwsp.edu/cnr/uwexlakes/

7.4 Appendix D – WDNR APMP Approval Email 4/26/23

Lake Hayward Grant Deliverables Approval and Future Grant and Permit Application Eligibility

Hello Heidi and Sara,

I have reviewed the final draft of your Aquatic Plant Management Plan for Lake Hayward and all deliverables have been met for Surface Water Planning Grant AEPP67322. You have done a nice job on the plan. We can close out the grant and will make the final reimbursement. In addition I have determined that some of the education, monitoring, and management activities identified in the Management Strategy 2023-2027 section are eligible for Surface Water Grants funding subject to the eligibility and application requirements of the Surface Water Grants program and specifically to the comments below.

At this time Goal 2, Objective 2a and 2b are not eligible for Surface Water Grant funding as the only funding allowed for aquatic plant management is for aquatic invasive species. As pointed out in the management plan, the plants that are currently causing navigational nuisance are not non-indigenous invasive species.

I would note that under Goal 2, Objective 2c, related to management of aquatic invasive plants, that the approval of a specific AIS control proposal for grant eligibility and permitting will depend on DNR review of and discussions with the Lake Hayward Property Owners Association about the annual control and monitoring strategy. DNR and LHPOA should consider the need for management, likelihood of effective management, and also any unintended, non-target impacts. Consideration of your EWM control consideration criteria (Figure 25, page 41) and an annual meeting to discuss the control and monitoring strategy for the coming year will facilitate DNR decisions on annual EWM control plans, however DNR cannot guarantee that a treatment proposal will always be approved for grant funding and/or permitted.

The Department will consider an aquatic plant management permit application for the mechanical harvest of aquatic plants in Lake Hayward given that you have provided us with the required aquatic plant management plan.

Finally, if you would like to apply for a Surface Water grant in the future you will need to submit a grant pre-application and associated eligibility determination by September 15 (or 60 days before the final grant application deadline) or earlier during the year of application. You can contact me for instructions on how to do so or you can find this information in the Surface Water Grant Applicant Guide linked here: https://dnr.wi.gov/files/pdf/pubs/cf/cf0002.pdf

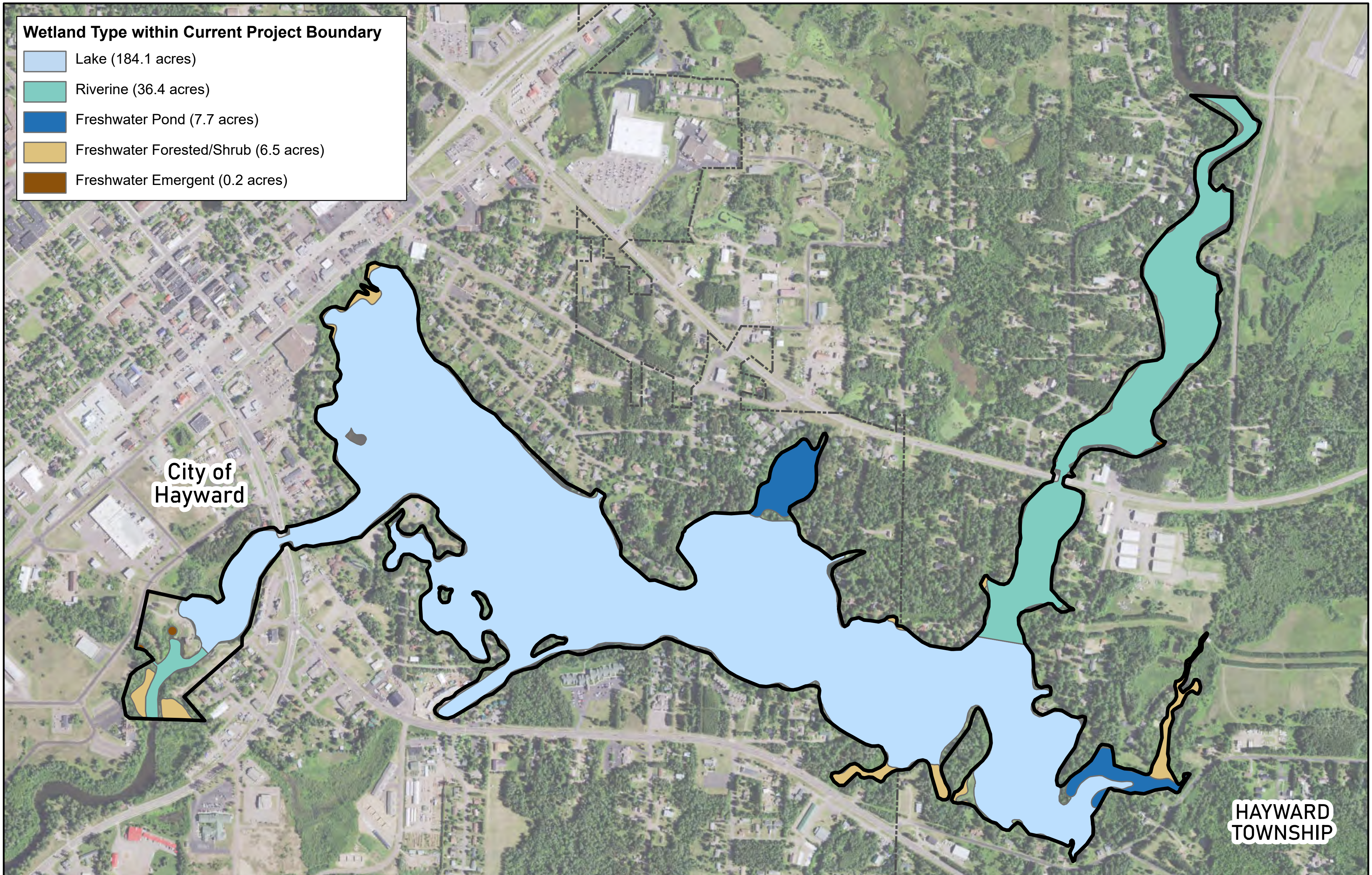
Please let me know if you have questions about any of this. Feel free to give me a call at the number below to discuss.

Thank you for your continuing efforts to protect Lake Hayward!

Sincerely,

Scott Van Egeren
Water Resources Management Specialist – Water Quality Bureau/Environmental Management Division
Wisconsin Department of Natural Resources
107 Sutliff Ave, Rhinelander, WI 54501
Scott.VanEgeren@wi.gov
(715) 471-0007

APPENDIX E-10 Wetlands in the Hayward Project Vicinity



Current Project Boundary

Municipal Boundary

N

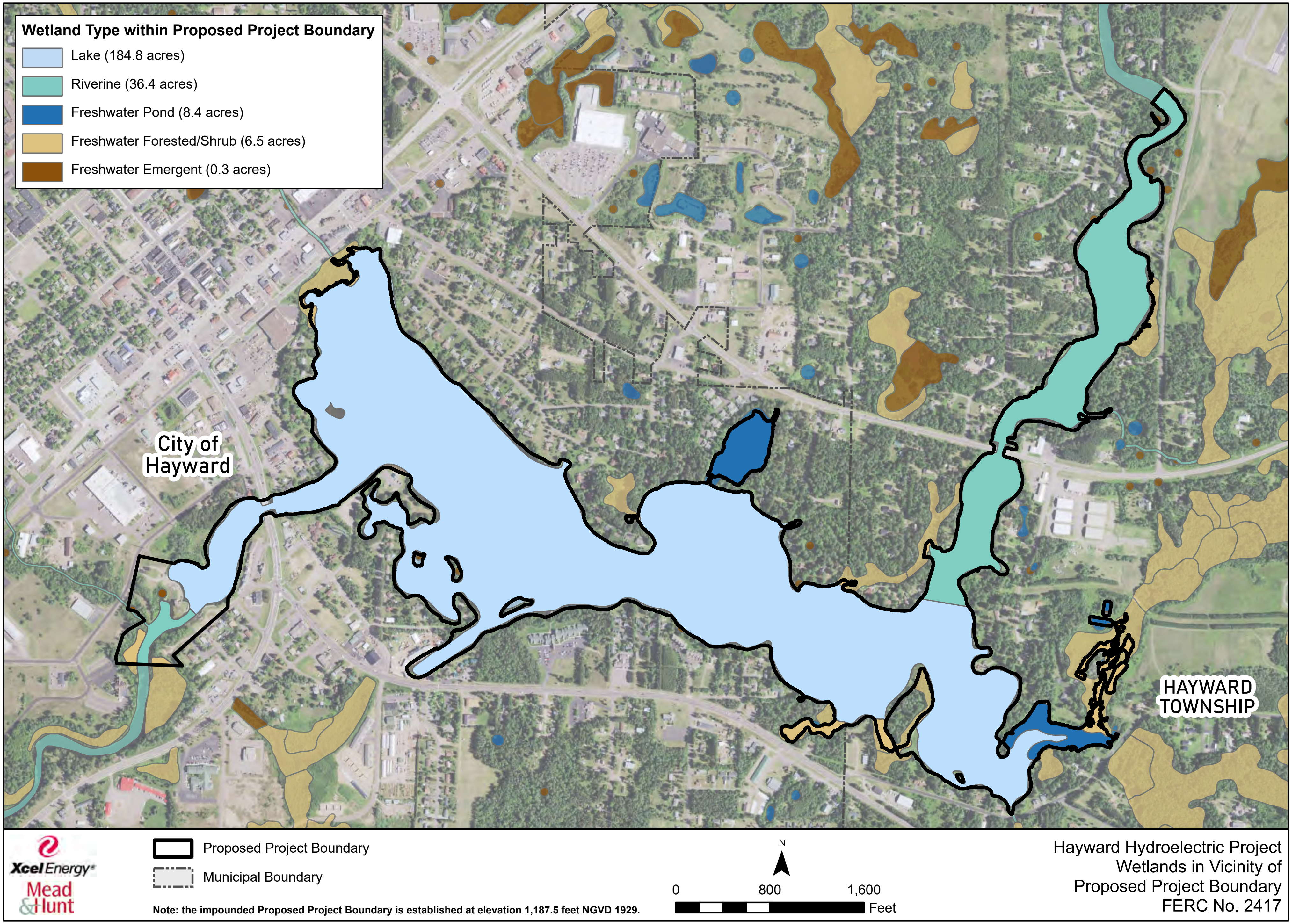
0 800 1,600 Feet

Hayward Hydroelectric Project
Current Project Boundary Vicinity Wetlands

FERC No. 2417

Source Layer: US Fish & Wildlife Service National Wetland Inventory, WI 2022 NAIP (natural color, 0.6-meter resolution)

X:\2400100\192923.01\TECH\Hayward and Tego\Project Maps\Hayward\DLA\PRO\Hayward_DLA_Maps.aprx



Hayward Hydroelectric Project
Wetlands in Vicinity of
Proposed Project Boundary
FERC No. 2417

Source Layer: US Fish & Wildlife Service National Wetland Inventory, WI 2022 NAIP (natural color, 0.6-meter resolution)

APPENDIX E-11 WDNR Hayward Lake Fish Data

Visit Type	Gear	Sample Date	Fish Data Seq No	Species	Number of Fish	Total No.	% of Total
NETTING	FYKE NET	13-Jun-03	2107286	BLACK BULLHEAD	1		
NETTING	FYKE NET	13-Jun-03	2107323	BLACK BULLHEAD	1		
NETTING	FYKE NET	14-Jun-03	2107332	BLACK BULLHEAD	1		
NETTING	FYKE NET	14-Jun-03	2107339	BLACK BULLHEAD	1		
NETTING	FYKE NET	14-Jun-03	2107344	BLACK BULLHEAD	1		
NETTING	FYKE NET	15-Jun-03	2107366	BLACK BULLHEAD	1		
NETTING	FYKE NET	15-Jun-03	2107372	BLACK BULLHEAD	1		
NETTING	FYKE NET	15-Jun-03	2107378	BLACK BULLHEAD	1		
NETTING	MINI FYKE NET '	15-Jul-03	2115282	BLACK BULLHEAD	1		
NETTING	MINI FYKE NET '	15-Jul-03	2115283	BLACK BULLHEAD	1		
NETTING	MINI FYKE NET '	15-Jul-03	2115284	BLACK BULLHEAD	1		
NETTING	MINI FYKE NET '	16-Jul-03	2115315	BLACK BULLHEAD	1		
NETTING	FYKE NET	8-Apr-05	4002727	BLACK BULLHEAD	1		
NETTING	FYKE NET	8-Apr-05	4002728	BLACK BULLHEAD	1		
NETTING	FYKE NET	9-Apr-05	4002733	BLACK BULLHEAD	1		
NETTING	FYKE NET	11-Apr-05	4002766	BLACK BULLHEAD	1		
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057501	BLACK BULLHEAD	1		
NETTING	FYKE NET	24-Apr-08	6774508	BLACK BULLHEAD	9		
NETTING	FYKE NET	25-Apr-08	6774669	BLACK BULLHEAD	5	31	0.36%
NETTING	FYKE NET	28-May-02	2088790	BLACK CRAPPIE	1		
NETTING	FYKE NET	28-May-02	2088791	BLACK CRAPPIE	1		
NETTING	FYKE NET	28-May-02	2088792	BLACK CRAPPIE	1		
NETTING	FYKE NET	28-May-02	2088793	BLACK CRAPPIE	3		
NETTING	FYKE NET	28-May-02	2088794	BLACK CRAPPIE	1		
ELECTROFI!	BOOM SHOCKEI	26-Sep-02	13422157	BLACK CRAPPIE	45		
NETTING	FYKE NET	8-Jun-03	2107208	BLACK CRAPPIE	3		
NETTING	FYKE NET	8-Jun-03	2107232	BLACK CRAPPIE	1		
NETTING	FYKE NET	8-Jun-03	2107233	BLACK CRAPPIE	2		
NETTING	FYKE NET	9-Jun-03	2107240	BLACK CRAPPIE	1		
NETTING	FYKE NET	9-Jun-03	2107267	BLACK CRAPPIE	2		
NETTING	FYKE NET	9-Jun-03	2107268	BLACK CRAPPIE	2		
NETTING	FYKE NET	10-Jun-03	2107277	BLACK CRAPPIE	1		
NETTING	FYKE NET	10-Jun-03	2107281	BLACK CRAPPIE	1		
NETTING	FYKE NET	13-Jun-03	2107291	BLACK CRAPPIE	1		
NETTING	FYKE NET	13-Jun-03	2107318	BLACK CRAPPIE	1		
NETTING	FYKE NET	14-Jun-03	2107337	BLACK CRAPPIE	2		
NETTING	FYKE NET	14-Jun-03	2107343	BLACK CRAPPIE	1		
NETTING	FYKE NET	15-Jun-03	2104373	BLACK CRAPPIE	9		
NETTING	FYKE NET	15-Jun-03	2104374	BLACK CRAPPIE	2		
NETTING	FYKE NET	15-Jun-03	2104375	BLACK CRAPPIE	1		
NETTING	FYKE NET	15-Jun-03	2107371	BLACK CRAPPIE	1		
NETTING	FYKE NET	15-Jun-03	2107377	BLACK CRAPPIE	1		
NETTING	MINI FYKE NET '	15-Jul-03	2115285	BLACK CRAPPIE	1		
NETTING	MINI FYKE NET '	15-Jul-03	2115286	BLACK CRAPPIE	1		
NETTING	MINI FYKE NET '	16-Jul-03	2115306	BLACK CRAPPIE	19		
NETTING	MINI FYKE NET '	16-Jul-03	2115307	BLACK CRAPPIE	1		
NETTING	MINI FYKE NET '	16-Jul-03	2115308	BLACK CRAPPIE	1		
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149513	BLACK CRAPPIE	2		
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149514	BLACK CRAPPIE	1		
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149515	BLACK CRAPPIE	1		
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149516	BLACK CRAPPIE	1		
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149517	BLACK CRAPPIE	1		
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149518	BLACK CRAPPIE	1		
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149519	BLACK CRAPPIE	1		
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149520	BLACK CRAPPIE	1		
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149521	BLACK CRAPPIE	2		
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149522	BLACK CRAPPIE	1		
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149572	BLACK CRAPPIE	1		
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149573	BLACK CRAPPIE	1		
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149574	BLACK CRAPPIE	1		

ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149575	BLACK CRAPPIE	2
NETTING	FYKE NET	9-Apr-05	4002732	BLACK CRAPPIE	1
NETTING	FYKE NET	11-Apr-05	4002769	BLACK CRAPPIE	3
OTHER	HOOK AND LINE	11-May-05	2740678	BLACK CRAPPIE	1
OTHER	HOOK AND LINE	11-May-05	2740679	BLACK CRAPPIE	2
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057460	BLACK CRAPPIE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057461	BLACK CRAPPIE	2
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057462	BLACK CRAPPIE	3
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057463	BLACK CRAPPIE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057464	BLACK CRAPPIE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057465	BLACK CRAPPIE	4
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057466	BLACK CRAPPIE	3
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057467	BLACK CRAPPIE	2
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057468	BLACK CRAPPIE	7
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057469	BLACK CRAPPIE	5
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057470	BLACK CRAPPIE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057588	BLACK CRAPPIE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057589	BLACK CRAPPIE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057590	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-08	6774382	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-08	6774383	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-08	6774384	BLACK CRAPPIE	2
NETTING	FYKE NET	24-Apr-08	6774385	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-08	6774386	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-08	6774387	BLACK CRAPPIE	2
NETTING	FYKE NET	24-Apr-08	6774388	BLACK CRAPPIE	2
NETTING	FYKE NET	24-Apr-08	6774389	BLACK CRAPPIE	2
NETTING	FYKE NET	24-Apr-08	6774390	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-08	6774391	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-08	6774392	BLACK CRAPPIE	2
NETTING	FYKE NET	24-Apr-08	6774393	BLACK CRAPPIE	2
NETTING	FYKE NET	24-Apr-08	6774394	BLACK CRAPPIE	2
NETTING	FYKE NET	24-Apr-08	6774395	BLACK CRAPPIE	3
NETTING	FYKE NET	24-Apr-08	6774396	BLACK CRAPPIE	5
NETTING	FYKE NET	24-Apr-08	6774397	BLACK CRAPPIE	2
NETTING	FYKE NET	24-Apr-08	6774398	BLACK CRAPPIE	2
NETTING	FYKE NET	24-Apr-08	6774399	BLACK CRAPPIE	3
NETTING	FYKE NET	24-Apr-08	6774400	BLACK CRAPPIE	3
NETTING	FYKE NET	24-Apr-08	6774401	BLACK CRAPPIE	2
NETTING	FYKE NET	24-Apr-08	6774402	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-08	6774403	BLACK CRAPPIE	6
NETTING	FYKE NET	24-Apr-08	6774404	BLACK CRAPPIE	3
NETTING	FYKE NET	24-Apr-08	6774405	BLACK CRAPPIE	8
NETTING	FYKE NET	24-Apr-08	6774406	BLACK CRAPPIE	5
NETTING	FYKE NET	24-Apr-08	6774407	BLACK CRAPPIE	7
NETTING	FYKE NET	24-Apr-08	6774408	BLACK CRAPPIE	4
NETTING	FYKE NET	24-Apr-08	6774409	BLACK CRAPPIE	6
NETTING	FYKE NET	24-Apr-08	6774410	BLACK CRAPPIE	4
NETTING	FYKE NET	24-Apr-08	6774411	BLACK CRAPPIE	5
NETTING	FYKE NET	24-Apr-08	6774412	BLACK CRAPPIE	2
NETTING	FYKE NET	24-Apr-08	6774413	BLACK CRAPPIE	3
NETTING	FYKE NET	24-Apr-08	6774414	BLACK CRAPPIE	3
NETTING	FYKE NET	24-Apr-08	6774415	BLACK CRAPPIE	3
NETTING	FYKE NET	24-Apr-08	6774416	BLACK CRAPPIE	3
NETTING	FYKE NET	24-Apr-08	6774417	BLACK CRAPPIE	3
NETTING	FYKE NET	24-Apr-08	6774418	BLACK CRAPPIE	2
NETTING	FYKE NET	24-Apr-08	6774419	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-08	6774420	BLACK CRAPPIE	3
NETTING	FYKE NET	24-Apr-08	6774421	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-08	6774422	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-08	6774423	BLACK CRAPPIE	1

NETTING	FYKE NET	24-Apr-08	6774424	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-08	6774425	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-08	6774426	BLACK CRAPPIE	1
NETTING	FYKE NET	25-Apr-08	6774553	BLACK CRAPPIE	1
NETTING	FYKE NET	25-Apr-08	6774554	BLACK CRAPPIE	1
NETTING	FYKE NET	25-Apr-08	6774555	BLACK CRAPPIE	1
NETTING	FYKE NET	25-Apr-08	6774556	BLACK CRAPPIE	1
NETTING	FYKE NET	25-Apr-08	6774557	BLACK CRAPPIE	2
NETTING	FYKE NET	25-Apr-08	6774558	BLACK CRAPPIE	2
NETTING	FYKE NET	25-Apr-08	6774559	BLACK CRAPPIE	1
NETTING	FYKE NET	25-Apr-08	6774560	BLACK CRAPPIE	7
NETTING	FYKE NET	25-Apr-08	6774561	BLACK CRAPPIE	2
NETTING	FYKE NET	25-Apr-08	6774562	BLACK CRAPPIE	4
NETTING	FYKE NET	25-Apr-08	6774563	BLACK CRAPPIE	1
NETTING	FYKE NET	25-Apr-08	6774564	BLACK CRAPPIE	3
NETTING	FYKE NET	25-Apr-08	6774565	BLACK CRAPPIE	1
NETTING	FYKE NET	25-Apr-08	6774566	BLACK CRAPPIE	4
NETTING	FYKE NET	25-Apr-08	6774567	BLACK CRAPPIE	4
NETTING	FYKE NET	25-Apr-08	6774568	BLACK CRAPPIE	2
NETTING	FYKE NET	25-Apr-08	6774569	BLACK CRAPPIE	1
NETTING	FYKE NET	25-Apr-08	6774570	BLACK CRAPPIE	3
NETTING	FYKE NET	25-Apr-08	6774571	BLACK CRAPPIE	2
NETTING	FYKE NET	25-Apr-08	6774572	BLACK CRAPPIE	3
NETTING	FYKE NET	25-Apr-08	6774573	BLACK CRAPPIE	2
NETTING	FYKE NET	25-Apr-08	6774574	BLACK CRAPPIE	1
NETTING	FYKE NET	25-Apr-08	6774575	BLACK CRAPPIE	4
NETTING	FYKE NET	25-Apr-08	6774576	BLACK CRAPPIE	2
NETTING	FYKE NET	25-Apr-08	6774577	BLACK CRAPPIE	1
NETTING	FYKE NET	25-Apr-08	6774578	BLACK CRAPPIE	2
NETTING	FYKE NET	25-Apr-08	6774579	BLACK CRAPPIE	2
NETTING	FYKE NET	25-Apr-08	6774580	BLACK CRAPPIE	1
NETTING	FYKE NET	25-Apr-08	6774581	BLACK CRAPPIE	1
NETTING	FYKE NET	25-Apr-08	6774582	BLACK CRAPPIE	1
NETTING	FYKE NET	25-Apr-08	6774583	BLACK CRAPPIE	1
NETTING	FYKE NET	25-Apr-08	6774584	BLACK CRAPPIE	1
NETTING	FYKE NET	25-Apr-08	6774585	BLACK CRAPPIE	1
NETTING	FYKE NET	25-Apr-08	6774586	BLACK CRAPPIE	2
NETTING	FYKE NET	25-Apr-08	6774587	BLACK CRAPPIE	1
NETTING	FYKE NET	25-Apr-08	6774588	BLACK CRAPPIE	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783330	BLACK CRAPPIE	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783331	BLACK CRAPPIE	1
NETTING	FYKE NET	23-Apr-14	10379731	BLACK CRAPPIE	2
NETTING	FYKE NET	23-Apr-14	10379741	BLACK CRAPPIE	5
NETTING	FYKE NET	23-Apr-14	10379744	BLACK CRAPPIE	2
NETTING	FYKE NET	23-Apr-14	10379752	BLACK CRAPPIE	10
NETTING	FYKE NET	23-Apr-14	10379758	BLACK CRAPPIE	6
NETTING	FYKE NET	23-Apr-14	10379760	BLACK CRAPPIE	3
NETTING	FYKE NET	23-Apr-14	10379764	BLACK CRAPPIE	3
NETTING	FYKE NET	23-Apr-14	10379765	BLACK CRAPPIE	3
NETTING	FYKE NET	23-Apr-14	10379767	BLACK CRAPPIE	1
NETTING	FYKE NET	23-Apr-14	10379768	BLACK CRAPPIE	1
NETTING	FYKE NET	23-Apr-14	10379771	BLACK CRAPPIE	1
NETTING	FYKE NET	23-Apr-14	10379777	BLACK CRAPPIE	11
NETTING	FYKE NET	23-Apr-14	10379822	BLACK CRAPPIE	35
NETTING	FYKE NET	23-Apr-14	10379830	BLACK CRAPPIE	11
NETTING	FYKE NET	23-Apr-14	10379847	BLACK CRAPPIE	14
NETTING	FYKE NET	23-Apr-14	10379865	BLACK CRAPPIE	18
NETTING	FYKE NET	24-Apr-14	10379874	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10379875	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10379876	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10379877	BLACK CRAPPIE	1

NETTING	FYKE NET	24-Apr-14	10379878	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10379879	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10379880	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10379881	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10379882	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10379883	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10379935	BLACK CRAPPIE	89
NETTING	FYKE NET	24-Apr-14	10379943	BLACK CRAPPIE	15
NETTING	FYKE NET	24-Apr-14	10379953	BLACK CRAPPIE	23
NETTING	FYKE NET	24-Apr-14	10379965	BLACK CRAPPIE	15
NETTING	FYKE NET	24-Apr-14	10379973	BLACK CRAPPIE	2
NETTING	FYKE NET	24-Apr-14	10379981	BLACK CRAPPIE	3
NETTING	FYKE NET	24-Apr-14	10380022	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380023	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380024	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380025	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380026	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380027	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380028	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380029	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380030	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380031	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380032	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380033	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380034	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380035	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380036	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380037	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380038	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380039	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380040	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380041	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380042	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380043	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380044	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380045	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380046	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380047	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380048	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380049	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380050	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380051	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380052	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380053	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380054	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380055	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380056	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380057	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380058	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380059	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380060	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380120	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380121	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380122	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380123	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380124	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380125	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380126	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380127	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380128	BLACK CRAPPIE	1
NETTING	FYKE NET	24-Apr-14	10380129	BLACK CRAPPIE	1

NETTING	FYKE NET	24-Apr-14	10380130	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380131	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380132	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380133	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380134	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380135	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380136	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380137	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380138	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380139	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380140	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380141	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380142	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380143	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380144	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380145	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380146	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380147	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380148	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380149	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380150	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380151	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380152	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380153	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380154	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380155	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380156	BLACK CRAPPIE	1		
NETTING	FYKE NET	24-Apr-14	10380159	BLACK CRAPPIE	22		
NETTING	FYKE NET	25-Apr-14	10380169	BLACK CRAPPIE	1		
NETTING	FYKE NET	25-Apr-14	10380197	BLACK CRAPPIE	19		
NETTING	FYKE NET	25-Apr-14	10380204	BLACK CRAPPIE	10		
NETTING	FYKE NET	25-Apr-14	10380212	BLACK CRAPPIE	32		
NETTING	FYKE NET	25-Apr-14	10380219	BLACK CRAPPIE	26		
NETTING	FYKE NET	25-Apr-14	10380234	BLACK CRAPPIE	25		
NETTING	FYKE NET	25-Apr-14	10380254	BLACK CRAPPIE	9		
NETTING	FYKE NET	25-Apr-14	10380266	BLACK CRAPPIE	15		
NETTING	FYKE NET	25-Apr-14	10380268	BLACK CRAPPIE	11		
NETTING	FYKE NET	25-Apr-14	10380270	BLACK CRAPPIE	2		
NETTING	FYKE NET	25-Apr-14	10380271	BLACK CRAPPIE	27		
NETTING	FYKE NET	25-Apr-14	10380285	BLACK CRAPPIE	22		
NETTING	FYKE NET	25-Apr-14	10380299	BLACK CRAPPIE	50		
NETTING	FYKE NET	26-Apr-14	10380301	BLACK CRAPPIE	2		
NETTING	FYKE NET	26-Apr-14	10380307	BLACK CRAPPIE	6		
NETTING	FYKE NET	26-Apr-14	10380325	BLACK CRAPPIE	37		
NETTING	FYKE NET	26-Apr-14	10380333	BLACK CRAPPIE	3		
NETTING	FYKE NET	26-Apr-14	10380356	BLACK CRAPPIE	50		
NETTING	FYKE NET	26-Apr-14	10380379	BLACK CRAPPIE	27		
NETTING	FYKE NET	26-Apr-14	10380397	BLACK CRAPPIE	69		
NETTING	FYKE NET	26-Apr-14	10380405	BLACK CRAPPIE	7		
NETTING	FYKE NET	26-Apr-14	10380419	BLACK CRAPPIE	37		
NETTING	FYKE NET	26-Apr-14	10380430	BLACK CRAPPIE	17		
NETTING	FYKE NET	26-Apr-14	10380434	BLACK CRAPPIE	10		
NETTING	FYKE NET	26-Apr-14	10380437	BLACK CRAPPIE	14	1263	14.62%
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223505	BLUEGILL	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223506	BLUEGILL	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223507	BLUEGILL	3		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223508	BLUEGILL	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223509	BLUEGILL	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223510	BLUEGILL	2		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223511	BLUEGILL	6		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223512	BLUEGILL	9		

ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223513	BLUEGILL	9
ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223514	BLUEGILL	1
ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223515	BLUEGILL	4
ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223516	BLUEGILL	1
ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223517	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223518	BLUEGILL	2
NETTING	FYKE NET	28-May-02	2088771	BLUEGILL	4
NETTING	FYKE NET	28-May-02	2088772	BLUEGILL	2
NETTING	FYKE NET	28-May-02	2088773	BLUEGILL	2
NETTING	FYKE NET	28-May-02	2088774	BLUEGILL	2
NETTING	FYKE NET	28-May-02	2088775	BLUEGILL	1
NETTING	FYKE NET	28-May-02	2088776	BLUEGILL	3
NETTING	FYKE NET	28-May-02	2088777	BLUEGILL	1
NETTING	FYKE NET	28-May-02	2088778	BLUEGILL	1
NETTING	FYKE NET	28-May-02	2088779	BLUEGILL	1
ELECTROFIS	BOOM SHOCKEI	26-Sep-02	13422155	BLUEGILL	19
NETTING	FYKE NET	8-Jun-03	2107200	BLUEGILL	3
NETTING	FYKE NET	8-Jun-03	2107205	BLUEGILL	46
NETTING	FYKE NET	8-Jun-03	2107210	BLUEGILL	1
NETTING	FYKE NET	8-Jun-03	2107211	BLUEGILL	1
NETTING	FYKE NET	8-Jun-03	2107212	BLUEGILL	1
NETTING	FYKE NET	8-Jun-03	2107213	BLUEGILL	7
NETTING	FYKE NET	8-Jun-03	2107214	BLUEGILL	2
NETTING	FYKE NET	8-Jun-03	2107215	BLUEGILL	2
NETTING	FYKE NET	8-Jun-03	2107216	BLUEGILL	10
NETTING	FYKE NET	8-Jun-03	2107217	BLUEGILL	8
NETTING	FYKE NET	8-Jun-03	2107218	BLUEGILL	10
NETTING	FYKE NET	8-Jun-03	2107219	BLUEGILL	4
NETTING	FYKE NET	8-Jun-03	2107220	BLUEGILL	1
NETTING	FYKE NET	8-Jun-03	2107221	BLUEGILL	1
NETTING	FYKE NET	9-Jun-03	2107237	BLUEGILL	14
NETTING	FYKE NET	9-Jun-03	2107243	BLUEGILL	1
NETTING	FYKE NET	9-Jun-03	2107244	BLUEGILL	1
NETTING	FYKE NET	9-Jun-03	2107245	BLUEGILL	5
NETTING	FYKE NET	9-Jun-03	2107246	BLUEGILL	2
NETTING	FYKE NET	9-Jun-03	2107247	BLUEGILL	5
NETTING	FYKE NET	9-Jun-03	2107248	BLUEGILL	15
NETTING	FYKE NET	9-Jun-03	2107249	BLUEGILL	11
NETTING	FYKE NET	9-Jun-03	2107250	BLUEGILL	6
NETTING	FYKE NET	9-Jun-03	2107251	BLUEGILL	1
NETTING	FYKE NET	10-Jun-03	2107272	BLUEGILL	4
NETTING	FYKE NET	10-Jun-03	2107274	BLUEGILL	22
NETTING	FYKE NET	10-Jun-03	2107278	BLUEGILL	21
NETTING	FYKE NET	13-Jun-03	2107283	BLUEGILL	1
NETTING	FYKE NET	13-Jun-03	2107288	BLUEGILL	20
NETTING	FYKE NET	13-Jun-03	2107294	BLUEGILL	23
NETTING	FYKE NET	13-Jun-03	2107308	BLUEGILL	7
NETTING	FYKE NET	13-Jun-03	2107309	BLUEGILL	3
NETTING	FYKE NET	13-Jun-03	2107310	BLUEGILL	2
NETTING	FYKE NET	13-Jun-03	2107311	BLUEGILL	1
NETTING	FYKE NET	13-Jun-03	2107312	BLUEGILL	2
NETTING	FYKE NET	13-Jun-03	2107313	BLUEGILL	5
NETTING	FYKE NET	13-Jun-03	2107314	BLUEGILL	11
NETTING	FYKE NET	13-Jun-03	2107315	BLUEGILL	6
NETTING	FYKE NET	13-Jun-03	2107316	BLUEGILL	4
NETTING	FYKE NET	13-Jun-03	2107317	BLUEGILL	1
NETTING	FYKE NET	14-Jun-03	2107330	BLUEGILL	58
NETTING	FYKE NET	14-Jun-03	2107335	BLUEGILL	60
NETTING	FYKE NET	14-Jun-03	2107340	BLUEGILL	73
NETTING	FYKE NET	15-Jun-03	2104359	BLUEGILL	8
NETTING	FYKE NET	15-Jun-03	2104360	BLUEGILL	4

NETTING	FYKE NET	15-Jun-03	2104361	BLUEGILL	2
NETTING	FYKE NET	15-Jun-03	2104362	BLUEGILL	7
NETTING	FYKE NET	15-Jun-03	2104363	BLUEGILL	1
NETTING	FYKE NET	15-Jun-03	2104364	BLUEGILL	4
NETTING	FYKE NET	15-Jun-03	2104365	BLUEGILL	10
NETTING	FYKE NET	15-Jun-03	2104366	BLUEGILL	26
NETTING	FYKE NET	15-Jun-03	2104367	BLUEGILL	17
NETTING	FYKE NET	15-Jun-03	2104368	BLUEGILL	10
NETTING	FYKE NET	15-Jun-03	2104369	BLUEGILL	4
NETTING	FYKE NET	15-Jun-03	2104370	BLUEGILL	2
NETTING	FYKE NET	15-Jun-03	2104371	BLUEGILL	1
NETTING	FYKE NET	15-Jun-03	2104372	BLUEGILL	1
NETTING	FYKE NET	15-Jun-03	2104425	BLUEGILL	77
NETTING	FYKE NET	15-Jun-03	2107363	BLUEGILL	100
NETTING	FYKE NET	15-Jun-03	2107368	BLUEGILL	96
NETTING	FYKE NET	15-Jun-03	2107374	BLUEGILL	180
NETTING	MINI FYKE NET '	15-Jul-03	2115216	BLUEGILL	2
NETTING	MINI FYKE NET '	15-Jul-03	2115217	BLUEGILL	1
NETTING	MINI FYKE NET '	15-Jul-03	2115218	BLUEGILL	2
NETTING	MINI FYKE NET '	15-Jul-03	2115219	BLUEGILL	4
NETTING	MINI FYKE NET '	15-Jul-03	2115220	BLUEGILL	2
NETTING	MINI FYKE NET '	15-Jul-03	2115221	BLUEGILL	4
NETTING	MINI FYKE NET '	15-Jul-03	2115222	BLUEGILL	7
NETTING	MINI FYKE NET '	15-Jul-03	2115223	BLUEGILL	4
NETTING	MINI FYKE NET '	15-Jul-03	2115224	BLUEGILL	10
NETTING	MINI FYKE NET '	15-Jul-03	2115225	BLUEGILL	2
NETTING	MINI FYKE NET '	15-Jul-03	2115226	BLUEGILL	3
NETTING	MINI FYKE NET '	15-Jul-03	2115227	BLUEGILL	1
NETTING	MINI FYKE NET '	15-Jul-03	2115228	BLUEGILL	1
NETTING	MINI FYKE NET '	15-Jul-03	2115229	BLUEGILL	1
NETTING	MINI FYKE NET '	15-Jul-03	2115230	BLUEGILL	1
NETTING	MINI FYKE NET '	15-Jul-03	2115231	BLUEGILL	1
NETTING	MINI FYKE NET '	15-Jul-03	2115235	BLUEGILL	3
NETTING	MINI FYKE NET '	15-Jul-03	2115236	BLUEGILL	1
NETTING	MINI FYKE NET '	15-Jul-03	2115239	BLUEGILL	3
NETTING	MINI FYKE NET '	15-Jul-03	2115240	BLUEGILL	1
NETTING	MINI FYKE NET '	15-Jul-03	2115247	BLUEGILL	1
NETTING	MINI FYKE NET '	15-Jul-03	2115248	BLUEGILL	8
NETTING	MINI FYKE NET '	15-Jul-03	2115249	BLUEGILL	3
NETTING	MINI FYKE NET '	15-Jul-03	2115250	BLUEGILL	1
NETTING	MINI FYKE NET '	15-Jul-03	2115251	BLUEGILL	1
NETTING	MINI FYKE NET '	15-Jul-03	2115252	BLUEGILL	1
NETTING	MINI FYKE NET '	15-Jul-03	2115253	BLUEGILL	2
NETTING	MINI FYKE NET '	15-Jul-03	2115254	BLUEGILL	2
NETTING	MINI FYKE NET '	15-Jul-03	2115255	BLUEGILL	1
NETTING	MINI FYKE NET '	15-Jul-03	2115261	BLUEGILL	6
NETTING	MINI FYKE NET '	15-Jul-03	2115262	BLUEGILL	8
NETTING	MINI FYKE NET '	15-Jul-03	2115263	BLUEGILL	4
NETTING	MINI FYKE NET '	15-Jul-03	2115264	BLUEGILL	6
NETTING	MINI FYKE NET '	15-Jul-03	2115265	BLUEGILL	10
NETTING	MINI FYKE NET '	15-Jul-03	2115266	BLUEGILL	16
NETTING	MINI FYKE NET '	15-Jul-03	2115267	BLUEGILL	19
NETTING	MINI FYKE NET '	15-Jul-03	2115268	BLUEGILL	6
NETTING	MINI FYKE NET '	15-Jul-03	2115269	BLUEGILL	7
NETTING	MINI FYKE NET '	15-Jul-03	2115270	BLUEGILL	1
NETTING	MINI FYKE NET '	16-Jul-03	2115287	BLUEGILL	9
NETTING	MINI FYKE NET '	16-Jul-03	2115288	BLUEGILL	5
NETTING	MINI FYKE NET '	16-Jul-03	2115289	BLUEGILL	138
NETTING	MINI FYKE NET '	16-Jul-03	2115290	BLUEGILL	9
NETTING	MINI FYKE NET '	16-Jul-03	2115291	BLUEGILL	6
NETTING	MINI FYKE NET '	16-Jul-03	2115292	BLUEGILL	15

NETTING	MINI FYKE NET \	16-Jul-03	2115293	BLUEGILL	7
NETTING	MINI FYKE NET \	16-Jul-03	2115294	BLUEGILL	6
NETTING	MINI FYKE NET \	16-Jul-03	2115295	BLUEGILL	11
NETTING	MINI FYKE NET \	16-Jul-03	2115296	BLUEGILL	21
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149507	BLUEGILL	2
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149508	BLUEGILL	3
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149509	BLUEGILL	9
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149510	BLUEGILL	5
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149511	BLUEGILL	5
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149512	BLUEGILL	1
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149565	BLUEGILL	1
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149566	BLUEGILL	3
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149567	BLUEGILL	4
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149568	BLUEGILL	5
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149569	BLUEGILL	8
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149570	BLUEGILL	4
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149571	BLUEGILL	3
NETTING	FYKE NET	8-Apr-05	4002729	BLUEGILL	1
NETTING	FYKE NET	10-Apr-05	4002777	BLUEGILL	2
NETTING	FYKE NET	10-Apr-05	4002778	BLUEGILL	1
NETTING	FYKE NET	10-Apr-05	4002779	BLUEGILL	1
NETTING	FYKE NET	10-Apr-05	4002786	BLUEGILL	1
NETTING	FYKE NET	11-Apr-05	4002768	BLUEGILL	2
OTHER	HOOK AND LINE	11-May-05	2740661	BLUEGILL	4
OTHER	HOOK AND LINE	11-May-05	2740662	BLUEGILL	1
OTHER	HOOK AND LINE	11-May-05	2740663	BLUEGILL	5
OTHER	HOOK AND LINE	11-May-05	2740664	BLUEGILL	7
OTHER	HOOK AND LINE	11-May-05	2740665	BLUEGILL	6
OTHER	HOOK AND LINE	11-May-05	2740666	BLUEGILL	13
OTHER	HOOK AND LINE	11-May-05	2740667	BLUEGILL	15
OTHER	HOOK AND LINE	11-May-05	2740668	BLUEGILL	21
OTHER	HOOK AND LINE	11-May-05	2740669	BLUEGILL	2
OTHER	HOOK AND LINE	11-May-05	2740670	BLUEGILL	3
OTHER	HOOK AND LINE	11-May-05	2740671	BLUEGILL	1
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057447	BLUEGILL	2
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057448	BLUEGILL	14
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057449	BLUEGILL	4
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057450	BLUEGILL	17
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057451	BLUEGILL	24
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057452	BLUEGILL	11
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057453	BLUEGILL	1
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057454	BLUEGILL	5
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057455	BLUEGILL	15
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057456	BLUEGILL	11
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057457	BLUEGILL	11
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057458	BLUEGILL	5
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057459	BLUEGILL	1
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057573	BLUEGILL	2
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057574	BLUEGILL	6
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057575	BLUEGILL	10
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057576	BLUEGILL	5
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057577	BLUEGILL	4
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057578	BLUEGILL	3
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057579	BLUEGILL	2
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057580	BLUEGILL	2
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057581	BLUEGILL	5
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057582	BLUEGILL	5
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057583	BLUEGILL	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783239	BLUEGILL	10
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783256	BLUEGILL	2
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783257	BLUEGILL	1

ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783258	BLUEGILL	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783259	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783260	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783261	BLUEGILL	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783262	BLUEGILL	3
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783263	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783264	BLUEGILL	4
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783265	BLUEGILL	7
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783266	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783267	BLUEGILL	4
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783268	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783269	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783270	BLUEGILL	4
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783271	BLUEGILL	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783272	BLUEGILL	3
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783273	BLUEGILL	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783274	BLUEGILL	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783275	BLUEGILL	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783276	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783277	BLUEGILL	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783278	BLUEGILL	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783279	BLUEGILL	3
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783280	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783281	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783282	BLUEGILL	4
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783283	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783284	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783285	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783286	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783287	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783288	BLUEGILL	4
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783289	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783290	BLUEGILL	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783291	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783292	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783570	BLUEGILL	6
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783571	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783572	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783573	BLUEGILL	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783574	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783575	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783576	BLUEGILL	6
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783577	BLUEGILL	4
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783578	BLUEGILL	4
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783579	BLUEGILL	4
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783580	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783581	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783582	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783583	BLUEGILL	3
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783584	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783585	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783586	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783587	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783588	BLUEGILL	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783589	BLUEGILL	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783590	BLUEGILL	3
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783591	BLUEGILL	3
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783592	BLUEGILL	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783593	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783594	BLUEGILL	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783595	BLUEGILL	5

ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783596	BLUEGILL	3
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783597	BLUEGILL	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783598	BLUEGILL	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783599	BLUEGILL	3
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783600	BLUEGILL	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783601	BLUEGILL	4
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783602	BLUEGILL	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783603	BLUEGILL	3
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783604	BLUEGILL	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783605	BLUEGILL	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783606	BLUEGILL	2
NETTING	FYKE NET	23-Apr-14	10379730	BLUEGILL	7
NETTING	FYKE NET	23-Apr-14	10379742	BLUEGILL	7
NETTING	FYKE NET	23-Apr-14	10379745	BLUEGILL	1
NETTING	FYKE NET	23-Apr-14	10379751	BLUEGILL	11
NETTING	FYKE NET	23-Apr-14	10379757	BLUEGILL	7
NETTING	FYKE NET	23-Apr-14	10379761	BLUEGILL	2
NETTING	FYKE NET	23-Apr-14	10379763	BLUEGILL	4
NETTING	FYKE NET	23-Apr-14	10379766	BLUEGILL	1
NETTING	FYKE NET	23-Apr-14	10379769	BLUEGILL	1
NETTING	FYKE NET	23-Apr-14	10379770	BLUEGILL	2
NETTING	FYKE NET	23-Apr-14	10379773	BLUEGILL	2
NETTING	FYKE NET	23-Apr-14	10379774	BLUEGILL	2
NETTING	FYKE NET	23-Apr-14	10379778	BLUEGILL	11
NETTING	FYKE NET	23-Apr-14	10379821	BLUEGILL	232
NETTING	FYKE NET	23-Apr-14	10379829	BLUEGILL	52
NETTING	FYKE NET	23-Apr-14	10379846	BLUEGILL	21
NETTING	FYKE NET	23-Apr-14	10379864	BLUEGILL	53
NETTING	FYKE NET	24-Apr-14	10379867	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379868	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379869	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379870	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379871	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379872	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379934	BLUEGILL	122
NETTING	FYKE NET	24-Apr-14	10379942	BLUEGILL	18
NETTING	FYKE NET	24-Apr-14	10379952	BLUEGILL	25
NETTING	FYKE NET	24-Apr-14	10379964	BLUEGILL	5
NETTING	FYKE NET	24-Apr-14	10379980	BLUEGILL	2
NETTING	FYKE NET	24-Apr-14	10379982	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379983	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379984	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379985	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379986	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379987	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379988	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379989	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379990	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379991	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379992	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379993	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379994	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379995	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379996	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379997	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379998	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10379999	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380000	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380001	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380002	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380003	BLUEGILL	1

NETTING	FYKE NET	24-Apr-14	10380004	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380005	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380006	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380007	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380008	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380009	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380010	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380011	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380012	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380013	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380014	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380015	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380066	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380067	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380068	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380069	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380070	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380071	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380072	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380073	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380074	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380075	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380076	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380077	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380078	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380079	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380080	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380081	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380082	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380083	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380084	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380085	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380086	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380087	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380088	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380089	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380090	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380091	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380092	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380093	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380094	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380095	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380096	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380097	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380098	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380099	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380100	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380101	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380102	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380103	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380104	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380105	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380106	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380107	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380108	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380109	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380110	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380111	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380112	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380113	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380114	BLUEGILL	1

NETTING	FYKE NET	24-Apr-14	10380115	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380116	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380117	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380158	BLUEGILL	68
NETTING	FYKE NET	24-Apr-14	10380160	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380161	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380162	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380163	BLUEGILL	1
NETTING	FYKE NET	24-Apr-14	10380164	BLUEGILL	1
NETTING	FYKE NET	25-Apr-14	10380168	BLUEGILL	1
NETTING	FYKE NET	25-Apr-14	10380172	BLUEGILL	1
NETTING	FYKE NET	25-Apr-14	10380198	BLUEGILL	9
NETTING	FYKE NET	25-Apr-14	10380205	BLUEGILL	2
NETTING	FYKE NET	25-Apr-14	10380213	BLUEGILL	48
NETTING	FYKE NET	25-Apr-14	10380218	BLUEGILL	38
NETTING	FYKE NET	25-Apr-14	10380233	BLUEGILL	34
NETTING	FYKE NET	25-Apr-14	10380253	BLUEGILL	18
NETTING	FYKE NET	25-Apr-14	10380265	BLUEGILL	20
NETTING	FYKE NET	25-Apr-14	10380267	BLUEGILL	80
NETTING	FYKE NET	25-Apr-14	10380269	BLUEGILL	8
NETTING	FYKE NET	25-Apr-14	10380272	BLUEGILL	11
NETTING	FYKE NET	25-Apr-14	10380284	BLUEGILL	34
NETTING	FYKE NET	25-Apr-14	10380300	BLUEGILL	49
NETTING	FYKE NET	26-Apr-14	10380302	BLUEGILL	1
NETTING	FYKE NET	26-Apr-14	10380326	BLUEGILL	25
NETTING	FYKE NET	26-Apr-14	10380332	BLUEGILL	6
NETTING	FYKE NET	26-Apr-14	10380357	BLUEGILL	58
NETTING	FYKE NET	26-Apr-14	10380378	BLUEGILL	40
NETTING	FYKE NET	26-Apr-14	10380398	BLUEGILL	29
NETTING	FYKE NET	26-Apr-14	10380404	BLUEGILL	9
NETTING	FYKE NET	26-Apr-14	10380420	BLUEGILL	109
NETTING	FYKE NET	26-Apr-14	10380421	BLUEGILL	40
NETTING	FYKE NET	26-Apr-14	10380424	BLUEGILL	20
NETTING	FYKE NET	26-Apr-14	10380431	BLUEGILL	29
NETTING	FYKE NET	26-Apr-14	10380433	BLUEGILL	7
NETTING	FYKE NET	26-Apr-14	10380438	BLUEGILL	9
NETTING	MINI FYKE NET	20-Jun-18	12626971	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626972	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626973	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626974	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626975	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626976	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626977	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626978	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626979	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626980	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626981	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626982	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626983	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626984	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626985	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626986	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626987	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626988	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626989	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626990	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626991	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626992	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626993	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626994	BLUEGILL	1
NETTING	MINI FYKE NET	20-Jun-18	12626995	BLUEGILL	1

NETTING	MINI FYKE NET	20-Jun-18	12626996	BLUEGILL	1		
NETTING	MINI FYKE NET	20-Jun-18	12626997	BLUEGILL	1		
NETTING	MINI FYKE NET	20-Jun-18	12626998	BLUEGILL	1		
NETTING	MINI FYKE NET	20-Jun-18	12626999	BLUEGILL	1		
NETTING	MINI FYKE NET	20-Jun-18	12627000	BLUEGILL	1	3499	40.49%
NETTING	FYKE NET	8-Apr-05	4002669	BROOK TROUT	1		
NETTING	FYKE NET	9-Apr-05	4002734	BROOK TROUT	1		
NETTING	FYKE NET	11-Apr-05	4002765	BROOK TROUT	1	3	0.03%
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223487	BROWN BULLHEAD	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223488	BROWN BULLHEAD	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223489	BROWN BULLHEAD	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223490	BROWN BULLHEAD	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223491	BROWN BULLHEAD	1		
NETTING	FYKE NET	9-Jun-03	2107253	BROWN BULLHEAD	2		
NETTING	FYKE NET	9-Jun-03	2107254	BROWN BULLHEAD	2		
NETTING	FYKE NET	10-Jun-03	2107282	BROWN BULLHEAD	2		
NETTING	FYKE NET	13-Jun-03	2107293	BROWN BULLHEAD	1		
NETTING	FYKE NET	13-Jun-03	2107324	BROWN BULLHEAD	1	13	0.15%
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8226340	BROWN TROUT	1		
NETTING	FYKE NET	25-Apr-14	10380235	BROWN TROUT	1	2	0.02%
NETTING	FYKE NET	25-Apr-08	6774664	BURBOT	1	1	0.01%
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149532	CENTRAL MUDMINNOW	4		
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149592	CENTRAL MUDMINNOW	2		
NETTING	FYKE NET	8-Apr-05	4002723	CENTRAL MUDMINNOW	1		
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783347	CENTRAL MUDMINNOW	1		
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783349	CENTRAL MUDMINNOW	1		
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783350	CENTRAL MUDMINNOW	1		
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783351	CENTRAL MUDMINNOW	1		
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783352	CENTRAL MUDMINNOW	2		
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783353	CENTRAL MUDMINNOW	1		
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783354	CENTRAL MUDMINNOW	1		
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783355	CENTRAL MUDMINNOW	1	16	0.19%
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057498	CHESNUT LAMPREY (AMMOCOETE)	1		
NETTING	FYKE NET	24-Apr-08	6774509	CHESTNUT LAMPREY	2	3	0.03%
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149528	COMMON SHINER	5		
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149529	COMMON SHINER	6		
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149530	COMMON SHINER	1		
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149531	COMMON SHINER	1		
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149580	COMMON SHINER	3		
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149581	COMMON SHINER	3		
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149582	COMMON SHINER	1		
NETTING	FYKE NET	11-Apr-05	4002767	COMMON SHINER	2	22	0.25%
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223492	CRAPPIES	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223493	CRAPPIES	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223494	CRAPPIES	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223495	CRAPPIES	1	4	0.05%
NETTING	FYKE NET	9-Jun-03	2107242	GOLDEN SHINER	1		
NETTING	FYKE NET	14-Jun-03	2107334	GOLDEN SHINER	7		
NETTING	FYKE NET	15-Jun-03	2107367	GOLDEN SHINER	2		
NETTING	FYKE NET	10-Apr-05	4002784	GOLDEN SHINER	1		
NETTING	FYKE NET	11-Apr-05	4002774	GOLDEN SHINER	1		
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783685	GOLDEN SHINER	1		
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783686	GOLDEN SHINER	1	14	0.16%
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783678	GREATER REDHORSE	1		
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783679	GREATER REDHORSE	1	2	0.02%
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068909	LARGEMOUTH BASS	1		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068910	LARGEMOUTH BASS	1		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068911	LARGEMOUTH BASS	1		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068912	LARGEMOUTH BASS	2		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068913	LARGEMOUTH BASS	2		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068914	LARGEMOUTH BASS	1		

ELECTROFIS	BOOM SHOCKEI	3-Oct-01	2068915	LARGEMOUTH BASS	2
ELECTROFIS	BOOM SHOCKEI	3-Oct-01	2068916	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	3-Oct-01	2068917	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	3-Oct-01	2068918	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	3-Oct-01	2068919	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	3-Oct-01	2068920	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	3-Oct-01	2068921	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	3-Oct-01	2068922	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	3-Oct-01	2068923	LARGEMOUTH BASS	2
ELECTROFIS	BOOM SHOCKEI	3-Oct-01	2068924	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	3-Oct-01	2068925	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	3-Oct-01	2068926	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	26-Sep-02	13422156	LARGEMOUTH BASS	16
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068987	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068988	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068989	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068990	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068991	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068992	LARGEMOUTH BASS	2
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068993	LARGEMOUTH BASS	2
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068994	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068995	LARGEMOUTH BASS	2
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068996	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068997	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068998	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068999	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2069000	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2069001	LARGEMOUTH BASS	1
NETTING	FYKE NET	8-Jun-03	2107207	LARGEMOUTH BASS	1
NETTING	FYKE NET	8-Jun-03	2107234	LARGEMOUTH BASS	1
NETTING	FYKE NET	15-Jun-03	2104434	LARGEMOUTH BASS	1
NETTING	FYKE NET	15-Jun-03	2104435	LARGEMOUTH BASS	1
NETTING	FYKE NET	15-Jun-03	2104436	LARGEMOUTH BASS	1
NETTING	FYKE NET	15-Jun-03	2104437	LARGEMOUTH BASS	1
NETTING	FYKE NET	15-Jun-03	2107380	LARGEMOUTH BASS	3
NETTING	FYKE NET	15-Jun-03	2107381	LARGEMOUTH BASS	3
NETTING	FYKE NET	15-Jun-03	2107382	LARGEMOUTH BASS	3
NETTING	MINI FYKE NET '	15-Jul-03	2115232	LARGEMOUTH BASS	1
NETTING	MINI FYKE NET '	15-Jul-03	2115237	LARGEMOUTH BASS	2
NETTING	MINI FYKE NET '	15-Jul-03	2115238	LARGEMOUTH BASS	2
NETTING	MINI FYKE NET '	15-Jul-03	2115241	LARGEMOUTH BASS	1
NETTING	MINI FYKE NET '	15-Jul-03	2115242	LARGEMOUTH BASS	3
NETTING	MINI FYKE NET '	15-Jul-03	2115243	LARGEMOUTH BASS	3
NETTING	MINI FYKE NET '	15-Jul-03	2115244	LARGEMOUTH BASS	1
NETTING	MINI FYKE NET '	15-Jul-03	2115245	LARGEMOUTH BASS	2
NETTING	MINI FYKE NET '	15-Jul-03	2115246	LARGEMOUTH BASS	3
NETTING	MINI FYKE NET '	15-Jul-03	2115257	LARGEMOUTH BASS	2
NETTING	MINI FYKE NET '	15-Jul-03	2115258	LARGEMOUTH BASS	6
NETTING	MINI FYKE NET '	15-Jul-03	2115259	LARGEMOUTH BASS	2
NETTING	MINI FYKE NET '	15-Jul-03	2115260	LARGEMOUTH BASS	2
NETTING	MINI FYKE NET '	15-Jul-03	2115279	LARGEMOUTH BASS	1
NETTING	MINI FYKE NET '	15-Jul-03	2115280	LARGEMOUTH BASS	2
NETTING	MINI FYKE NET '	16-Jul-03	2115309	LARGEMOUTH BASS	34
NETTING	MINI FYKE NET '	16-Jul-03	2115310	LARGEMOUTH BASS	2
NETTING	MINI FYKE NET '	16-Jul-03	2115311	LARGEMOUTH BASS	1
NETTING	MINI FYKE NET '	16-Jul-03	2115312	LARGEMOUTH BASS	7
NETTING	MINI FYKE NET '	16-Jul-03	2115313	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149337	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149474	LARGEMOUTH BASS	2
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149475	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149476	LARGEMOUTH BASS	1

ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149477	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149478	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724733	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724734	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724735	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724736	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724737	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724738	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724739	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724740	LARGEMOUTH BASS	2
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724741	LARGEMOUTH BASS	2
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724742	LARGEMOUTH BASS	2
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724743	LARGEMOUTH BASS	2
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724744	LARGEMOUTH BASS	2
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724745	LARGEMOUTH BASS	4
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724746	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724747	LARGEMOUTH BASS	1
NETTING	FYKE NET	9-Apr-05	4002731	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	27-Apr-05	2740552	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	27-Apr-05	2740553	LARGEMOUTH BASS	3
ELECTROFIS	BOOM SHOCKEI	27-Apr-05	2740554	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	27-Apr-05	2740555	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	27-Apr-05	2740556	LARGEMOUTH BASS	1
OTHER	HOOK AND LINE	11-May-05	2740680	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868311	LARGEMOUTH BASS	2
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868312	LARGEMOUTH BASS	12
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868313	LARGEMOUTH BASS	2
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868314	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868315	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868316	LARGEMOUTH BASS	6
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868317	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868318	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868319	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868320	LARGEMOUTH BASS	3
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868321	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868322	LARGEMOUTH BASS	3
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868323	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868324	LARGEMOUTH BASS	2
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868325	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057403	LARGEMOUTH BASS	2
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057405	LARGEMOUTH BASS	3
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057406	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057410	LARGEMOUTH BASS	2
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057411	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057412	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057413	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057414	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057416	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057417	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057418	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057419	LARGEMOUTH BASS	5
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057420	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057421	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057422	LARGEMOUTH BASS	2
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057423	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057424	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057425	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057426	LARGEMOUTH BASS	2
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057427	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057556	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057557	LARGEMOUTH BASS	1

ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057558	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057559	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783756	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783757	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783758	LARGEMOUTH BASS	3
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783759	LARGEMOUTH BASS	4
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783760	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783761	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783762	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783763	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783764	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783765	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783766	LARGEMOUTH BASS	3
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783767	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783768	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783828	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783829	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783830	LARGEMOUTH BASS	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783831	LARGEMOUTH BASS	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783832	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783833	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783834	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783835	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783836	LARGEMOUTH BASS	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783837	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783838	LARGEMOUTH BASS	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783839	LARGEMOUTH BASS	2
NETTING	FYKE NET	2-May-13	9967988	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9967989	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9967990	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9967991	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9967992	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9967993	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9967994	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9967995	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9967996	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9967997	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9967998	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9967999	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9968000	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9968001	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9968002	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9968003	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9968004	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9968005	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9968006	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9968007	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9968008	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9968009	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9968010	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9968011	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9968012	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9968013	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9968014	LARGEMOUTH BASS	1
NETTING	FYKE NET	2-May-13	9968015	LARGEMOUTH BASS	1
NETTING	FYKE NET	24-Apr-14	10379884	LARGEMOUTH BASS	1
NETTING	FYKE NET	24-Apr-14	10379885	LARGEMOUTH BASS	1
NETTING	FYKE NET	24-Apr-14	10379890	LARGEMOUTH BASS	1
NETTING	FYKE NET	24-Apr-14	10379905	LARGEMOUTH BASS	1
NETTING	FYKE NET	24-Apr-14	10379907	LARGEMOUTH BASS	1
NETTING	FYKE NET	24-Apr-14	10379928	LARGEMOUTH BASS	1

NETTING	FYKE NET	24-Apr-14	10379930	LARGEMOUTH BASS	1		
NETTING	FYKE NET	24-Apr-14	10379940	LARGEMOUTH BASS	1		
NETTING	FYKE NET	24-Apr-14	10379979	LARGEMOUTH BASS	1		
NETTING	FYKE NET	26-Apr-14	10380329	LARGEMOUTH BASS	1		
NETTING	FYKE NET	26-Apr-14	10380336	LARGEMOUTH BASS	1		
NETTING	FYKE NET	26-Apr-14	10380337	LARGEMOUTH BASS	1	336	3.89%
NETTING	FYKE NET	8-Apr-05	4002720	LOGPERCH	1		
NETTING	FYKE NET	8-Apr-05	4002721	LOGPERCH	1		
NETTING	FYKE NET	8-Apr-05	4002722	LOGPERCH	1	3	0.03%
ELECTROFIS	BOOM SHOCKEI	3-Oct-01	2068952	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	3-Oct-01	2068953	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	3-Oct-01	2068954	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	3-Oct-01	2068955	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	3-Oct-01	2068956	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	26-Sep-02	1998702	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	26-Sep-02	1998703	MUSKELLUNGE	2		
ELECTROFIS	BOOM SHOCKEI	26-Sep-02	1998704	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	26-Sep-02	1998705	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	26-Sep-02	1998706	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	26-Sep-02	1998707	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068977	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068978	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068979	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068980	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068981	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068982	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149321	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149322	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149323	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149324	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149443	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149444	MUSKELLUNGE	2		
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724725	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724726	MUSKELLUNGE	2		
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724727	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724728	MUSKELLUNGE	4		
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724729	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724730	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724731	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724732	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	27-Apr-05	2740549	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	27-Apr-05	2740550	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	27-Apr-05	2740551	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868327	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868328	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868329	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868330	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868331	MUSKELLUNGE	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057561	MUSKELLUNGE	1		
NETTING	FYKE NET	24-Apr-08	6774484	MUSKELLUNGE	1		
NETTING	FYKE NET	24-Apr-08	6774485	MUSKELLUNGE	1		
NETTING	FYKE NET	24-Apr-08	6774486	MUSKELLUNGE	1		
NETTING	FYKE NET	24-Apr-08	6774487	MUSKELLUNGE	1		
NETTING	FYKE NET	24-Apr-08	6774488	MUSKELLUNGE	1		
NETTING	FYKE NET	24-Apr-08	6774489	MUSKELLUNGE	1		
NETTING	FYKE NET	24-Apr-08	6774490	MUSKELLUNGE	1		
NETTING	FYKE NET	24-Apr-08	6774491	MUSKELLUNGE	1		
NETTING	FYKE NET	24-Apr-08	6774492	MUSKELLUNGE	1		
NETTING	FYKE NET	25-Apr-08	6774649	MUSKELLUNGE	1		
NETTING	FYKE NET	25-Apr-08	6774650	MUSKELLUNGE	1		
NETTING	FYKE NET	25-Apr-08	6774651	MUSKELLUNGE	1		

NETTING	FYKE NET	25-Apr-08	6774652	MUSKELLUNGE	1		
NETTING	FYKE NET	25-Apr-08	6774653	MUSKELLUNGE	1		
ELECTROFI:	BOOM SHOCKEI	9-Jun-08	6783849	MUSKELLUNGE	1		
NETTING	FYKE NET	2-May-13	9967978	MUSKELLUNGE	1		
NETTING	FYKE NET	2-May-13	9967979	MUSKELLUNGE	1		
NETTING	FYKE NET	2-May-13	9967980	MUSKELLUNGE	1		
NETTING	FYKE NET	2-May-13	9967981	MUSKELLUNGE	1		
NETTING	FYKE NET	2-May-13	9967982	MUSKELLUNGE	1		
NETTING	FYKE NET	2-May-13	9967983	MUSKELLUNGE	1		
NETTING	FYKE NET	2-May-13	9967984	MUSKELLUNGE	1		
NETTING	FYKE NET	2-May-13	9967985	MUSKELLUNGE	1		
NETTING	FYKE NET	2-May-13	9967986	MUSKELLUNGE	1		
NETTING	FYKE NET	2-May-13	9968016	MUSKELLUNGE	1		
NETTING	FYKE NET	2-May-13	9968017	MUSKELLUNGE	1		
NETTING	FYKE NET	2-May-13	9968021	MUSKELLUNGE	1		
ELECTROFI:	BOOM SHOCKEI	28-Apr-14	10380439	MUSKELLUNGE	1		
OTHER	HOOK AND LINE	21-May-14	13225711	MUSKELLUNGE	1		
OTHER	HOOK AND LINE	21-May-14	13225712	MUSKELLUNGE	1		
OTHER	HOOK AND LINE	1-Jun-18	12565194	MUSKELLUNGE	1		
OTHER	HOOK AND LINE	4-Jul-18	12565195	MUSKELLUNGE	1	78	0.90%
NETTING	FYKE NET	24-Apr-08	6774505	NORTHERN HOG SUCKER	1		
NETTING	FYKE NET	24-Apr-08	6774506	NORTHERN HOG SUCKER	1		
NETTING	FYKE NET	24-Apr-08	6774507	NORTHERN HOG SUCKER	1		
NETTING	FYKE NET	25-Apr-08	6774668	NORTHERN HOG SUCKER	1	4	0.05%
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8223454	NORTHERN PIKE	1		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8223455	NORTHERN PIKE	1		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8223456	NORTHERN PIKE	2		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8223457	NORTHERN PIKE	1		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8223458	NORTHERN PIKE	1		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8223459	NORTHERN PIKE	1		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8223460	NORTHERN PIKE	1		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8223461	NORTHERN PIKE	1		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8223462	NORTHERN PIKE	1		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8223463	NORTHERN PIKE	1		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8226341	NORTHERN PIKE	1		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8226342	NORTHERN PIKE	1		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8226343	NORTHERN PIKE	1		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8226344	NORTHERN PIKE	1		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8226345	NORTHERN PIKE	4		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8226346	NORTHERN PIKE	1		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8226347	NORTHERN PIKE	1		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8226348	NORTHERN PIKE	1		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8226349	NORTHERN PIKE	2		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8226350	NORTHERN PIKE	2		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8226351	NORTHERN PIKE	1		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8226352	NORTHERN PIKE	4		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8226353	NORTHERN PIKE	2		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8226354	NORTHERN PIKE	2		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8226355	NORTHERN PIKE	2		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8226356	NORTHERN PIKE	1		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8226357	NORTHERN PIKE	1		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8226358	NORTHERN PIKE	4		
ELECTROFI:	BOOM SHOCKEI	27-Oct-65	8226359	NORTHERN PIKE	1		
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068927	NORTHERN PIKE	2		
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068928	NORTHERN PIKE	37		
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068929	NORTHERN PIKE	1		
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068930	NORTHERN PIKE	7		
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068931	NORTHERN PIKE	2		
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068932	NORTHERN PIKE	3		
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068933	NORTHERN PIKE	1		
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068934	NORTHERN PIKE	1		

ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068935	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068936	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068937	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068938	NORTHERN PIKE	2
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068939	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068940	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068941	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068942	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068943	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068944	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068945	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068946	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068947	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068948	NORTHERN PIKE	2
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068949	NORTHERN PIKE	2
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068950	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	3-Oct-01	2068951	NORTHERN PIKE	1
NETTING	FYKE NET	28-May-02	2088798	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998672	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998673	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998674	NORTHERN PIKE	6
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998675	NORTHERN PIKE	4
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998676	NORTHERN PIKE	2
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998677	NORTHERN PIKE	2
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998678	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998679	NORTHERN PIKE	4
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998680	NORTHERN PIKE	2
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998681	NORTHERN PIKE	2
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998682	NORTHERN PIKE	5
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998683	NORTHERN PIKE	3
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998684	NORTHERN PIKE	2
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998685	NORTHERN PIKE	3
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998686	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998687	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998688	NORTHERN PIKE	2
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998689	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998690	NORTHERN PIKE	3
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998691	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998692	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998693	NORTHERN PIKE	2
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998694	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998695	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998696	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998697	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998698	NORTHERN PIKE	2
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998699	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998700	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	26-Sep-02	1998701	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	4-Oct-02	2068957	NORTHERN PIKE	2
ELECTROFI:	BOOM SHOCKEI	4-Oct-02	2068958	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	4-Oct-02	2068959	NORTHERN PIKE	7
ELECTROFI:	BOOM SHOCKEI	4-Oct-02	2068960	NORTHERN PIKE	2
ELECTROFI:	BOOM SHOCKEI	4-Oct-02	2068961	NORTHERN PIKE	3
ELECTROFI:	BOOM SHOCKEI	4-Oct-02	2068962	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	4-Oct-02	2068963	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	4-Oct-02	2068964	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	4-Oct-02	2068965	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	4-Oct-02	2068966	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	4-Oct-02	2068967	NORTHERN PIKE	2
ELECTROFI:	BOOM SHOCKEI	4-Oct-02	2068968	NORTHERN PIKE	1
ELECTROFI:	BOOM SHOCKEI	4-Oct-02	2068969	NORTHERN PIKE	1

ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068970	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068971	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068972	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068973	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068974	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068975	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068976	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068983	NORTHERN PIKE	2
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068984	NORTHERN PIKE	2
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068985	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-02	2068986	NORTHERN PIKE	1
NETTING	FYKE NET	8-Jun-03	2107202	NORTHERN PIKE	1
NETTING	FYKE NET	8-Jun-03	2107235	NORTHERN PIKE	1
NETTING	FYKE NET	9-Jun-03	2107239	NORTHERN PIKE	3
NETTING	FYKE NET	9-Jun-03	2107269	NORTHERN PIKE	3
NETTING	FYKE NET	9-Jun-03	2107270	NORTHERN PIKE	3
NETTING	FYKE NET	9-Jun-03	2107271	NORTHERN PIKE	3
NETTING	FYKE NET	13-Jun-03	2107287	NORTHERN PIKE	1
NETTING	FYKE NET	13-Jun-03	2107292	NORTHERN PIKE	1
NETTING	FYKE NET	13-Jun-03	2107326	NORTHERN PIKE	2
NETTING	FYKE NET	13-Jun-03	2107327	NORTHERN PIKE	2
NETTING	FYKE NET	14-Jun-03	2107333	NORTHERN PIKE	1
NETTING	FYKE NET	15-Jun-03	2104428	NORTHERN PIKE	1
NETTING	FYKE NET	15-Jun-03	2104429	NORTHERN PIKE	2
NETTING	FYKE NET	15-Jun-03	2104430	NORTHERN PIKE	1
NETTING	FYKE NET	15-Jun-03	2104431	NORTHERN PIKE	1
NETTING	FYKE NET	15-Jun-03	2104432	NORTHERN PIKE	1
NETTING	FYKE NET	15-Jun-03	2104433	NORTHERN PIKE	1
NETTING	FYKE NET	15-Jun-03	2107373	NORTHERN PIKE	1
NETTING	FYKE NET	15-Jun-03	2107379	NORTHERN PIKE	1
NETTING	FYKE NET	15-Jun-03	2107383	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149313	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149314	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149315	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149316	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149317	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149318	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149319	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149320	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149460	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149461	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149462	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149463	NORTHERN PIKE	2
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149464	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149465	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149466	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149467	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149468	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724748	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724749	NORTHERN PIKE	3
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724750	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724751	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724752	NORTHERN PIKE	3
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724753	NORTHERN PIKE	3
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724754	NORTHERN PIKE	2
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724755	NORTHERN PIKE	2
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724756	NORTHERN PIKE	3
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724757	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724758	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724759	NORTHERN PIKE	4
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724760	NORTHERN PIKE	2

ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724761	NORTHERN PIKE	2
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724762	NORTHERN PIKE	2
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724763	NORTHERN PIKE	2
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724764	NORTHERN PIKE	2
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724765	NORTHERN PIKE	2
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724766	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724767	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724768	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724769	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724770	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724771	NORTHERN PIKE	2
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724772	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724773	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724774	NORTHERN PIKE	1
NETTING	FYKE NET	10-Apr-05	4002782	NORTHERN PIKE	1
NETTING	FYKE NET	10-Apr-05	4002783	NORTHERN PIKE	1
NETTING	FYKE NET	11-Apr-05	4002759	NORTHERN PIKE	1
NETTING	FYKE NET	11-Apr-05	4002760	NORTHERN PIKE	1
NETTING	FYKE NET	11-Apr-05	4002761	NORTHERN PIKE	1
NETTING	FYKE NET	11-Apr-05	4002762	NORTHERN PIKE	1
NETTING	FYKE NET	11-Apr-05	4002763	NORTHERN PIKE	1
NETTING	FYKE NET	11-Apr-05	4002764	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	27-Apr-05	2740547	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	27-Apr-05	2740548	NORTHERN PIKE	3
OTHER	HOOK AND LINE	11-May-05	2740681	NORTHERN PIKE	3
OTHER	HOOK AND LINE	11-May-05	2740682	NORTHERN PIKE	3
OTHER	HOOK AND LINE	11-May-05	2740683	NORTHERN PIKE	3
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868332	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868333	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868334	NORTHERN PIKE	3
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868335	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868336	NORTHERN PIKE	3
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868337	NORTHERN PIKE	2
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868338	NORTHERN PIKE	2
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868339	NORTHERN PIKE	3
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868340	NORTHERN PIKE	2
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868341	NORTHERN PIKE	2
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868342	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868343	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057434	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057435	NORTHERN PIKE	2
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057436	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057437	NORTHERN PIKE	2
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057438	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057439	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057440	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057441	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057442	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057443	NORTHERN PIKE	3
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057444	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057445	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057446	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057552	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057553	NORTHERN PIKE	3
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057554	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057555	NORTHERN PIKE	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057560	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774427	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774428	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774429	NORTHERN PIKE	3
NETTING	FYKE NET	24-Apr-08	6774430	NORTHERN PIKE	3

NETTING	FYKE NET	24-Apr-08	6774431	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774432	NORTHERN PIKE	3
NETTING	FYKE NET	24-Apr-08	6774433	NORTHERN PIKE	2
NETTING	FYKE NET	24-Apr-08	6774434	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774435	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774436	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774437	NORTHERN PIKE	2
NETTING	FYKE NET	24-Apr-08	6774438	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774439	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774440	NORTHERN PIKE	4
NETTING	FYKE NET	24-Apr-08	6774441	NORTHERN PIKE	4
NETTING	FYKE NET	24-Apr-08	6774442	NORTHERN PIKE	3
NETTING	FYKE NET	24-Apr-08	6774443	NORTHERN PIKE	3
NETTING	FYKE NET	24-Apr-08	6774444	NORTHERN PIKE	3
NETTING	FYKE NET	24-Apr-08	6774445	NORTHERN PIKE	3
NETTING	FYKE NET	24-Apr-08	6774446	NORTHERN PIKE	3
NETTING	FYKE NET	24-Apr-08	6774447	NORTHERN PIKE	4
NETTING	FYKE NET	24-Apr-08	6774448	NORTHERN PIKE	4
NETTING	FYKE NET	24-Apr-08	6774449	NORTHERN PIKE	2
NETTING	FYKE NET	24-Apr-08	6774450	NORTHERN PIKE	2
NETTING	FYKE NET	24-Apr-08	6774451	NORTHERN PIKE	4
NETTING	FYKE NET	24-Apr-08	6774452	NORTHERN PIKE	2
NETTING	FYKE NET	24-Apr-08	6774453	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774454	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774455	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774456	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774457	NORTHERN PIKE	2
NETTING	FYKE NET	24-Apr-08	6774458	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774459	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774460	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774461	NORTHERN PIKE	2
NETTING	FYKE NET	24-Apr-08	6774462	NORTHERN PIKE	2
NETTING	FYKE NET	24-Apr-08	6774463	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774464	NORTHERN PIKE	2
NETTING	FYKE NET	24-Apr-08	6774465	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774466	NORTHERN PIKE	2
NETTING	FYKE NET	24-Apr-08	6774467	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774468	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774469	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774470	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774471	NORTHERN PIKE	3
NETTING	FYKE NET	24-Apr-08	6774472	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774473	NORTHERN PIKE	2
NETTING	FYKE NET	24-Apr-08	6774474	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774475	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774476	NORTHERN PIKE	2
NETTING	FYKE NET	24-Apr-08	6774477	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774478	NORTHERN PIKE	2
NETTING	FYKE NET	24-Apr-08	6774479	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774480	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774481	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774482	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-08	6774483	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774589	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774590	NORTHERN PIKE	2
NETTING	FYKE NET	25-Apr-08	6774591	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774592	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774593	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774594	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774595	NORTHERN PIKE	2
NETTING	FYKE NET	25-Apr-08	6774596	NORTHERN PIKE	1

NETTING	FYKE NET	25-Apr-08	6774597	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774598	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774599	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774600	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774601	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774602	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774603	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774604	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774605	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774606	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774607	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774608	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774609	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774610	NORTHERN PIKE	2
NETTING	FYKE NET	25-Apr-08	6774611	NORTHERN PIKE	3
NETTING	FYKE NET	25-Apr-08	6774612	NORTHERN PIKE	5
NETTING	FYKE NET	25-Apr-08	6774613	NORTHERN PIKE	2
NETTING	FYKE NET	25-Apr-08	6774614	NORTHERN PIKE	2
NETTING	FYKE NET	25-Apr-08	6774615	NORTHERN PIKE	2
NETTING	FYKE NET	25-Apr-08	6774616	NORTHERN PIKE	4
NETTING	FYKE NET	25-Apr-08	6774617	NORTHERN PIKE	3
NETTING	FYKE NET	25-Apr-08	6774618	NORTHERN PIKE	2
NETTING	FYKE NET	25-Apr-08	6774619	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774620	NORTHERN PIKE	3
NETTING	FYKE NET	25-Apr-08	6774621	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774622	NORTHERN PIKE	3
NETTING	FYKE NET	25-Apr-08	6774623	NORTHERN PIKE	5
NETTING	FYKE NET	25-Apr-08	6774624	NORTHERN PIKE	4
NETTING	FYKE NET	25-Apr-08	6774625	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774626	NORTHERN PIKE	2
NETTING	FYKE NET	25-Apr-08	6774627	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774628	NORTHERN PIKE	2
NETTING	FYKE NET	25-Apr-08	6774629	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774630	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774631	NORTHERN PIKE	2
NETTING	FYKE NET	25-Apr-08	6774632	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774633	NORTHERN PIKE	2
NETTING	FYKE NET	25-Apr-08	6774634	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774635	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774636	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774637	NORTHERN PIKE	2
NETTING	FYKE NET	25-Apr-08	6774638	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774639	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774640	NORTHERN PIKE	2
NETTING	FYKE NET	25-Apr-08	6774641	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774642	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774643	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774644	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774645	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774646	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774647	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-08	6774648	NORTHERN PIKE	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783737	NORTHERN PIKE	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783738	NORTHERN PIKE	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783739	NORTHERN PIKE	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783740	NORTHERN PIKE	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783741	NORTHERN PIKE	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783742	NORTHERN PIKE	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783743	NORTHERN PIKE	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783744	NORTHERN PIKE	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783745	NORTHERN PIKE	1

ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783746 NORTHERN PIKE	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783747 NORTHERN PIKE	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783748 NORTHERN PIKE	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783749 NORTHERN PIKE	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783750 NORTHERN PIKE	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783769 NORTHERN PIKE	2
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783770 NORTHERN PIKE	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783771 NORTHERN PIKE	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783772 NORTHERN PIKE	2
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783773 NORTHERN PIKE	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783774 NORTHERN PIKE	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783775 NORTHERN PIKE	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783776 NORTHERN PIKE	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783777 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968022 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968023 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968024 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968025 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968026 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968027 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968028 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968029 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968030 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968031 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968032 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968033 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968034 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968035 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968036 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968037 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968038 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968039 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968040 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968041 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968042 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968043 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968044 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968045 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968046 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968047 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968048 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968049 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968050 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968051 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968052 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968053 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968054 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968055 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968056 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968057 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968058 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968059 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968060 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968061 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968062 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968063 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968064 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968065 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968066 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968067 NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968068 NORTHERN PIKE	1

NETTING	FYKE NET	2-May-13	9968069	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968070	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968071	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968072	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968073	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968074	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968075	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968076	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968077	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968078	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968079	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968080	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968081	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968082	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968083	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968084	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968085	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968086	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968087	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968088	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968089	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968090	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968091	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968092	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968093	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968094	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968095	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968096	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968097	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968098	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968099	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968100	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968101	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968102	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968103	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968104	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968105	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968106	NORTHERN PIKE	1
NETTING	FYKE NET	2-May-13	9968107	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379732	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379733	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379734	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379735	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379736	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379738	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379739	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379740	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379743	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379746	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379747	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379748	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379749	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379750	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379753	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379754	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379755	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379756	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379759	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379772	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379775	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379776	NORTHERN PIKE	1

NETTING	FYKE NET	23-Apr-14	10379785	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379788	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379790	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379792	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379802	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379823	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379824	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379825	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379826	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379827	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379831	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379832	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379833	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379834	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379835	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379836	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379837	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379838	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379839	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379840	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379842	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379843	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379844	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379845	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379848	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379849	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379850	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379851	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379852	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379853	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379854	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379857	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379858	NORTHERN PIKE	1
NETTING	FYKE NET	23-Apr-14	10379866	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379886	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379887	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379888	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379891	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379893	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379894	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379895	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379896	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379897	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379898	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379899	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379900	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379901	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379902	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379904	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379906	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379908	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379909	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379910	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379911	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379912	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379913	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379914	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379916	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379917	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379918	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379919	NORTHERN PIKE	1

NETTING	FYKE NET	24-Apr-14	10379920	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379921	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379922	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379923	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379924	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379925	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379926	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379927	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379929	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379931	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379932	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379933	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379938	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379939	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379941	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379945	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379946	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379947	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379948	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379949	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379950	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379951	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379955	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379956	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379957	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379958	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379959	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379960	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379961	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379962	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379963	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379967	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379968	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379969	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379970	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379971	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379972	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379974	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379975	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379976	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379977	NORTHERN PIKE	1
NETTING	FYKE NET	24-Apr-14	10379978	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380165	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380166	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380167	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380170	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380171	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380173	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380174	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380175	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380176	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380177	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380178	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380179	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380180	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380181	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380182	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380183	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380184	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380185	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380186	NORTHERN PIKE	1

NETTING	FYKE NET	25-Apr-14	10380187	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380188	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380189	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380190	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380191	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380192	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380199	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380200	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380201	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380202	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380203	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380206	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380207	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380208	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380209	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380210	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380211	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380214	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380215	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380216	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380217	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380226	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380227	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380228	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380229	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380230	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380231	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380232	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380247	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380248	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380249	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380250	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380251	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380255	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380256	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380257	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380258	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380259	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380260	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380261	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380273	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380274	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380275	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380276	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380277	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380278	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380279	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380280	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380281	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380282	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380290	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380291	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380292	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380293	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380294	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380295	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380296	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380297	NORTHERN PIKE	1
NETTING	FYKE NET	25-Apr-14	10380298	NORTHERN PIKE	1
NETTING	FYKE NET	26-Apr-14	10380303	NORTHERN PIKE	1
NETTING	FYKE NET	26-Apr-14	10380304	NORTHERN PIKE	1

NETTING	FYKE NET	26-Apr-14	10380308	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380309	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380310	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380311	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380312	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380313	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380314	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380315	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380316	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380317	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380318	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380319	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380320	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380321	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380322	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380323	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380327	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380328	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380330	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380331	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380334	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380338	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380339	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380340	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380341	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380342	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380344	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380345	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380363	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380364	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380365	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380366	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380370	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380371	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380372	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380373	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380374	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380375	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380384	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380385	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380386	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380387	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380388	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380391	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380392	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380393	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380394	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380407	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380408	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380409	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380410	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380411	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380412	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380413	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380414	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380415	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380416	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380417	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380423	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380428	NORTHERN PIKE	1		
NETTING	FYKE NET	26-Apr-14	10380432	NORTHERN PIKE	1	953	11.03%

NETTING	FYKE NET	25-Apr-08	6774660	NORTHERN PIKE X MUSKELLUNGE	1		
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783850	NORTHERN PIKE X MUSKELLUNGE	1	2	0.02%
NETTING	FYKE NET	8-Apr-05	4002724	PUGNOSE SHINER	1	1	0.01%
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223501	PUMPKINSEED	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223502	PUMPKINSEED	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223503	PUMPKINSEED	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223504	PUMPKINSEED	1		
NETTING	FYKE NET	28-May-02	2088780	PUMPKINSEED	173		
NETTING	FYKE NET	28-May-02	2088781	PUMPKINSEED	12		
NETTING	FYKE NET	28-May-02	2088782	PUMPKINSEED	12		
NETTING	FYKE NET	28-May-02	2088783	PUMPKINSEED	12		
NETTING	FYKE NET	28-May-02	2088784	PUMPKINSEED	10		
NETTING	FYKE NET	28-May-02	2088785	PUMPKINSEED	4		
NETTING	FYKE NET	28-May-02	2088786	PUMPKINSEED	2		
NETTING	FYKE NET	28-May-02	2088787	PUMPKINSEED	4		
ELECTROFI!	BOOM SHOCKEI	26-Sep-02	13422154	PUMPKINSEED	10		
NETTING	FYKE NET	8-Jun-03	2107201	PUMPKINSEED	25		
NETTING	FYKE NET	8-Jun-03	2107204	PUMPKINSEED	6		
NETTING	FYKE NET	8-Jun-03	2107206	PUMPKINSEED	33		
NETTING	FYKE NET	8-Jun-03	2107222	PUMPKINSEED	6		
NETTING	FYKE NET	8-Jun-03	2107223	PUMPKINSEED	6		
NETTING	FYKE NET	8-Jun-03	2107224	PUMPKINSEED	8		
NETTING	FYKE NET	8-Jun-03	2107225	PUMPKINSEED	19		
NETTING	FYKE NET	8-Jun-03	2107226	PUMPKINSEED	16		
NETTING	FYKE NET	8-Jun-03	2107227	PUMPKINSEED	6		
NETTING	FYKE NET	9-Jun-03	2107236	PUMPKINSEED	6		
NETTING	FYKE NET	9-Jun-03	2107238	PUMPKINSEED	125		
NETTING	FYKE NET	9-Jun-03	2107255	PUMPKINSEED	2		
NETTING	FYKE NET	9-Jun-03	2107256	PUMPKINSEED	5		
NETTING	FYKE NET	9-Jun-03	2107257	PUMPKINSEED	14		
NETTING	FYKE NET	9-Jun-03	2107258	PUMPKINSEED	11		
NETTING	FYKE NET	9-Jun-03	2107259	PUMPKINSEED	28		
NETTING	FYKE NET	9-Jun-03	2107260	PUMPKINSEED	27		
NETTING	FYKE NET	9-Jun-03	2107261	PUMPKINSEED	8		
NETTING	FYKE NET	9-Jun-03	2107262	PUMPKINSEED	2		
NETTING	FYKE NET	9-Jun-03	2107263	PUMPKINSEED	1		
NETTING	FYKE NET	10-Jun-03	2107273	PUMPKINSEED	14		
NETTING	FYKE NET	10-Jun-03	2107275	PUMPKINSEED	26		
NETTING	FYKE NET	10-Jun-03	2107279	PUMPKINSEED	58		
NETTING	FYKE NET	13-Jun-03	2107284	PUMPKINSEED	10		
NETTING	FYKE NET	13-Jun-03	2107289	PUMPKINSEED	47		
NETTING	FYKE NET	13-Jun-03	2107295	PUMPKINSEED	40		
NETTING	FYKE NET	13-Jun-03	2107298	PUMPKINSEED	7		
NETTING	FYKE NET	13-Jun-03	2107299	PUMPKINSEED	3		
NETTING	FYKE NET	13-Jun-03	2107300	PUMPKINSEED	4		
NETTING	FYKE NET	13-Jun-03	2107301	PUMPKINSEED	2		
NETTING	FYKE NET	13-Jun-03	2107302	PUMPKINSEED	6		
NETTING	FYKE NET	13-Jun-03	2107303	PUMPKINSEED	20		
NETTING	FYKE NET	13-Jun-03	2107304	PUMPKINSEED	20		
NETTING	FYKE NET	13-Jun-03	2107305	PUMPKINSEED	27		
NETTING	FYKE NET	13-Jun-03	2107306	PUMPKINSEED	11		
NETTING	FYKE NET	13-Jun-03	2107307	PUMPKINSEED	2		
NETTING	FYKE NET	14-Jun-03	2107331	PUMPKINSEED	62		
NETTING	FYKE NET	14-Jun-03	2107341	PUMPKINSEED	20		
NETTING	FYKE NET	14-Jun-03	2107345	PUMPKINSEED	26		
NETTING	FYKE NET	15-Jun-03	2104404	PUMPKINSEED	7		
NETTING	FYKE NET	15-Jun-03	2104405	PUMPKINSEED	3		
NETTING	FYKE NET	15-Jun-03	2104406	PUMPKINSEED	6		
NETTING	FYKE NET	15-Jun-03	2104407	PUMPKINSEED	7		
NETTING	FYKE NET	15-Jun-03	2104408	PUMPKINSEED	20		
NETTING	FYKE NET	15-Jun-03	2104409	PUMPKINSEED	31		

NETTING	FYKE NET	15-Jun-03	2104410	PUMPKINSEED	48
NETTING	FYKE NET	15-Jun-03	2104411	PUMPKINSEED	54
NETTING	FYKE NET	15-Jun-03	2104412	PUMPKINSEED	19
NETTING	FYKE NET	15-Jun-03	2104413	PUMPKINSEED	4
NETTING	FYKE NET	15-Jun-03	2104414	PUMPKINSEED	1
NETTING	FYKE NET	15-Jun-03	2107364	PUMPKINSEED	57
NETTING	FYKE NET	15-Jun-03	2107369	PUMPKINSEED	30
NETTING	FYKE NET	15-Jun-03	2107375	PUMPKINSEED	40
NETTING	MINI FYKE NET '	15-Jul-03	2115234	PUMPKINSEED	1
NETTING	MINI FYKE NET '	15-Jul-03	2115256	PUMPKINSEED	1
NETTING	MINI FYKE NET '	15-Jul-03	2115271	PUMPKINSEED	4
NETTING	MINI FYKE NET '	15-Jul-03	2115272	PUMPKINSEED	2
NETTING	MINI FYKE NET '	15-Jul-03	2115273	PUMPKINSEED	5
NETTING	MINI FYKE NET '	15-Jul-03	2115274	PUMPKINSEED	5
NETTING	MINI FYKE NET '	15-Jul-03	2115275	PUMPKINSEED	4
NETTING	MINI FYKE NET '	15-Jul-03	2115276	PUMPKINSEED	7
NETTING	MINI FYKE NET '	15-Jul-03	2115277	PUMPKINSEED	2
NETTING	MINI FYKE NET '	15-Jul-03	2115278	PUMPKINSEED	1
NETTING	MINI FYKE NET '	16-Jul-03	2115297	PUMPKINSEED	1
NETTING	MINI FYKE NET '	16-Jul-03	2115298	PUMPKINSEED	3
NETTING	MINI FYKE NET '	16-Jul-03	2115299	PUMPKINSEED	2
NETTING	MINI FYKE NET '	16-Jul-03	2115300	PUMPKINSEED	7
NETTING	MINI FYKE NET '	16-Jul-03	2115301	PUMPKINSEED	5
NETTING	MINI FYKE NET '	16-Jul-03	2115302	PUMPKINSEED	7
NETTING	MINI FYKE NET '	16-Jul-03	2115303	PUMPKINSEED	6
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149523	PUMPKINSEED	1
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149524	PUMPKINSEED	1
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149525	PUMPKINSEED	1
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149526	PUMPKINSEED	1
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149527	PUMPKINSEED	1
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149589	PUMPKINSEED	1
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149590	PUMPKINSEED	1
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149591	PUMPKINSEED	1
OTHER	HOOK AND LINE	11-May-05	2740672	PUMPKINSEED	1
OTHER	HOOK AND LINE	11-May-05	2740673	PUMPKINSEED	2
OTHER	HOOK AND LINE	11-May-05	2740674	PUMPKINSEED	1
OTHER	HOOK AND LINE	11-May-05	2740675	PUMPKINSEED	2
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057591	PUMPKINSEED	1
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057592	PUMPKINSEED	1
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057593	PUMPKINSEED	2
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057594	PUMPKINSEED	2
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057595	PUMPKINSEED	2
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783298	PUMPKINSEED	2
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783299	PUMPKINSEED	2
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783300	PUMPKINSEED	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783301	PUMPKINSEED	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783302	PUMPKINSEED	2
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783303	PUMPKINSEED	5
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783304	PUMPKINSEED	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783305	PUMPKINSEED	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783306	PUMPKINSEED	3
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783307	PUMPKINSEED	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783308	PUMPKINSEED	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783309	PUMPKINSEED	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783310	PUMPKINSEED	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783311	PUMPKINSEED	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783312	PUMPKINSEED	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783313	PUMPKINSEED	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783314	PUMPKINSEED	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783315	PUMPKINSEED	1
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783316	PUMPKINSEED	1

ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783317	PUMPKINSEED	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783318	PUMPKINSEED	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783621	PUMPKINSEED	2		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783622	PUMPKINSEED	2		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783623	PUMPKINSEED	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783624	PUMPKINSEED	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783625	PUMPKINSEED	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783626	PUMPKINSEED	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783627	PUMPKINSEED	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783628	PUMPKINSEED	2		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783629	PUMPKINSEED	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783630	PUMPKINSEED	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783631	PUMPKINSEED	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783632	PUMPKINSEED	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783633	PUMPKINSEED	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783634	PUMPKINSEED	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783635	PUMPKINSEED	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783636	PUMPKINSEED	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783637	PUMPKINSEED	3		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783638	PUMPKINSEED	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783639	PUMPKINSEED	2		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783640	PUMPKINSEED	4		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783641	PUMPKINSEED	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783642	PUMPKINSEED	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783643	PUMPKINSEED	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783644	PUMPKINSEED	1		
NETTING	FYKE NET	23-Apr-14	10379762	PUMPKINSEED	1		
NETTING	FYKE NET	23-Apr-14	10379789	PUMPKINSEED	1		
NETTING	FYKE NET	23-Apr-14	10379791	PUMPKINSEED	1		
NETTING	FYKE NET	23-Apr-14	10379795	PUMPKINSEED	1		
NETTING	FYKE NET	24-Apr-14	10379873	PUMPKINSEED	1		
NETTING	FYKE NET	24-Apr-14	10379937	PUMPKINSEED	1		
NETTING	FYKE NET	24-Apr-14	10380016	PUMPKINSEED	1		
NETTING	FYKE NET	24-Apr-14	10380017	PUMPKINSEED	1		
NETTING	FYKE NET	24-Apr-14	10380018	PUMPKINSEED	1		
NETTING	FYKE NET	24-Apr-14	10380019	PUMPKINSEED	1		
NETTING	FYKE NET	24-Apr-14	10380020	PUMPKINSEED	1		
NETTING	FYKE NET	24-Apr-14	10380021	PUMPKINSEED	1		
NETTING	FYKE NET	24-Apr-14	10380118	PUMPKINSEED	1		
NETTING	FYKE NET	24-Apr-14	10380119	PUMPKINSEED	1		
NETTING	FYKE NET	26-Apr-14	10380422	PUMPKINSEED	2	1493	17.28%
ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223481	REDHORSES	1		
ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223496	ROCK BASS	1		
ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223497	ROCK BASS	1		
ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223498	ROCK BASS	1		
ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223499	ROCK BASS	1		
ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223500	ROCK BASS	1		
NETTING	FYKE NET	13-Jun-03	2107325	ROCK BASS	1		
NETTING	FYKE NET	14-Jun-03	2107338	ROCK BASS	1		
NETTING	FYKE NET	15-Jun-03	2104423	ROCK BASS	1		
NETTING	FYKE NET	15-Jun-03	2104424	ROCK BASS	1		
NETTING	FYKE NET	10-Apr-05	4002787	ROCK BASS	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783684	ROCK BASS	1	12	0.14%
NETTING	FYKE NET	10-Apr-05	4002781	SHORTHEAD REDHORSE	1		
NETTING	FYKE NET	11-Apr-05	4002775	SHORTHEAD REDHORSE	1		
NETTING	FYKE NET	11-Apr-05	4002776	SHORTHEAD REDHORSE	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057497	SHORTHEAD REDHORSE	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057565	SHORTHEAD REDHORSE	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057566	SHORTHEAD REDHORSE	1		
NETTING	FYKE NET	24-Apr-08	6774499	SHORTHEAD REDHORSE	1		
NETTING	FYKE NET	25-Apr-08	6774665	SHORTHEAD REDHORSE	1		

NETTING	FYKE NET	25-Apr-08	6774666	SHORTHEAD REDHORSE	1		
NETTING	FYKE NET	25-Apr-08	6774667	SHORTHEAD REDHORSE	1		
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783332	SHORTHEAD REDHORSE	1		
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783680	SHORTHEAD REDHORSE	1		
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783681	SHORTHEAD REDHORSE	1		
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783682	SHORTHEAD REDHORSE	1	14	0.16%
ELECTROFI!	BOOM SHOCKEI	6-Oct-04	2724781	SILVER REDHORSE	1	1	0.01%
ELECTROFI!	BOOM SHOCKEI	25-Sep-06	3868326	SMALLMOUTH BASS	1		
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783755	SMALLMOUTH BASS	1		
NETTING	FYKE NET	2-May-13	9967987	SMALLMOUTH BASS	1	3	0.03%
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223464	SUCKERS	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223465	SUCKERS	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223466	SUCKERS	2		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223467	SUCKERS	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223468	SUCKERS	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223469	SUCKERS	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223470	SUCKERS	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223471	SUCKERS	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223472	SUCKERS	3		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223473	SUCKERS	2		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223474	SUCKERS	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223475	SUCKERS	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223476	SUCKERS	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223477	SUCKERS	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223478	SUCKERS	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223479	SUCKERS	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223480	SUCKERS	1	21	0.24%
NETTING	FYKE NET	11-Apr-05	4002773	TADPOLE MADTOM	1		
ELECTROFI!	BOOM SHOCKEI	9-Jun-08	6783687	TADPOLE MADTOM	1	2	0.02%
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223525	WALLEYE	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223526	WALLEYE	1		
ELECTROFI!	BOOM SHOCKEI	27-Oct-65	8223527	WALLEYE	1		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068890	WALLEYE	19		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068891	WALLEYE	22		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068892	WALLEYE	11		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068893	WALLEYE	1		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068894	WALLEYE	1		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068895	WALLEYE	1		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068896	WALLEYE	6		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068897	WALLEYE	3		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068898	WALLEYE	2		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068899	WALLEYE	2		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068900	WALLEYE	1		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068901	WALLEYE	2		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068902	WALLEYE	1		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068903	WALLEYE	2		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068904	WALLEYE	1		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068905	WALLEYE	1		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068906	WALLEYE	2		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068907	WALLEYE	1		
ELECTROFI!	BOOM SHOCKEI	3-Oct-01	2068908	WALLEYE	1		
NETTING	FYKE NET	28-May-02	2088797	WALLEYE	1		
ELECTROFI!	BOOM SHOCKEI	26-Sep-02	1998655	WALLEYE	1		
ELECTROFI!	BOOM SHOCKEI	26-Sep-02	1998656	WALLEYE	1		
ELECTROFI!	BOOM SHOCKEI	26-Sep-02	1998657	WALLEYE	2		
ELECTROFI!	BOOM SHOCKEI	26-Sep-02	1998658	WALLEYE	2		
ELECTROFI!	BOOM SHOCKEI	26-Sep-02	1998659	WALLEYE	2		
ELECTROFI!	BOOM SHOCKEI	26-Sep-02	1998660	WALLEYE	2		
ELECTROFI!	BOOM SHOCKEI	26-Sep-02	1998661	WALLEYE	2		
ELECTROFI!	BOOM SHOCKEI	26-Sep-02	1998662	WALLEYE	4		
ELECTROFI!	BOOM SHOCKEI	26-Sep-02	1998663	WALLEYE	1		

ELECTROFI!	BOOM SHOCKEI	26-Sep-02	1998664	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	26-Sep-02	1998665	WALLEYE	2
ELECTROFI!	BOOM SHOCKEI	26-Sep-02	1998666	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	26-Sep-02	1998667	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	26-Sep-02	1998668	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	26-Sep-02	1998669	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	26-Sep-02	1998670	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	26-Sep-02	1998671	WALLEYE	1
NETTING	FYKE NET	10-Jun-03	2107280	WALLEYE	1
NETTING	FYKE NET	14-Jun-03	2107342	WALLEYE	1
NETTING	FYKE NET	14-Jun-03	2107346	WALLEYE	1
NETTING	FYKE NET	15-Jun-03	2104426	WALLEYE	1
NETTING	FYKE NET	15-Jun-03	2104427	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149303	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149304	WALLEYE	5
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149305	WALLEYE	7
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149306	WALLEYE	6
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149307	WALLEYE	5
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149308	WALLEYE	2
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149309	WALLEYE	2
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149310	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149311	WALLEYE	2
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149312	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149439	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149440	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149441	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	1-Oct-03	2149442	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	6-Oct-04	2724712	WALLEYE	4
ELECTROFI!	BOOM SHOCKEI	6-Oct-04	2724713	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	6-Oct-04	2724714	WALLEYE	3
ELECTROFI!	BOOM SHOCKEI	6-Oct-04	2724715	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	6-Oct-04	2724716	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	6-Oct-04	2724717	WALLEYE	2
ELECTROFI!	BOOM SHOCKEI	6-Oct-04	2724718	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	6-Oct-04	2724719	WALLEYE	2
ELECTROFI!	BOOM SHOCKEI	6-Oct-04	2724720	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	6-Oct-04	2724721	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	6-Oct-04	2724722	WALLEYE	2
ELECTROFI!	BOOM SHOCKEI	6-Oct-04	2724723	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	6-Oct-04	2724724	WALLEYE	1
ELECTROFI!	MINI BOOM SH	11-Apr-05	2740646	WALLEYE	1
ELECTROFI!	MINI BOOM SH	11-Apr-05	2740647	WALLEYE	2
ELECTROFI!	MINI BOOM SH	11-Apr-05	2740648	WALLEYE	1
ELECTROFI!	MINI BOOM SH	11-Apr-05	2740649	WALLEYE	1
ELECTROFI!	MINI BOOM SH	11-Apr-05	2740650	WALLEYE	1
ELECTROFI!	MINI BOOM SH	11-Apr-05	2740651	WALLEYE	1
ELECTROFI!	MINI BOOM SH	11-Apr-05	2740652	WALLEYE	2
ELECTROFI!	MINI BOOM SH	11-Apr-05	2740653	WALLEYE	1
ELECTROFI!	MINI BOOM SH	11-Apr-05	2740654	WALLEYE	1
ELECTROFI!	MINI BOOM SH	11-Apr-05	2740655	WALLEYE	1
ELECTROFI!	MINI BOOM SH	11-Apr-05	2740656	WALLEYE	1
ELECTROFI!	MINI BOOM SH	11-Apr-05	2740657	WALLEYE	1
ELECTROFI!	MINI BOOM SH	11-Apr-05	2740658	WALLEYE	1
ELECTROFI!	MINI BOOM SH	11-Apr-05	2740659	WALLEYE	1
ELECTROFI!	MINI BOOM SH	11-Apr-05	2740660	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	25-Sep-06	3868302	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	25-Sep-06	3868303	WALLEYE	2
ELECTROFI!	BOOM SHOCKEI	25-Sep-06	3868304	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	25-Sep-06	3868305	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	25-Sep-06	3868306	WALLEYE	1
ELECTROFI!	BOOM SHOCKEI	25-Sep-06	3868307	WALLEYE	1

ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868308	WALLEYE	1		
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868309	WALLEYE	1		
ELECTROFIS	BOOM SHOCKEI	25-Sep-06	3868310	WALLEYE	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057382	WALLEYE	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057383	WALLEYE	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057384	WALLEYE	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057385	WALLEYE	2		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057386	WALLEYE	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057387	WALLEYE	3		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057388	WALLEYE	2		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057389	WALLEYE	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057550	WALLEYE	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057551	WALLEYE	1		
NETTING	FYKE NET	24-Apr-08	6774493	WALLEYE	3		
NETTING	FYKE NET	24-Apr-08	6774494	WALLEYE	1		
NETTING	FYKE NET	24-Apr-08	6774495	WALLEYE	1		
NETTING	FYKE NET	24-Apr-08	6774496	WALLEYE	1		
NETTING	FYKE NET	24-Apr-08	6774497	WALLEYE	1		
NETTING	FYKE NET	24-Apr-08	6774498	WALLEYE	2		
NETTING	FYKE NET	25-Apr-08	6774654	WALLEYE	1		
NETTING	FYKE NET	25-Apr-08	6774655	WALLEYE	1		
NETTING	FYKE NET	25-Apr-08	6774656	WALLEYE	1		
NETTING	FYKE NET	25-Apr-08	6774657	WALLEYE	1		
NETTING	FYKE NET	25-Apr-08	6774658	WALLEYE	1		
NETTING	FYKE NET	25-Apr-08	6774659	WALLEYE	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783751	WALLEYE	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783752	WALLEYE	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783753	WALLEYE	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783754	WALLEYE	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783840	WALLEYE	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783841	WALLEYE	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783842	WALLEYE	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783843	WALLEYE	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783844	WALLEYE	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783845	WALLEYE	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783846	WALLEYE	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783847	WALLEYE	2		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783848	WALLEYE	2		
NETTING	FYKE NET	2-May-13	9968018	WALLEYE	1		
NETTING	FYKE NET	2-May-13	9968019	WALLEYE	1		
NETTING	FYKE NET	2-May-13	9968020	WALLEYE	1		
NETTING	FYKE NET	23-Apr-14	10379779	WALLEYE	1		
NETTING	FYKE NET	23-Apr-14	10379780	WALLEYE	1		
NETTING	FYKE NET	23-Apr-14	10379781	WALLEYE	1		
NETTING	FYKE NET	23-Apr-14	10379812	WALLEYE	1		
NETTING	FYKE NET	24-Apr-14	10379889	WALLEYE	1		
NETTING	FYKE NET	24-Apr-14	10379892	WALLEYE	1		
NETTING	FYKE NET	24-Apr-14	10379903	WALLEYE	1		
NETTING	FYKE NET	24-Apr-14	10379915	WALLEYE	1		
NETTING	FYKE NET	25-Apr-14	10380193	WALLEYE	1		
NETTING	FYKE NET	25-Apr-14	10380252	WALLEYE	1		
NETTING	FYKE NET	26-Apr-14	10380343	WALLEYE	1		
NETTING	FYKE NET	26-Apr-14	10380427	WALLEYE	1	258	2.99%
NETTING	FYKE NET	28-May-02	2088795	WHITE SUCKER	1		
NETTING	FYKE NET	28-May-02	2088796	WHITE SUCKER	1		
NETTING	FYKE NET	9-Jun-03	2107252	WHITE SUCKER	1		
NETTING	FYKE NET	13-Jun-03	2107297	WHITE SUCKER	1		
NETTING	FYKE NET	13-Jun-03	2107328	WHITE SUCKER	1		
NETTING	FYKE NET	15-Jun-03	2104438	WHITE SUCKER	1		
NETTING	MINI FYKE NET '	16-Jul-03	2115314	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149342	WHITE SUCKER	1		

ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149497	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149498	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149499	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149500	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149501	WHITE SUCKER	2		
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149561	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149562	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149563	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149564	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724778	WHITE SUCKER	3		
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724779	WHITE SUCKER	3		
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724780	WHITE SUCKER	3		
NETTING	FYKE NET	8-Apr-05	4002725	WHITE SUCKER	1		
NETTING	FYKE NET	8-Apr-05	4002726	WHITE SUCKER	1		
NETTING	FYKE NET	9-Apr-05	4002730	WHITE SUCKER	1		
NETTING	FYKE NET	10-Apr-05	4002780	WHITE SUCKER	1		
NETTING	FYKE NET	10-Apr-05	4002785	WHITE SUCKER	1		
NETTING	FYKE NET	11-Apr-05	4002770	WHITE SUCKER	1		
NETTING	FYKE NET	11-Apr-05	4002771	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057486	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057487	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057494	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057496	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057503	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057562	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057563	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057564	WHITE SUCKER	1		
NETTING	FYKE NET	24-Apr-08	6774500	WHITE SUCKER	1		
NETTING	FYKE NET	24-Apr-08	6774501	WHITE SUCKER	1		
NETTING	FYKE NET	24-Apr-08	6774502	WHITE SUCKER	1		
NETTING	FYKE NET	24-Apr-08	6774503	WHITE SUCKER	1		
NETTING	FYKE NET	24-Apr-08	6774504	WHITE SUCKER	1		
NETTING	FYKE NET	25-Apr-08	6774661	WHITE SUCKER	1		
NETTING	FYKE NET	25-Apr-08	6774662	WHITE SUCKER	1		
NETTING	FYKE NET	25-Apr-08	6774663	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783333	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783334	WHITE SUCKER	2		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783335	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783336	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783337	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783338	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783339	WHITE SUCKER	2		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783340	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783341	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783342	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783343	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783344	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783345	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783346	WHITE SUCKER	1		
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783683	WHITE SUCKER	1	67	0.78%
ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223482	YELLOW BULLHEAD	1		
ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223483	YELLOW BULLHEAD	1		
ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223484	YELLOW BULLHEAD	1		
ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223485	YELLOW BULLHEAD	1		
ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223486	YELLOW BULLHEAD	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057499	YELLOW BULLHEAD	1		
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057500	YELLOW BULLHEAD	1		
NETTING	FYKE NET	24-Apr-08	6774510	YELLOW BULLHEAD	2		
NETTING	FYKE NET	25-Apr-08	6774670	YELLOW BULLHEAD	3	12	0.14%
ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223519	YELLOW PERCH	1		
ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223520	YELLOW PERCH	1		

ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223521	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223522	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223523	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	27-Oct-65	8223524	YELLOW PERCH	1
NETTING	FYKE NET	28-May-02	2088788	YELLOW PERCH	2
NETTING	FYKE NET	28-May-02	2088789	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	26-Sep-02	13422158	YELLOW PERCH	15
NETTING	FYKE NET	8-Jun-03	2107203	YELLOW PERCH	1
NETTING	FYKE NET	8-Jun-03	2107209	YELLOW PERCH	1
NETTING	FYKE NET	8-Jun-03	2107228	YELLOW PERCH	1
NETTING	FYKE NET	8-Jun-03	2107229	YELLOW PERCH	1
NETTING	FYKE NET	9-Jun-03	2107241	YELLOW PERCH	1
NETTING	FYKE NET	9-Jun-03	2107264	YELLOW PERCH	3
NETTING	FYKE NET	9-Jun-03	2107265	YELLOW PERCH	3
NETTING	FYKE NET	9-Jun-03	2107266	YELLOW PERCH	3
NETTING	FYKE NET	10-Jun-03	2107276	YELLOW PERCH	3
NETTING	FYKE NET	13-Jun-03	2107285	YELLOW PERCH	1
NETTING	FYKE NET	13-Jun-03	2107290	YELLOW PERCH	2
NETTING	FYKE NET	13-Jun-03	2107296	YELLOW PERCH	1
NETTING	FYKE NET	13-Jun-03	2107319	YELLOW PERCH	4
NETTING	FYKE NET	13-Jun-03	2107320	YELLOW PERCH	4
NETTING	FYKE NET	13-Jun-03	2107321	YELLOW PERCH	4
NETTING	FYKE NET	13-Jun-03	2107322	YELLOW PERCH	4
NETTING	FYKE NET	14-Jun-03	2107336	YELLOW PERCH	1
NETTING	FYKE NET	15-Jun-03	2104376	YELLOW PERCH	5
NETTING	FYKE NET	15-Jun-03	2104377	YELLOW PERCH	3
NETTING	FYKE NET	15-Jun-03	2104378	YELLOW PERCH	5
NETTING	FYKE NET	15-Jun-03	2104379	YELLOW PERCH	1
NETTING	FYKE NET	15-Jun-03	2104380	YELLOW PERCH	2
NETTING	FYKE NET	15-Jun-03	2104381	YELLOW PERCH	2
NETTING	FYKE NET	15-Jun-03	2104382	YELLOW PERCH	1
NETTING	FYKE NET	15-Jun-03	2104383	YELLOW PERCH	1
NETTING	FYKE NET	15-Jun-03	2107365	YELLOW PERCH	2
NETTING	FYKE NET	15-Jun-03	2107370	YELLOW PERCH	1
NETTING	FYKE NET	15-Jun-03	2107376	YELLOW PERCH	1
NETTING	MINI FYKE NET '	15-Jul-03	2115233	YELLOW PERCH	1
NETTING	MINI FYKE NET '	15-Jul-03	2115281	YELLOW PERCH	1
NETTING	MINI FYKE NET '	16-Jul-03	2115304	YELLOW PERCH	1
NETTING	MINI FYKE NET '	16-Jul-03	2115305	YELLOW PERCH	1
NETTING	MINI FYKE NET '	16-Jul-03	2115316	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149576	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149577	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149578	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	1-Oct-03	2149579	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724775	YELLOW PERCH	3
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724776	YELLOW PERCH	3
ELECTROFIS	BOOM SHOCKEI	6-Oct-04	2724777	YELLOW PERCH	3
NETTING	FYKE NET	11-Apr-05	4002772	YELLOW PERCH	1
OTHER	HOOK AND LINE	11-May-05	2740676	YELLOW PERCH	3
OTHER	HOOK AND LINE	11-May-05	2740677	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057471	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057472	YELLOW PERCH	2
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057473	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057474	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057475	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057476	YELLOW PERCH	2
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057477	YELLOW PERCH	2
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057478	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057479	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057480	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	4-Oct-07	6057481	YELLOW PERCH	1

ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057482	YELLOW PERCH	1
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057596	YELLOW PERCH	1
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057597	YELLOW PERCH	1
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057598	YELLOW PERCH	1
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057599	YELLOW PERCH	1
ELECTROFI!	BOOM SHOCKEI	4-Oct-07	6057600	YELLOW PERCH	2
NETTING	FYKE NET	24-Apr-08	6774340	YELLOW PERCH	1
NETTING	FYKE NET	24-Apr-08	6774341	YELLOW PERCH	1
NETTING	FYKE NET	24-Apr-08	6774342	YELLOW PERCH	1
NETTING	FYKE NET	24-Apr-08	6774343	YELLOW PERCH	1
NETTING	FYKE NET	24-Apr-08	6774344	YELLOW PERCH	4
NETTING	FYKE NET	24-Apr-08	6774345	YELLOW PERCH	2
NETTING	FYKE NET	24-Apr-08	6774346	YELLOW PERCH	3
NETTING	FYKE NET	24-Apr-08	6774347	YELLOW PERCH	4
NETTING	FYKE NET	24-Apr-08	6774348	YELLOW PERCH	1
NETTING	FYKE NET	24-Apr-08	6774349	YELLOW PERCH	6
NETTING	FYKE NET	24-Apr-08	6774350	YELLOW PERCH	5
NETTING	FYKE NET	24-Apr-08	6774351	YELLOW PERCH	4
NETTING	FYKE NET	24-Apr-08	6774352	YELLOW PERCH	1
NETTING	FYKE NET	24-Apr-08	6774353	YELLOW PERCH	4
NETTING	FYKE NET	24-Apr-08	6774354	YELLOW PERCH	3
NETTING	FYKE NET	24-Apr-08	6774355	YELLOW PERCH	5
NETTING	FYKE NET	24-Apr-08	6774356	YELLOW PERCH	3
NETTING	FYKE NET	24-Apr-08	6774357	YELLOW PERCH	1
NETTING	FYKE NET	24-Apr-08	6774358	YELLOW PERCH	2
NETTING	FYKE NET	24-Apr-08	6774359	YELLOW PERCH	2
NETTING	FYKE NET	24-Apr-08	6774360	YELLOW PERCH	3
NETTING	FYKE NET	24-Apr-08	6774361	YELLOW PERCH	3
NETTING	FYKE NET	24-Apr-08	6774362	YELLOW PERCH	5
NETTING	FYKE NET	24-Apr-08	6774363	YELLOW PERCH	2
NETTING	FYKE NET	24-Apr-08	6774364	YELLOW PERCH	4
NETTING	FYKE NET	24-Apr-08	6774365	YELLOW PERCH	2
NETTING	FYKE NET	24-Apr-08	6774366	YELLOW PERCH	2
NETTING	FYKE NET	24-Apr-08	6774367	YELLOW PERCH	3
NETTING	FYKE NET	24-Apr-08	6774368	YELLOW PERCH	1
NETTING	FYKE NET	24-Apr-08	6774369	YELLOW PERCH	2
NETTING	FYKE NET	24-Apr-08	6774370	YELLOW PERCH	3
NETTING	FYKE NET	24-Apr-08	6774371	YELLOW PERCH	1
NETTING	FYKE NET	24-Apr-08	6774372	YELLOW PERCH	2
NETTING	FYKE NET	24-Apr-08	6774373	YELLOW PERCH	1
NETTING	FYKE NET	24-Apr-08	6774374	YELLOW PERCH	2
NETTING	FYKE NET	24-Apr-08	6774375	YELLOW PERCH	2
NETTING	FYKE NET	24-Apr-08	6774376	YELLOW PERCH	1
NETTING	FYKE NET	24-Apr-08	6774377	YELLOW PERCH	1
NETTING	FYKE NET	24-Apr-08	6774378	YELLOW PERCH	1
NETTING	FYKE NET	24-Apr-08	6774379	YELLOW PERCH	1
NETTING	FYKE NET	24-Apr-08	6774380	YELLOW PERCH	1
NETTING	FYKE NET	24-Apr-08	6774381	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-08	6774511	YELLOW PERCH	2
NETTING	FYKE NET	25-Apr-08	6774512	YELLOW PERCH	2
NETTING	FYKE NET	25-Apr-08	6774513	YELLOW PERCH	2
NETTING	FYKE NET	25-Apr-08	6774514	YELLOW PERCH	2
NETTING	FYKE NET	25-Apr-08	6774515	YELLOW PERCH	2
NETTING	FYKE NET	25-Apr-08	6774516	YELLOW PERCH	2
NETTING	FYKE NET	25-Apr-08	6774517	YELLOW PERCH	4
NETTING	FYKE NET	25-Apr-08	6774518	YELLOW PERCH	2
NETTING	FYKE NET	25-Apr-08	6774519	YELLOW PERCH	4
NETTING	FYKE NET	25-Apr-08	6774520	YELLOW PERCH	3
NETTING	FYKE NET	25-Apr-08	6774521	YELLOW PERCH	3
NETTING	FYKE NET	25-Apr-08	6774522	YELLOW PERCH	7
NETTING	FYKE NET	25-Apr-08	6774523	YELLOW PERCH	2

NETTING	FYKE NET	25-Apr-08	6774524	YELLOW PERCH	5
NETTING	FYKE NET	25-Apr-08	6774525	YELLOW PERCH	3
NETTING	FYKE NET	25-Apr-08	6774526	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-08	6774527	YELLOW PERCH	7
NETTING	FYKE NET	25-Apr-08	6774528	YELLOW PERCH	2
NETTING	FYKE NET	25-Apr-08	6774529	YELLOW PERCH	5
NETTING	FYKE NET	25-Apr-08	6774530	YELLOW PERCH	6
NETTING	FYKE NET	25-Apr-08	6774531	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-08	6774532	YELLOW PERCH	5
NETTING	FYKE NET	25-Apr-08	6774533	YELLOW PERCH	2
NETTING	FYKE NET	25-Apr-08	6774534	YELLOW PERCH	3
NETTING	FYKE NET	25-Apr-08	6774535	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-08	6774536	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-08	6774537	YELLOW PERCH	7
NETTING	FYKE NET	25-Apr-08	6774538	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-08	6774539	YELLOW PERCH	3
NETTING	FYKE NET	25-Apr-08	6774540	YELLOW PERCH	3
NETTING	FYKE NET	25-Apr-08	6774541	YELLOW PERCH	2
NETTING	FYKE NET	25-Apr-08	6774542	YELLOW PERCH	2
NETTING	FYKE NET	25-Apr-08	6774543	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-08	6774544	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-08	6774545	YELLOW PERCH	2
NETTING	FYKE NET	25-Apr-08	6774546	YELLOW PERCH	4
NETTING	FYKE NET	25-Apr-08	6774547	YELLOW PERCH	2
NETTING	FYKE NET	25-Apr-08	6774548	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-08	6774549	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-08	6774550	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-08	6774551	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-08	6774552	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783319	YELLOW PERCH	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783320	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783321	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783322	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783323	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783324	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783325	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783326	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783327	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783328	YELLOW PERCH	2
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783329	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783659	YELLOW PERCH	5
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783660	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783661	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783662	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783663	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783664	YELLOW PERCH	1
ELECTROFIS	BOOM SHOCKEI	9-Jun-08	6783665	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379737	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379782	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379783	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379784	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379786	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379787	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379793	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379794	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379796	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379797	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379798	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379799	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379800	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379801	YELLOW PERCH	1

NETTING	FYKE NET	23-Apr-14	10379803	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379804	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379805	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379806	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379807	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379808	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379809	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379810	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379811	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379813	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379814	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379815	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379816	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379817	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379818	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379819	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379820	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379828	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379841	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379855	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379856	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379859	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379860	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379861	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379862	YELLOW PERCH	1
NETTING	FYKE NET	23-Apr-14	10379863	YELLOW PERCH	1
NETTING	FYKE NET	24-Apr-14	10379936	YELLOW PERCH	15
NETTING	FYKE NET	24-Apr-14	10379944	YELLOW PERCH	2
NETTING	FYKE NET	24-Apr-14	10379954	YELLOW PERCH	5
NETTING	FYKE NET	24-Apr-14	10379966	YELLOW PERCH	4
NETTING	FYKE NET	24-Apr-14	10380061	YELLOW PERCH	1
NETTING	FYKE NET	24-Apr-14	10380062	YELLOW PERCH	1
NETTING	FYKE NET	24-Apr-14	10380063	YELLOW PERCH	1
NETTING	FYKE NET	24-Apr-14	10380064	YELLOW PERCH	1
NETTING	FYKE NET	24-Apr-14	10380065	YELLOW PERCH	1
NETTING	FYKE NET	24-Apr-14	10380157	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380194	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380195	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380196	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380220	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380221	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380222	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380223	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380224	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380225	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380236	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380237	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380238	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380239	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380240	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380241	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380242	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380243	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380244	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380245	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380246	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380262	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380263	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380264	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380283	YELLOW PERCH	1
NETTING	FYKE NET	25-Apr-14	10380286	YELLOW PERCH	1

NETTING	FYKE NET	25-Apr-14	10380287	YELLOW PERCH	1		
NETTING	FYKE NET	25-Apr-14	10380288	YELLOW PERCH	1		
NETTING	FYKE NET	25-Apr-14	10380289	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380305	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380306	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380324	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380335	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380346	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380347	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380348	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380349	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380350	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380351	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380352	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380353	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380354	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380355	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380358	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380359	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380360	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380361	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380362	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380367	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380368	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380369	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380376	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380377	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380380	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380381	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380382	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380383	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380389	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380390	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380395	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380396	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380399	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380400	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380401	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380402	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380403	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380406	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380418	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380425	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380426	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380429	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380435	YELLOW PERCH	1		
NETTING	FYKE NET	26-Apr-14	10380436	YELLOW PERCH	1	508	5.88%
					8641	8641	

APPENDIX E-12 WDNR Namekagon River Fish Data Downstream of Hayward Dam

Co.	Waterbody Name	WBIC	Survey Year	Station Name	Swims Station	Site Seq No.	Survey Seq No	Survey Begin	Survey End	Survey Status	Data Entry	Visit Fish Seq No	Visit Type	Gear Type	Sample Date	Substation Name	Target Species	Fish Data Sqq No,	Net Number	Species code	Species	No. of Fish	Length or Lower length IN	Length Upper IN	Length or Lower Length MM
SAWYER	NAMEKAG	2689500	2003	NAMEKAGON 120 (BELOW LAKE HAYWARD DAM)	10009811	125771	51517	8-May-03	8-May-03	DATA ENTF	warwir	485119	ELECTROFISHING	STREAM SHOCKER	8-May-03	BELOW DAM	ALL SPECIES	2077655	-	N09	WHITE SUCKER	8	-	-	-
SAWYER	NAMEKAG	2689500	2003	NAMEKAGON 120 (BELOW LAKE HAYWARD DAM)	10009811	125771	51517	8-May-03	8-May-03	DATA ENTF	warwir	485119	ELECTROFISHING	STREAM SHOCKER	8-May-03	BELOW DAM	ALL SPECIES	2077656	-	N13	NORTHERN HOG SUCKER	1	-	-	-
SAWYER	NAMEKAG	2689500	2003	NAMEKAGON 120 (BELOW LAKE HAYWARD DAM)	10009811	125771	51517	8-May-03	8-May-03	DATA ENTF	warwir	485119	ELECTROFISHING	STREAM SHOCKER	8-May-03	BELOW DAM	ALL SPECIES	2077657	-	N22	SHORTHEAD REDHORSE	5	-	-	-
SAWYER	NAMEKAG	2689500	2003	NAMEKAGON 120 (BELOW LAKE HAYWARD DAM)	10009811	125771	51517	8-May-03	8-May-03	DATA ENTF	warwir	485119	ELECTROFISHING	STREAM SHOCKER	8-May-03	BELOW DAM	ALL SPECIES	2077658	-	N21	GOLDEN REDHORSE	2	-	-	-
SAWYER	NAMEKAG	2689500	2003	NAMEKAGON 120 (BELOW LAKE HAYWARD DAM)	10009811	125771	51517	8-May-03	8-May-03	DATA ENTF	warwir	485119	ELECTROFISHING	STREAM SHOCKER	8-May-03	BELOW DAM	ALL SPECIES	2077659	-	N23	GREATER REDHORSE	1	-	-	-
SAWYER	NAMEKAG	2689500	2003	NAMEKAGON 120 (BELOW LAKE HAYWARD DAM)	10009811	125771	51517	8-May-03	8-May-03	DATA ENTF	warwir	485119	ELECTROFISHING	STREAM SHOCKER	8-May-03	BELOW DAM	ALL SPECIES	2077660	-	W09	BLUEGILL	1	-	-	-
SAWYER	NAMEKAG	2689500	2003	NAMEKAGON 120 (BELOW LAKE HAYWARD DAM)	10009811	125771	51517	8-May-03	8-May-03	DATA ENTF	warwir	485119	ELECTROFISHING	STREAM SHOCKER	8-May-03	BELOW DAM	ALL SPECIES	2077661	-	W06	PUMPKINSEED	1	-	-	-
SAWYER	NAMEKAG	2689500	2003	NAMEKAGON 120 (BELOW LAKE HAYWARD DAM)	10009811	125771	51517	8-May-03	8-May-03	DATA ENTF	warwir	485119	ELECTROFISHING	STREAM SHOCKER	8-May-03	BELOW DAM	ALL SPECIES	2077662	-	X15	YELLOW PERCH	1	-	-	-
SAWYER	NAMEKAG	2689500	2003	NAMEKAGON 120 (BELOW LAKE HAYWARD DAM)	10009811	125771	51517	8-May-03	8-May-03	DATA ENTF	warwir	485119	ELECTROFISHING	STREAM SHOCKER	8-May-03	BELOW DAM	ALL SPECIES	2077663	-	X12	JOHNNY DARTER	1	-	-	-
SAWYER	NAMEKAG	2689500	2003	NAMEKAGON 120 (BELOW LAKE HAYWARD DAM)	10009811	125771	51517	8-May-03	8-May-03	DATA ENTF	warwir	485119	ELECTROFISHING	STREAM SHOCKER	8-May-03	BELOW DAM	ALL SPECIES	2077664	-	X10	FANTAIL DARTER	1	-	-	-
SAWYER	NAMEKAG	2689500	2003	NAMEKAGON 120 (BELOW LAKE HAYWARD DAM)	10009811	125771	51517	8-May-03	8-May-03	DATA ENTF	warwir	485119	ELECTROFISHING	STREAM SHOCKER	8-May-03	BELOW DAM	ALL SPECIES	2077666	-	M28	COMMON SHINER	11	-	-	-
SAWYER	NAMEKAG	2689500	2003	NAMEKAGON 120 (BELOW LAKE HAYWARD DAM)	10009811	125771	51517	8-May-03	8-May-03	DATA ENTF	warwir	485119	ELECTROFISHING	STREAM SHOCKER	8-May-03	BELOW DAM	ALL SPECIES	2077667	-	M50	CREEK CHUB	1	-	-	-
SAWYER	NAMEKAG	2689500	2003	NAMEKAGON 120 (BELOW LAKE HAYWARD DAM)	10009811	125771	51517	8-May-03	8-May-03	DATA ENTF	warwir	485119	ELECTROFISHING	STREAM SHOCKER	8-May-03	BELOW DAM	ALL SPECIES	2077668	-	M49	LONGNOSE DACE	3	-	-	-
SAWYER	NAMEKAG	2689500	2003	NAMEKAGON 120 (BELOW LAKE HAYWARD DAM)	10009811	125771	51517	8-May-03	8-May-03	DATA ENTF	warwir	485119	ELECTROFISHING	STREAM SHOCKER	8-May-03	BELOW DAM	ALL SPECIES	2077669	-	M48	WESTERN BLACKNOSE DACE	1	-	-	-
SAWYER	NAMEKAG	2689500	2003	NAMEKAGON 120 (BELOW LAKE HAYWARD DAM)	10009811	125771	51517	8-May-03	8-May-03	DATA ENTF	warwir	485119	ELECTROFISHING	STREAM SHOCKER	8-May-03	BELOW DAM	ALL SPECIES	2077670	-	M19	HORNYHEAD CHUB	1	-	-	-
SAWYER	NAMEKAG	2689500	2003	NAMEKAGON 120 (BELOW LAKE HAYWARD DAM)	10009811	125771	51517	8-May-03	8-May-03	DATA ENTF	warwir	485119	ELECTROFISHING	STREAM SHOCKER	8-May-03	BELOW DAM	ALL SPECIES	2077671	-	M32	BLACKNOSE SHINER	2	-	-	-
SAWYER	NAMEKAG	2689500	2003	NAMEKAGON 120 (BELOW LAKE HAYWARD DAM)	10009811	125771	51517	8-May-03	8-May-03	DATA ENTF	warwir	485119	ELECTROFISHING	STREAM SHOCKER	8-May-03	BELOW DAM	ALL SPECIES	2077672	-	M06	CENTRAL STONEROLLER	1	-	-	-
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	21-Jul-20	21-Jul-20	DATA ENTF	woltem	774387	OTHER	HOOK AND LINE	21-Jul-20	N1	SMALLMOUTH BASS	13546492	-	W11	SMALLMOUTH BASS	1	12.5	-	317.5
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	21-Jul-20	21-Jul-20	DATA ENTF	woltem	774387	OTHER	HOOK AND LINE	21-Jul-20	N1	SMALLMOUTH BASS	13546493	-	W12	LARGEMOUTH BASS	1	13.6	-	345.44
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	21-Jul-20	21-Jul-20	DATA ENTF	woltem	774387	OTHER	HOOK AND LINE	21-Jul-20	N1	SMALLMOUTH BASS	13546494	-	W09	BLUEGILL	1	6.2	-	157.48
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546495	-	W11	SMALLMOUTH BASS	1	10.4	-	264.16
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546496	-	W11	SMALLMOUTH BASS	1	8.1	-	205.74
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546497	-	W11	SMALLMOUTH BASS	1	9.5	-	241.3
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546498	-	W11	SMALLMOUTH BASS	1	12.9	-	327.66
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546499	-	W11	SMALLMOUTH BASS	1	19.5	-	495.3
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546500	-	W11	SMALLMOUTH BASS	1	19	-	482.6
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546501	-	W11	SMALLMOUTH BASS	1	10	-	254
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546502	-	W11	SMALLMOUTH BASS	1	17.1	-	434.34
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546503	-	W11	SMALLMOUTH BASS	1	14.6	-	370.84
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546504	-	W11	SMALLMOUTH BASS	1	14.1	-	358.14
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546505	-	W11	SMALLMOUTH BASS	1	16.3	-	414.02
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546506	-	W11	SMALLMOUTH BASS	1	17.8	-	452.12
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546507	-	W11	SMALLMOUTH BASS	1	8	-	203.2
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546508	-	W11	SMALLMOUTH BASS	1	14.5	-	368.3
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546509	-	W11	SMALLMOUTH BASS	1	5.9	-	149.86
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546510	-	W11	SMALLMOUTH BASS	1	5.4	-	137.16
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546511	-	L02	NORTHERN PIKE	1	21.5	-	546.1
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546512	-	L02	NORTHERN PIKE	1	15.2	-	386.08
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546513	-	W06	PUMPKINSEED	1	6.2	-	157.48
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546514	-	N09	WHITE SUCKER	1	15.2	-	386.08
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546515	-	N09	WHITE SUCKER	1	12.2	-	309.88
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546516	-	N22	SHORTHEAD REDHORSE	1	14.5	-	368.3
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546517	-	N22	SHORTHEAD REDHORSE	1	14.5	-	368.3
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546518	-	N22	SHORTHEAD REDHORSE	1	12.4	-	314.96
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546519	-	N22	SHORTHEAD REDHORSE	1	13.3	-	337.82
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546520	-	N21	GOLDEN REDHORSE	1	15.2	-	386.08
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546521	-	N21	GOLDEN REDHORSE	1	15.2	-	386.08
SAWYER	NAMEKAG	2689500	2020	Namekagon River SMB -N1- DS Lake Hayward Dam to US Rolph Rd Portage	10054272	1625254	5.15E+08	13-Aug-20	13-Aug-20	DATA ENTF	woltem	774388	OTHER	HOOK AND LINE	13-Aug-20	N1	SMALLMOUTH BASS	13546522	-	N21	GOLDEN REDHORSE	1	14.5	-	368.3

APPENDIX E-13 WDNR Hayward Lake 2022 Fish Survey Summary

2022 SPRING FISHERIES SURVEY SUMMARY

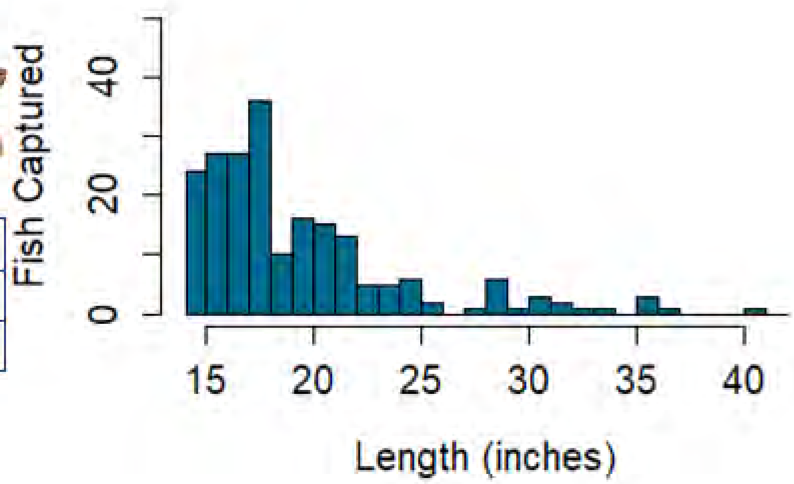
LAKE HAYWARD, SAWYER COUNTY

Report by Max Wolter

The Wisconsin Department of Natural Resources (DNR) Hayward Fisheries Management Team conducted a fyke netting survey on Lake Hayward (a.k.a. Hayward Lake) from April 17-19, 2022. The primary species targeted were Northern Pike and Walleye, but useful data were also gathered on Black Crappies and Yellow Perch. Up to eight nets were set overnight for two nights, which resulted in 16 total net-nights of effort. An electrofishing survey was conducted on June 1, 2022 to target Largemouth Bass and Bluegill and included 2.5 miles of shoreline. Quality, preferred and memorable sizes referenced in this summary are based on standard proportions of world record lengths developed for each species by the American Fisheries Society.

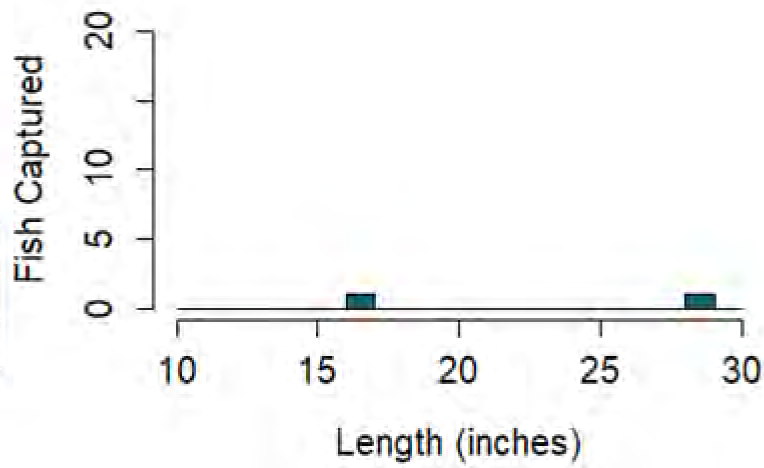
Northern Pike

Captured 15 per net-night ≥ 14 inches	
Quality Size ≥ 21"	25%
Preferred Size ≥ 28"	9%



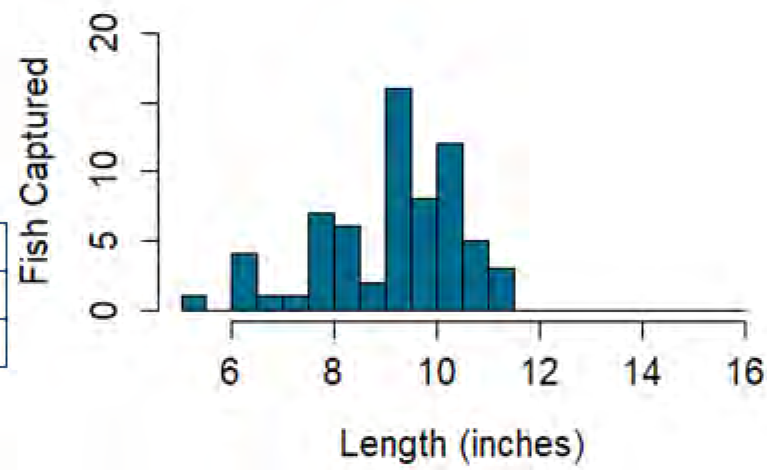
Walleye (Adult)

Captured 0.2 per net-night ≥ 10 inches	
Quality Size ≥ 15"	100%
Preferred Size ≥ 20"	100%



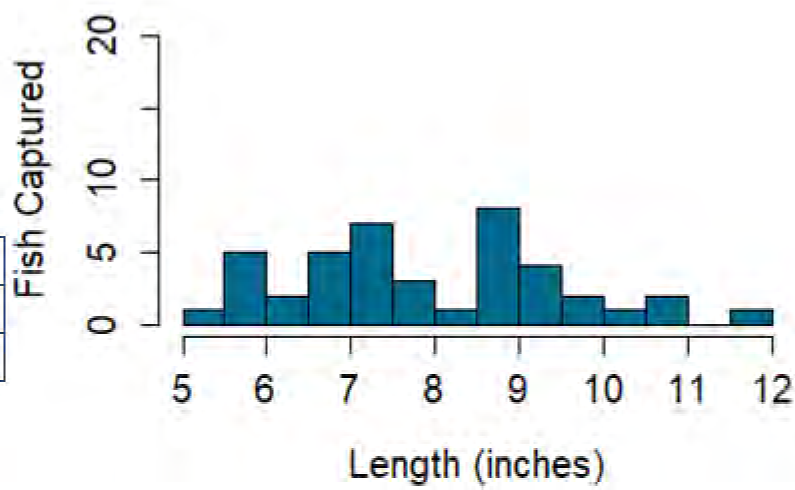
Black Crappie

Captured 4.1 per net-night ≥ 5 inches	
Quality Size ≥ 8"	78%
Preferred Size ≥ 10"	30%



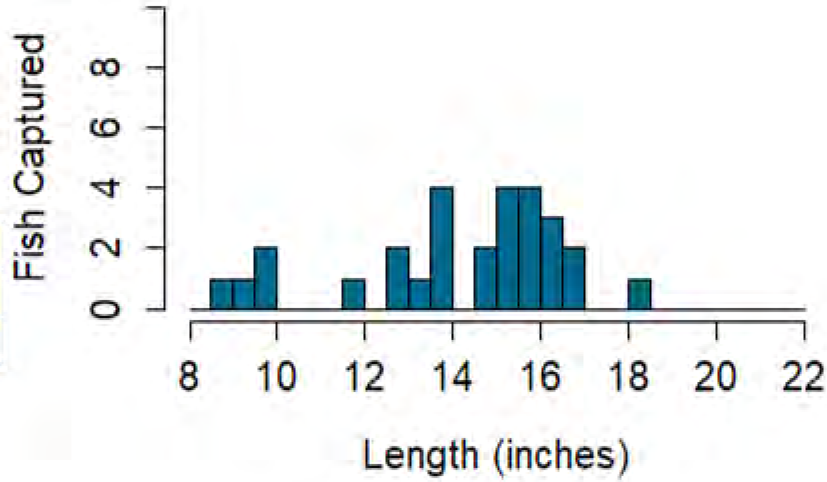
Yellow Perch

Captured 2.6 per net-night ≥ 5 inches	
Quality Size ≥ 8"	45%
Preferred Size ≥ 10"	10%



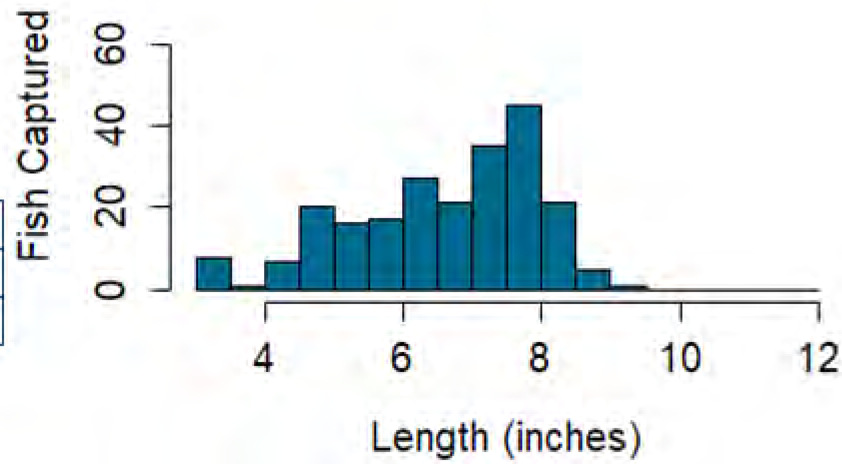
Largemouth Bass

Captured 12 per mile ≥ 8 inches	
Quality Size ≥ 12"	82%
Preferred Size ≥ 15"	50%



Bluegill

Captured 228 per mile ≥ 3 inches	
Quality Size ≥ 6"	69%
Preferred Size ≥ 8"	12%



SUMMARY OF RESULTS

This netting survey was well-timed for Walleye and Northern Pike, capturing the start of spawning activity for each species. Nets were set immediately after ice out and covered a variety of habitat types. Water temperature was below the ideal range for capturing Black Crappies and Yellow Perch, but the results are still included in this report. The electrofishing survey was also well-timed for target species. Lake Hayward is a “Complex-Riverine” lake based on the DNR Fisheries lake class system. “Complex” refers to the number of gamefish present in the fish community. Riverine systems present challenges for both surveying and managing populations since fish can move from lake to river habitats. This report will compare catch rates from Lake Hayward in 2022 to other lakes of this same type.

NORTHERN PIKE

Northern Pike catch rates (15 per net night) were exceptionally high (99th percentile) compared to lakes in the same class as Lake Hayward. Pike were generally small (75% were under 21 inches), but the top-end size was excellent. A 40-inch pike was captured in the survey, along with several others over 35 inches. Pike anglers in Lake Hayward should expect action from a lot of smaller pike, with a chance for a true trophy. There is no minimum length limit for Northern Pike, and anglers may harvest up to five per day. Harvest of smaller pike is encouraged.

DNR fisheries technician, Evan Sniadajewski, with a 40-inch Northern Pike from Lake Hayward. Northern Pike are abundant in this lake, but some reach excellent size. Photo courtesy of Max Wolter

WALLEYE

Only two Walleye were captured in this survey, indicating a low abundance of the species. This matches previous surveys of Lake Hayward. The Walleye population is supported almost exclusively through stocking. Very little natural reproduction has been observed. However, stocked Walleye may not stay in Lake Hayward. Walleye have opportunities to leave Lake Hayward both upstream into Namekagon River and downstream over the dam. The Walleye regulation on Lake Hayward is a 15-inch minimum length limit, a 20-24-inch protected slot with only one fish over 24 inches, and a three fish daily bag limit.

MUSKELLUNGE

Muskellunge are present in Lake Hayward, and trophy-sized fish have been caught in past surveys and local Muskellunge tournaments. No Muskellunge were captured during this survey. Muskellunge may not have been shallow enough to be captured due to very cold water temperatures at the time of the survey. Future efforts will try to document the status of this population. Muskellunge are stocked periodically into Lake Hayward, but some may move into the river, like Walleye.

BLACK CRAPPIE

The Black Crappie catch rate was below average compared to lakes in the same class. Survey timing may have played a minor role in the catch rate, and higher rates may have been observed with a later netting survey. Still, Black Crappies in Lake Hayward have nice size, with about one in three being over 10 inches. The daily bag limit for panfish on Lake Hayward is 25 (for all panfish species combined).

YELLOW PERCH

Yellow Perch catch rate was about average compared to other lakes in this class. Yellow Perch in Lake Hayward have good size, with a large percentage of the survey catch being over 8 inches. The daily bag limit for panfish on Lake Hayward is 25 (for all panfish species combined).

LARGEMOUTH BASS

The catch rate for Largemouth Bass in Lake Hayward was close to average compared to lakes of the same class. Half of the Largemouth Bass captured in the survey were over 15 inches, offering a quality bass fishing opportunity for anglers focused more on size than catch rate. There is a 14-inch minimum length limit for bass and a five-fish daily bag limit. Smallmouth Bass are present in Lake Hayward, but none were captured in this survey. Smallmouth Bass likely prefer the riverine areas upstream from Lake Hayward more than the lake itself.

BLUEGILL

The Bluegill catch rate was above average compared to other lakes in this class. Despite being relatively abundant, the size of Bluegill was excellent. More than 10% of Bluegill captured were over 8 inches long. Lake Hayward has a strong reputation as a Bluegill fishery, both during open water and through the ice. The daily bag limit for panfish on Lake Hayward is 25 (for all panfish species combined).

Other species present include: White Sucker, Northern Hogsucker, Pumpkinseed Sunfish, Rock Bass, several species of redhorse, Brown Trout and various minnow species.

Survey Crew: Max Wolter, Scott Braden and Evan Sniadajewski
Reviewed and approved by Aaron Cole

APPENDIX E-14 WDNR Hayward Project Fish Stocking Data

Source	Stocked Waterbody Name	Local Waterbody Name	Location	Species	Strain(Stock)	Age Class	Number Fish Stocked	Avg Fish Length(IN)	
DNR	HAYWARD LAKE		41N-9W-27	MUSKELLUNGE	UPPER CHIPPEWA RIVER	LARGE FINGERLING	100	12.6	
DNR	HAYWARD LAKE		41N-9W-27	MUSKELLUNGE	UPPER CHIPPEWA RIVER	LARGE FINGERLING	253	10.7	
DNR	HAYWARD LAKE		41N-9W-27	MUSKELLUNGE	UPPER CHIPPEWA RIVER	LARGE FINGERLING	247	12.8	
DNR	HAYWARD LAKE		41N-9W-27	MUSKELLUNGE	UPPER WISCONSIN RIVER	LARGE FINGERLING	185	13.1	
DNR	HAYWARD LAKE		41N-9W-27	MUSKELLUNGE	UPPER CHIPPEWA RIVER	LARGE FINGERLING	247	10.9	
DNR	HAYWARD LAKE		41N-9W-27	MUSKELLUNGE	UPPER CHIPPEWA RIVER	LARGE FINGERLING	136	12.4	
DNR	HAYWARD LAKE		41N-9W-27	MUSKELLUNGE	UNSPECIFIED	LARGE FINGERLING	247	11	
DNR	HAYWARD LAKE		41N-9W-27	MUSKELLUNGE	UNSPECIFIED	LARGE FINGERLING	247	11.4	
DNR	HAYWARD LAKE		41N-9W-27	MUSKELLUNGE	UNSPECIFIED	LARGE FINGERLING	124	12	
DNR	HAYWARD LAKE		41N-9W-27	MUSKELLUNGE	UNSPECIFIED	LARGE FINGERLING	247	11.7	
DNR	HAYWARD LAKE		41N-9W-27	MUSKELLUNGE	UNSPECIFIED	FINGERLING	247	10.7	
DNR	HAYWARD LAKE		41N-9W-27	MUSKELLUNGE	UNSPECIFIED	FINGERLING	247	12	
DNR	HAYWARD LAKE		41N-9W-27	MUSKELLUNGE	UNSPECIFIED	FINGERLING	347	10	
DNR	HAYWARD LAKE		41N-9W-27	MUSKELLUNGE	UNSPECIFIED	FINGERLING	200	11	
DNR	HAYWARD LAKE		41N-9W-27	MUSKELLUNGE	UNSPECIFIED	FINGERLING	200	11	
DNR	HAYWARD LAKE		41N-9W-27	MUSKELLUNGE	UNSPECIFIED	FINGERLING	200	9	
DNR	HAYWARD LAKE		41N-9W-27	MUSKELLUNGE	UNSPECIFIED	FINGERLING	247	9	
DNR	HAYWARD LAKE		41N-9W-27	MUSKELLUNGE	UNSPECIFIED	FINGERLING	894	10	
DNR	HAYWARD LAKE		41N-9W-27	MUSKELLUNGE	UNSPECIFIED	FINGERLING	247	9	
DNR	HAYWARD LAKE		41N-9W-27	MUSKELLUNGE	UNSPECIFIED	FINGERLING	200	9	
									total
DNR	HAYWARD LAKE		41N-9W-27	MUSKELLUNGE	UNSPECIFIED	FINGERLING	300	13	5362 muskie
									unsp
DNR	HAYWARD LAKE		41N-9W-27	PANFISH	UNSPECIFIED	ADULT (FIELD TRANSFER)	250	6.5	250 panfish
DNR	HAYWARD LAKE		41N-9W-27	WALLEYE	MISSISSIPPI HEADWATERS	SMALL FINGERLING	6678	1.7	
DNR	HAYWARD LAKE		41N-9W-27	WALLEYE	MISSISSIPPI HEADWATERS	SMALL FINGERLING	6995	1.5	
DNR	HAYWARD LAKE		41N-9W-27	WALLEYE	MISSISSIPPI HEADWATERS	SMALL FINGERLING	18542	1.4	
DNR	HAYWARD LAKE		41N-9W-27	WALLEYE	MISSISSIPPI HEADWATERS	LARGE FINGERLING	2460	6.8	
DNR	HAYWARD LAKE		41N-9W-27	WALLEYE	MISSISSIPPI HEADWATERS	LARGE FINGERLING	2470	7.7	
DNR	HAYWARD LAKE		41N-9W-27	WALLEYE	UNSPECIFIED	LARGE FINGERLING	2470	6	
DNR	HAYWARD LAKE		41N-9W-27	WALLEYE	UNSPECIFIED	LARGE FINGERLING	2470	7.5	
DNR	HAYWARD LAKE		41N-9W-27	WALLEYE	UNSPECIFIED	LARGE FINGERLING	4940	6.4	
DNR	HAYWARD LAKE		41N-9W-27	WALLEYE	UNSPECIFIED	LARGE FINGERLING	2470	8.3	
DNR	HAYWARD LAKE		41N-9W-27	WALLEYE	UNSPECIFIED	LARGE FINGERLING	2460	7.9	
DNR	HAYWARD LAKE		41N-9W-27	WALLEYE	UNSPECIFIED	FINGERLING	2470	7.4	
DNR	HAYWARD LAKE		41N-9W-27	WALLEYE	UNSPECIFIED	FINGERLING	2520	6.15	
DNR	HAYWARD LAKE		41N-9W-27	WALLEYE	UNSPECIFIED	FINGERLING	12460	2	
DNR	HAYWARD LAKE		41N-9W-27	WALLEYE	UNSPECIFIED	FINGERLING	14880	2	
DNR	HAYWARD LAKE		41N-9W-27	WALLEYE	UNSPECIFIED	FINGERLING	10176	3	
DNR	HAYWARD LAKE		41N-9W-27	WALLEYE	UNSPECIFIED	FINGERLING	9982	3	
DNR	HAYWARD LAKE		41N-9W-27	WALLEYE	UNSPECIFIED	FINGERLING	11046	3	
DNR	HAYWARD LAKE		41N-9W-27	WALLEYE	UNSPECIFIED	FINGERLING	10215	3	
DNR	HAYWARD LAKE		41N-9W-27	WALLEYE	UNSPECIFIED	FINGERLING	10325	3	136029 walleye

APPENDIX E-15 Hayward Project Mussel Study Report

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:

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Excellence In Any Environment

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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

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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
	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
Reach 1 (US)	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
	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
Reach 1 (US)	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
	T6	0-10	0.30	0	5	30	20	40	0	0	5	0	0	0
Reach 1 (US)	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.

Reach	Transect/Segment		Depth (m)	Substrate Composition (%)										
				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

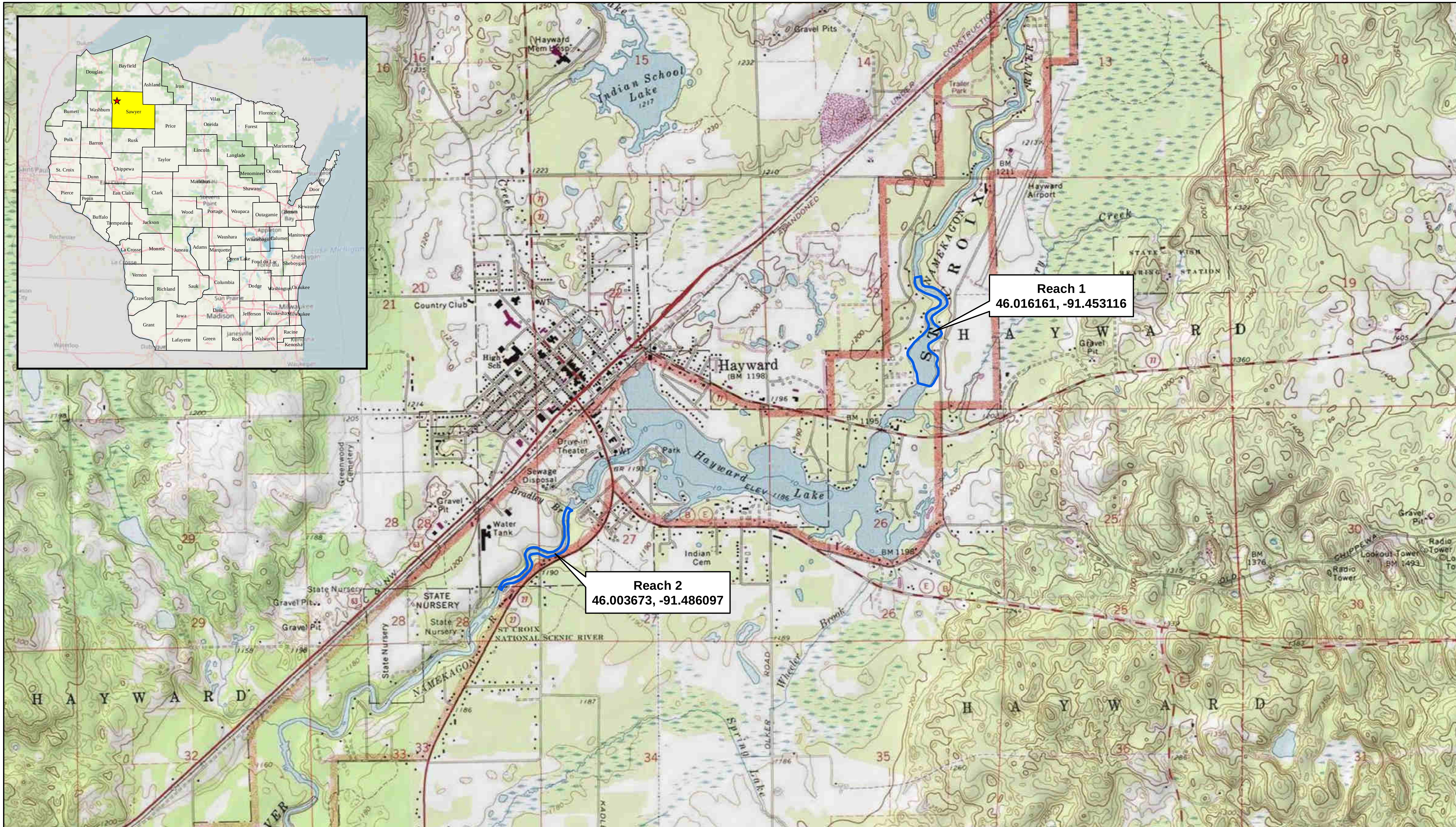

Figure 1. Hayward Project Location on USGS 7.5-minute Topographic Map of Hayward Quadrangle. Sawyer County, Wisconsin.

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\M\Mead-and-Hunt\16082_Wisconsin_Mussels\Map1_Location_Hayward.mxd

Date: 8/17/2022

Basemap courtesy of National Geographic Society (2013).

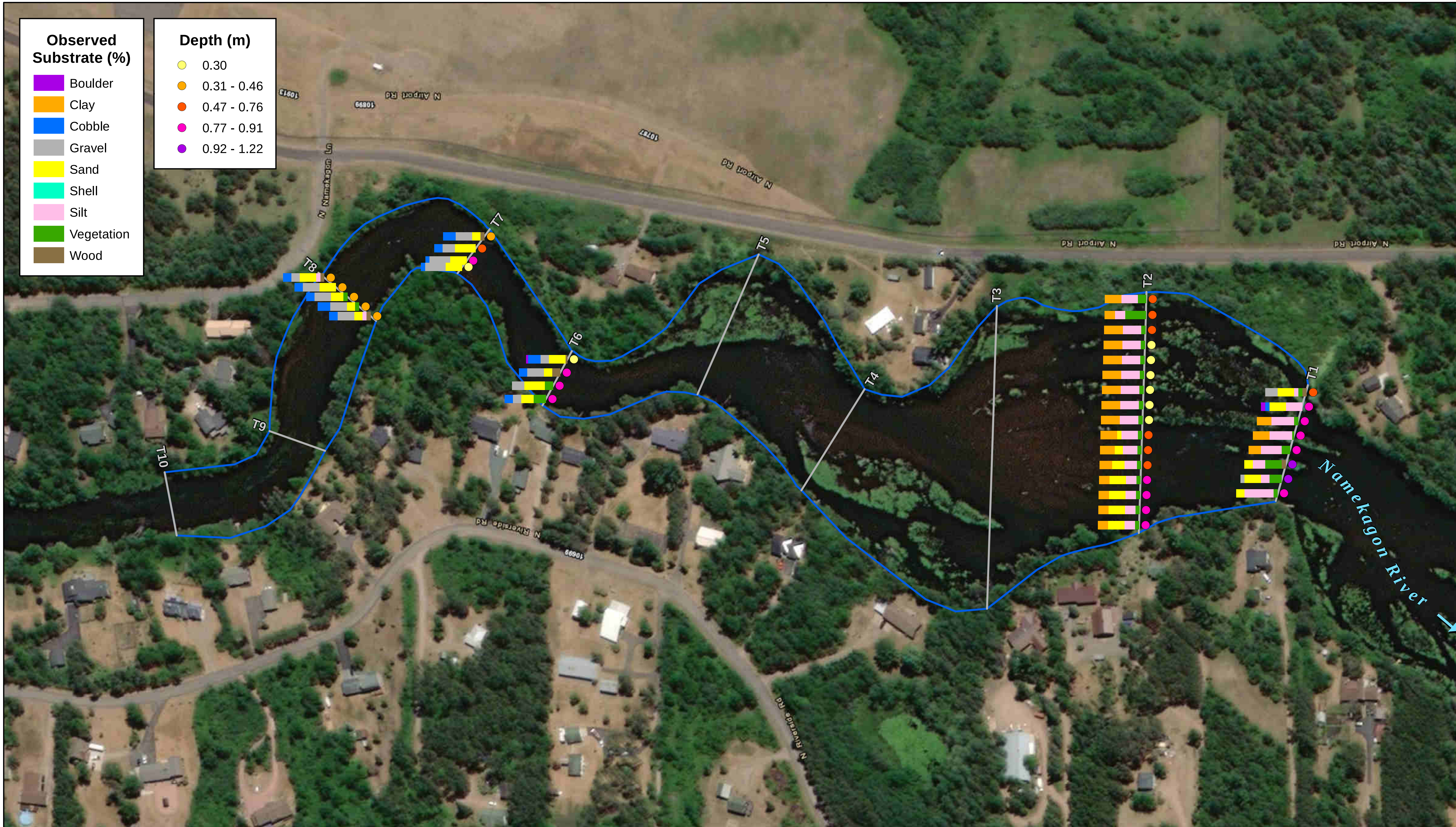

Figure 2. Substrate and Depth for the Hayward Project Reach One on the Namekagon River. Sawyer County, Wisconsin.

Survey Transect
Riverine Reach Study Area

0 150 300 600 Feet
0 50 100 200 Meters

EnviroScience
Excellence In Any Environment

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

Basemap courtesy of Esri.

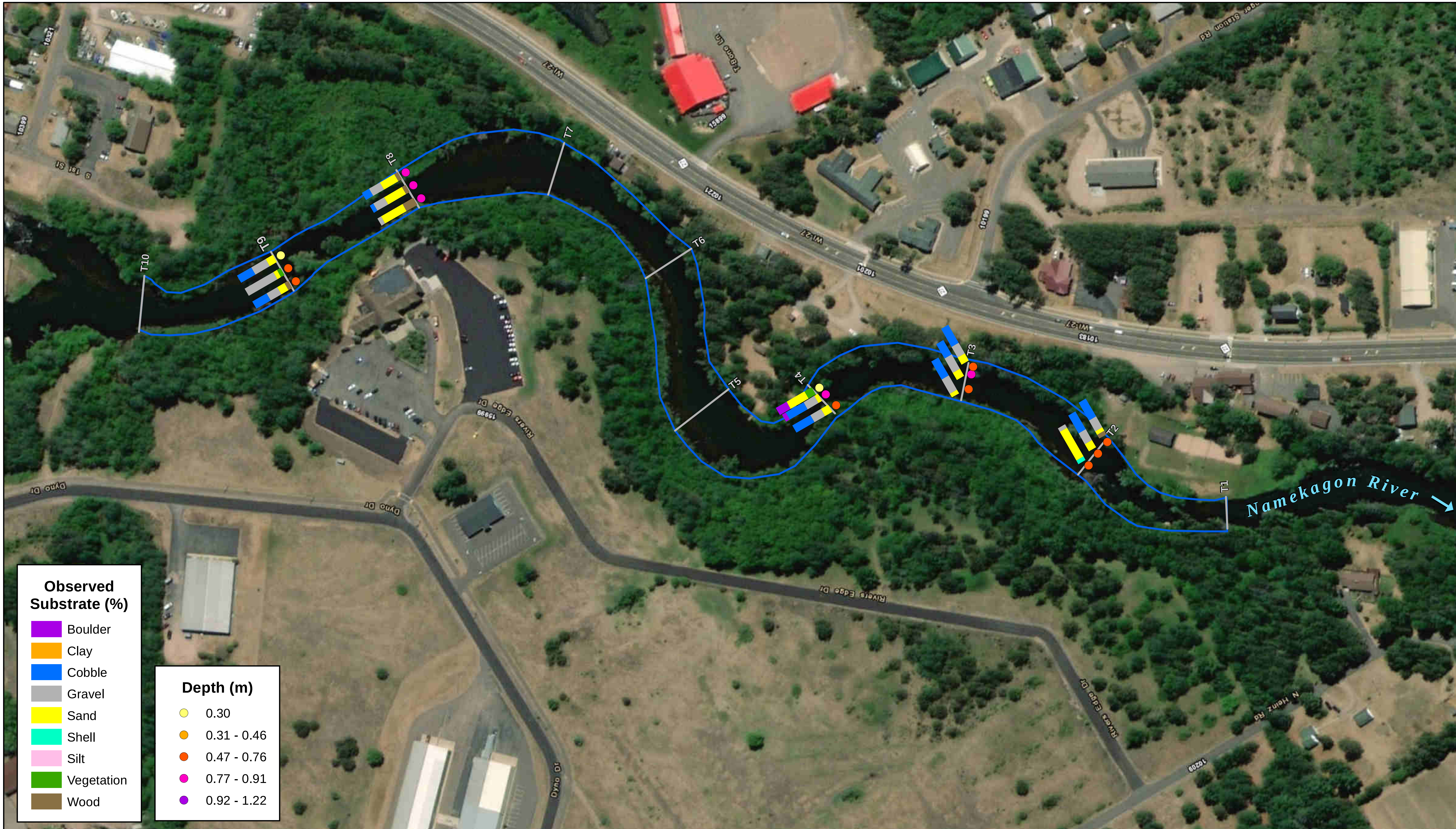

Figure 3. Substrate and Depth for the Hayward Project Reach Two on the Namekagon River. Sawyer County, Wisconsin.

Survey Transect

Riverine Reach Study Area

0 150 300 600 Feet

0 50 100 200 Meters

EnviroScience
Excellence In Any Environment

Path: P:\10_Projects\MI\Mead-and-Hunt\480M\16082_Wisconsin_Mussels\16082_GIS\Map3_Substrate_R2_Hayward.mxd

Date: 8/24/2022

Basemap courtesy of Esri.

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

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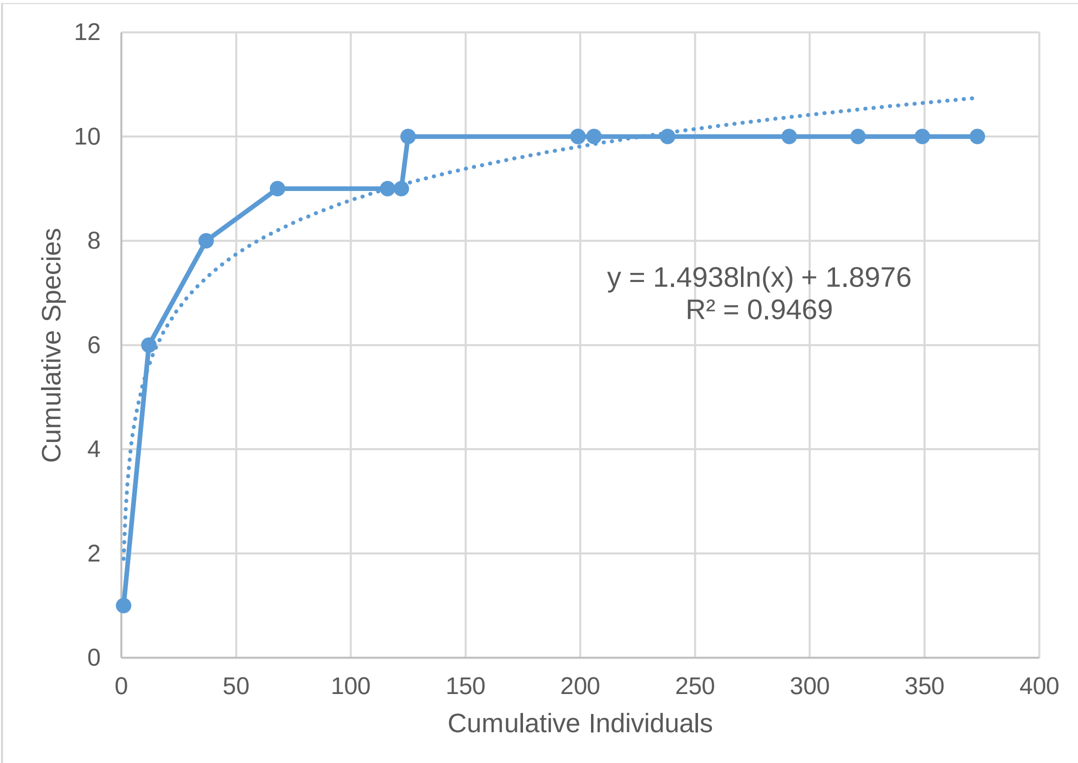
Date: 8/24/2022

Basemap courtesy of Esri.

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

WISCONSIN DEPT. OF NATURAL RESOURCES

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@envirosciencein c.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@envirosciencein c.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
EnviroScience™
Excellence In Any Environment
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, Hayward Mussel Survey, June 2022.

Photo No.	Coordinates: UTM Zone 15N Northing	Coordinates: UTM Zone 15N Easting	Coordinates: NAD 1983 Latitude	Coordinates: NAD 1983 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.

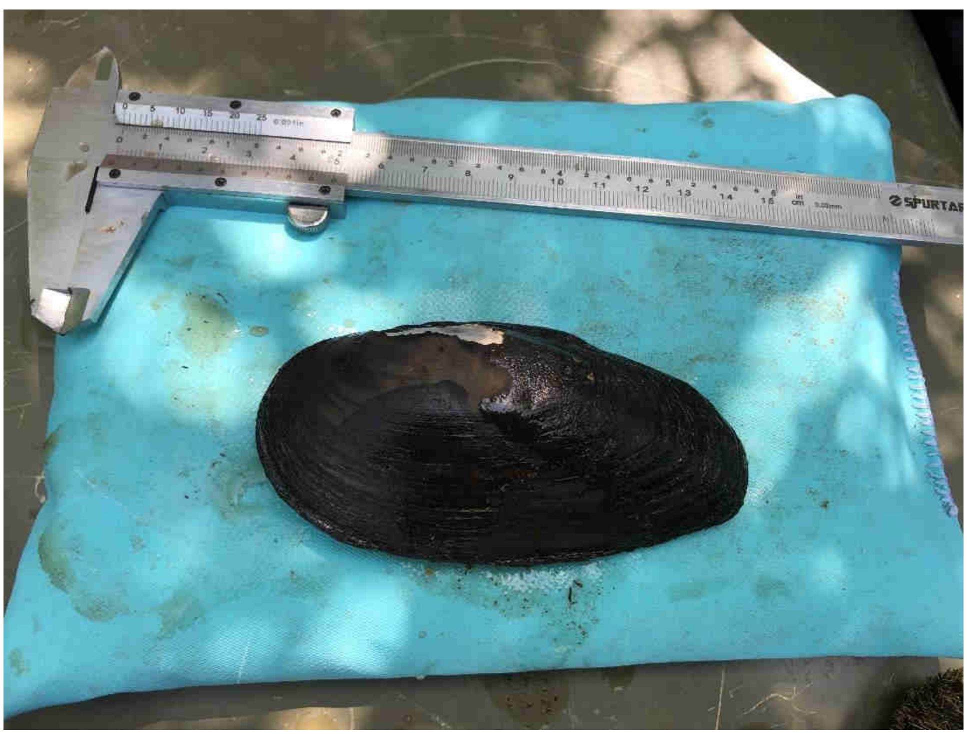


Photo 12. Representative photo of Spike (*Eurynia dilatata*) collected in the study area.

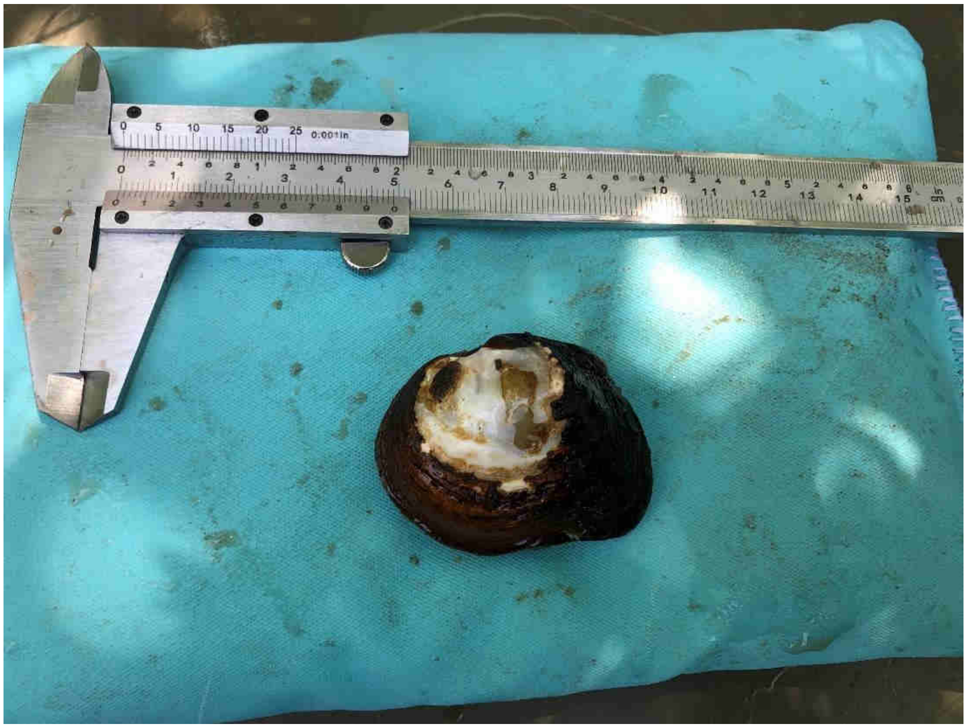


Photo 13. Representative photo of Wabash Pigtoe (*Fusconaia flava*) collected in the study area.

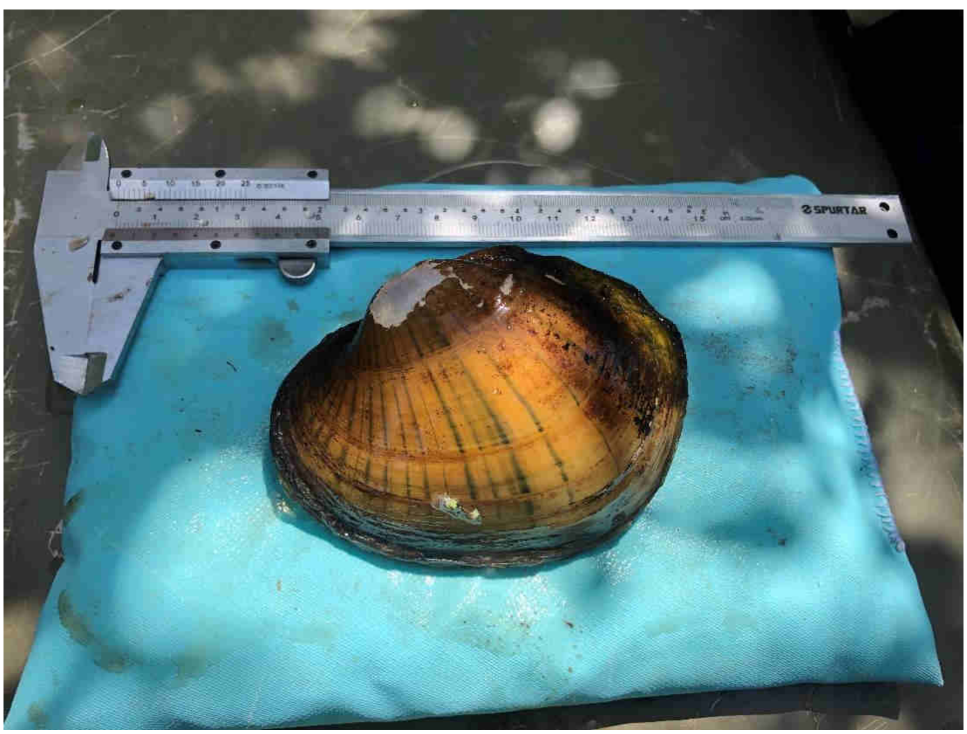


Photo 14. Representative photo of Plain Pocketbook (*Lampsilis cardium*) collected in the study area.

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.

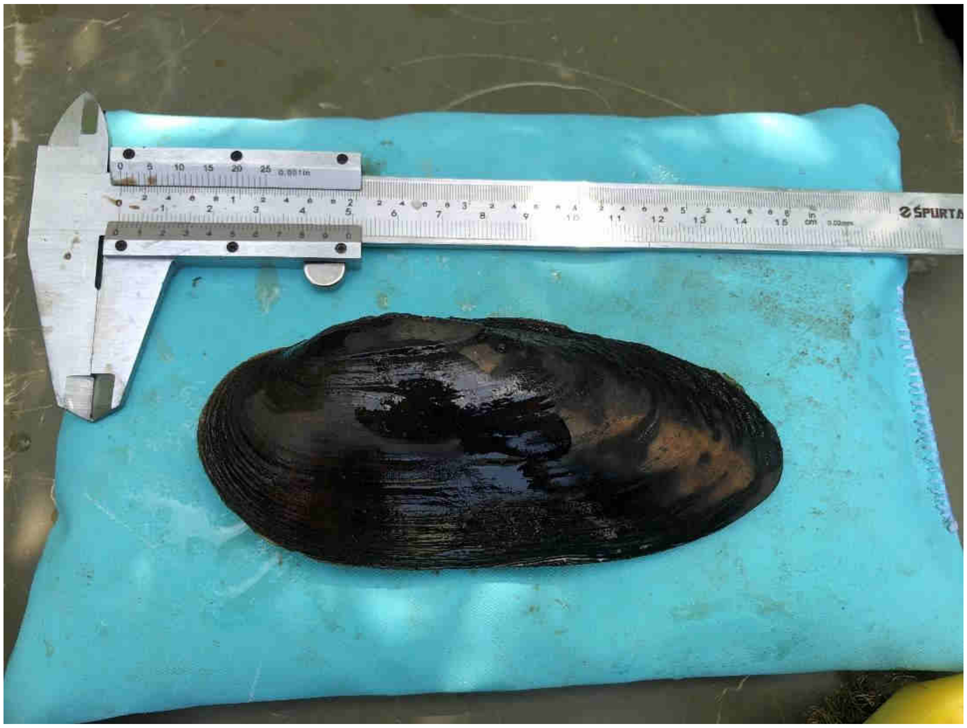


Photo 17. Representative photo of Black Sandshell (*Ligumia recta*) collected in the study area.

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.

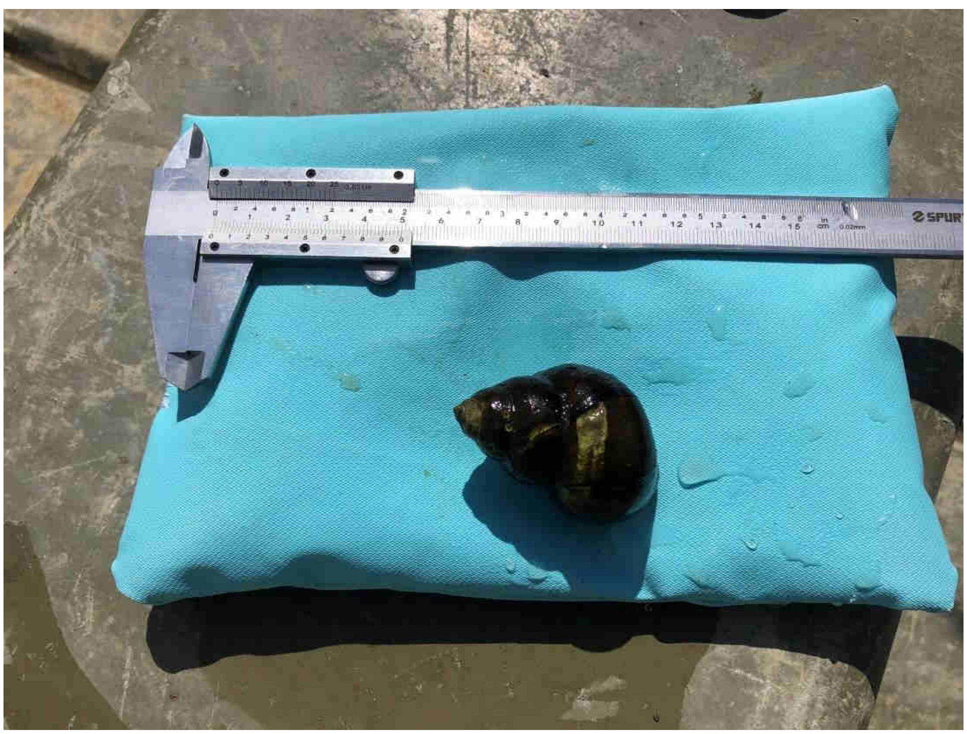


Photo 20. Representative photo of invasive Chinese Mystery Snail (*Cipangopaludina chinensis*) collected in Reach 1.

APPENDIX E-16 WDNR Hayward Project Macroinvertebrate Sampling Data

Monitoring Station

Station ID 10029431
Station Name NAMEKAGON R 70 M US OF HOSPITAL RD.

Show specific parameter: <Show All>

Sample Results

Previous 1-25 of 92 Next

Project	Date/Time	DNR Parameter	Species	Result	Units	Present/Absent	Lab Comments
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	PLECOPTERA CAPNIIDAE PARACAPNIA ANGULATA		3			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	PLECOPTERA TAENIOPTERYGIDAE TAENIOPTERYX		1			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	EPHEMEROPTERA EPHEMERELLIDAE EPHEMERELLA		18			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	EPHEMEROPTERA EPHEMERELLIDAE EPHEMERELLA INVARIA		54			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	EPHEMEROPTERA EPHEMERELLIDAE EPHEMERELLA SUBVARIA		1			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	EPHEMEROPTERA EPHEMERELLIDAE EURYLOPHELLA BICOLOR		2			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	EPHEMEROPTERA HEPTAGENIIDAE EPEORUS VITREUS		2			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	EPHEMEROPTERA HEPTAGENIIDAE MACCAFFERTIUM		9			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	EPHEMEROPTERA HEPTAGENIIDAE MACCAFFERTIUM MEDIOPUNCTATUM		8			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	EPHEMEROPTERA HEPTAGENIIDAE MACCAFFERTIUM MODESTUM		2			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	EPHEMEROPTERA HEPTAGENIIDAE LEUCROCUTA		6			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	EPHEMEROPTERA ISONYCHIIDAE ISONYCHIA		2			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	ODONATA GOMPHIDAE OPHIOGOMPHUS		1			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	TRICHOPTERA BRACHYCENTRIDAE MICRASEMA RUSTICUM		1			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	TRICHOPTERA HYDROPSYCHIDAE CHEUMATOPSYCHE		2			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	TRICHOPTERA HYDROPSYCHIDAE CERATOPSYCHE ALTERNANS		1			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	TRICHOPTERA HYDROPSYCHIDAE CERATOPSYCHE BRONTA		6			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	TRICHOPTERA HYDROPSYCHIDAE CERATOPSYCHE VEXA		3			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	TRICHOPTERA PSYCHOMYIIDAE PSYCHOMYIA FLAVIDA		1			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	TRICHOPTERA UENOIDAE NEOPHYLAX		1			

NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	COLEOPTERA ELMIDAE OPTIOSERVUS	2
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	COLEOPTERA ELMIDAE OPTIOSERVUS TRIVITTATUS	42
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	DIPTERA TIPULIDAE DICRANOTA	1
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	DIPTERA TIPULIDAE PSEUDOLIMNOPHILA	1
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	DIPTERA TANYPODINAE 0 CONCHAPELOPIA	1

Monitoring Station

Station ID 10029431
Station Name NAMEKAGON R 70 M US OF HOSPITAL RD.

Show specific parameter: <Show All>

Sample Results

Project	Date/Time	DNR Parameter	Species	Result	Units	Present/Absent	Lab Comments
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	DIPTERA DIAMESINAE 2 PAGASTIA		1			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	DIPTERA ORTHOCLADIINAE 1 ORTHOCLADIUS (ORTHOCLADIUS)		2			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	DIPTERA CHIRONOMINAE 4 CLADOTANYTARSUS		4			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	DIPTERA CHIRONOMINAE 4 CRYPTOCHIRONOMUS		2			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	DIPTERA CHIRONOMINAE 4 MICROTENDIPES PEDELLUS GROUP PINDER, REISS 1983		1			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	DIPTERA CHIRONOMINAE 4 NILOTHAUMA		1			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	TRICLADIDA		1			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	BASOMMATOPHORA ANCYLIDAE FERRISSIA		4			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	VENEROIDA PISIDIIDAE SPHAERIUM		1			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	DIPTERA ORTHOCLADIINAE 1 ORTHOCLADIUS (EUORTHOCLADIUS) RIVULORUM		4			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	DIPTERA ORTHOCLADIINAE 1 CRICOTOPUS/ORTHOCLADIUS FERRINGTON ET AL. 2008		1			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Macroinvertebrate Index of Biological Integrity (IBI), Wadable		6.71113			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	HILSENHOFF'S BIOTIC INDEX (HBI)		2.201			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	FAMILY-LEVEL BIOTIC INDEX (FBI)		2.882			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	HBI Max 10		2.916			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	SPECIES RICHNESS		33			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	GENERA RICHNESS		29			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	PERCENT EPT INDIVIDUALS		64			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	PERCENT EPT GENERA		45			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	PERCENT CHIRONOMIDAE INDIVIDUALS		9			

NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	SHANNON'S DIVERSITY INDEX	3.29
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	PERCENT SCRAPERS	39
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	PERCENT FILTERER	8
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	PERCENT SHREDDERS	3
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	PERCENT GATHERERS	47

Monitoring Station

Station ID 10029431
Station Name NAMEKAGON R 70 M US OF HOSPITAL RD.

Show specific parameter: <Show All>

Sample Results

Project	Date/Time	DNR Parameter	Species	Result	Units	Present/Absent	Lab Comments
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Macroinvertebrate Family Rank 1		EPHEMERELLIDAE			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Macroinvertebrate Family Rank 2		ELMIDAE			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Macroinvertebrate Family Rank 3		HEPTAGENIIDAE			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Macroinvertebrate Family Rank 4		CHIRONOMIDAE			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Macroinvertebrate Family Rank 5		HYDROPSYCHIDAE			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Macroinvertebrate Genus Rank 1		EPHEMERELLA			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Macroinvertebrate Genus Rank 2		OPTIOSERVUS			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Macroinvertebrate Genus Rank 3		MACCAFFERTIUM			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Macroinvertebrate Genus Rank 4		CERATOPSYCHE			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Macroinvertebrate Genus Rank 5		LEUCROCUTA			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Mean Pollution Tolerance Value		3			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	DEPO Percent Individuals (DEP_PC_CNT)		75.401			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	DEPO Genera (DEPO_G)		15			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	DEPO, percent genera (DEP_PC_GEN)		50			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	EPT Genera (EPT_GENERA)		13			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	EPT Individuals (EPT_COUNT)		123			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	EPT Percent Individuals (EPT_PC_CNT)		65.775			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Amph Percent Individuals (AMP_PC_CNT)		0			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	EPT Percent Genera (EPT_PC_GEN)		50			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Isop Percent Individuals (ISO_PC_CNT)		0			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Isop Genera (ISOP_G)		0			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Isop Percent Genera (ISO_PC_GEN)		0			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Dipt Percent Genera (DIP_PC_GEN)		42.308			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Dipt Percent Individuals (DIP_PC_CNT)		10.16			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Chir Percent Individuals (CHI_PC_CNT)		9.091			

Monitoring Station

Station ID 10029431
Station Name NAMEKAGON R 70 M US OF HOSPITAL RD.

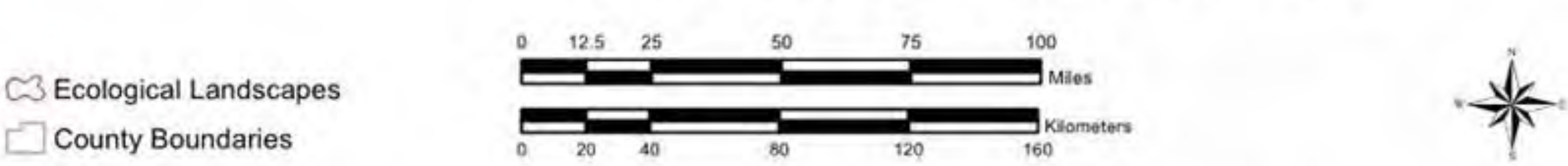
Show specific parameter: <Show All>

Sample Results

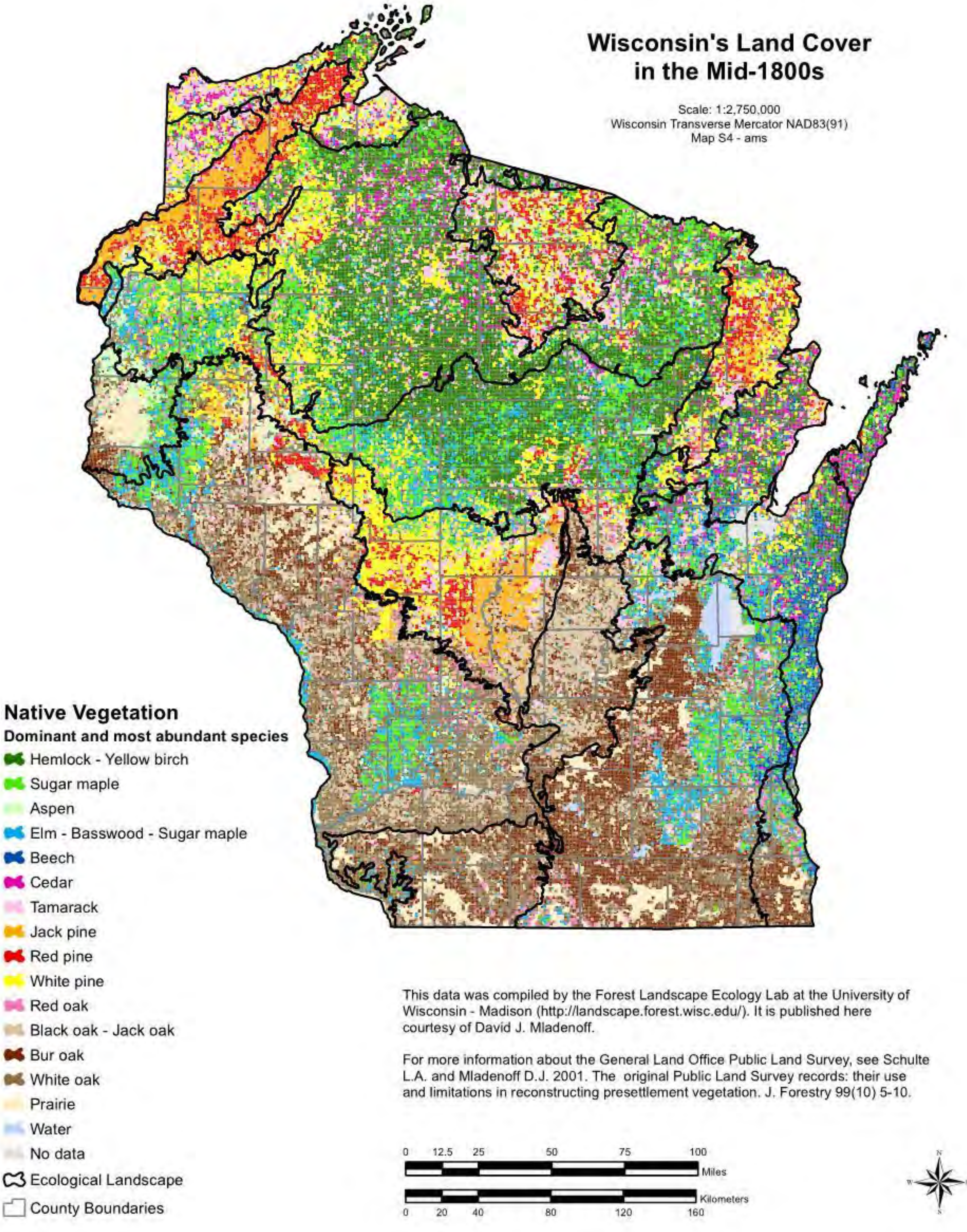
Project	Date/Time	DNR Parameter	Species	Result	Units	Present/Absent	Lab Comments
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Chir Percent Genera (CHI_PC_GEN)		34.615			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Gatherers Percent Individuals (GAT_PC_CNT)		48.387			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Gatherers Percent Genera (GAT_PC_GEN)		36			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Scrapers Percent Individuals (SCR_PC_CNT)		37.634			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Shredders Percent Individuals (SHR_PC_CNT)		3.226			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Insect Taxa (INSECT_T)		30			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Insect Percent Individuals (INSECT_PI)		96.891			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	EPT Taxa (EPT_T)		17			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Dominance 3 Percent Individuals (DOM3_PI)		59.067			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Intolerant EPT 2 Percent Individuals (INTOL_EPT2_PI)		38.86			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Tolerant Chir Percent Individuals (TOL_CHIR8_PI)		1.036			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Functional Trait Niches (ECOFTN)		15			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Amph Isop Percent Individuals (A_I_PC_CNT)		0			
NOR Watershed Rotation Sites (Non_LTT)	10/25/2008 12:00 AM	Species Richness (Wadable IBI Intermediate)		33			
2018 CWA Impairment Assessments	10/25/2008 12:00 AM	Wadeable Stream 10 Year Mean mIBI Assessment Value		6.71113			
2018 CWA Impairment Assessments	07/15/2008 12:00 AM	Wadeable Stream 10 Year Mean fIBI Assessment Value		100			
2018 CWA Impairment Assessments	07/15/2008 12:00 AM	Assessment River Station Natural Community		COOL-WARM MAINSTEM			

APPENDIX E-17 Ecological Landscapes of Wisconsin

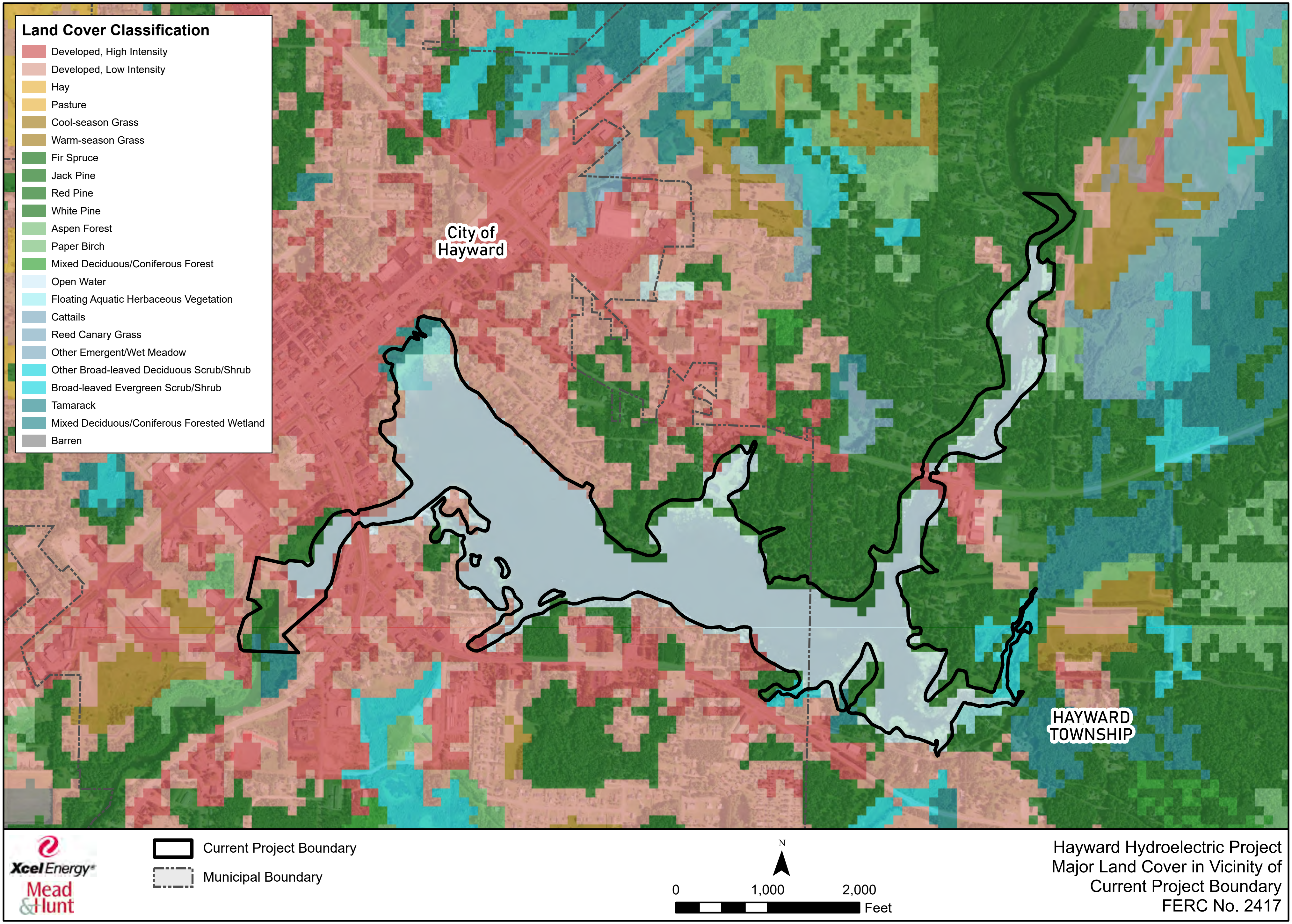
Wisconsin was divided into 16 ecoregions with similar ecology and management opportunities. Each of these ecoregions is called an Ecological Landscape. The Ecological Landscapes are based on the National Hierarchical Framework of Ecological Units (NHFEU; Cleland et al. 1997). There were too many NHFEU Subsections and too few NHFEU Sections to be useful for management purposes. Ecological Landscapes use the same boundaries as NHFEU Sections or Subsections. However, some NHFEU Subsections were combined to reduce the number of geographical units in the state to a manageable number. Therefore, Ecological Landscapes are at a size (scale) between NHFEU Sections and Subsections.



APPENDIX E-18 Land Cover in the Mid-1800's


Wisconsin's Land Cover
in the Mid-1800s
Scale: 1:2,750,000
Wisconsin Transverse Mercator NAD83(91)
Map S4 - ams
Native Vegetation
Dominant and most abundant species
Hemlock - Yellow birch
Sugar maple
Aspen
Elm - Basswood - Sugar maple
Beech
Cedar
Tamarack
Jack pine
Red pine
White pine
Red oak
Black oak - Jack oak
Bur oak
White oak
Prairie
Water
No data
Ecological Landscape
County Boundaries
This data was compiled by the Forest Landscape Ecology Lab at the University of Wisconsin - Madison (http://landscape.forest.wisc.edu/). It is published here courtesy of David J. Mladenoff.
For more information about the General Land Office Public Land Survey, see Schulte L.A. and Mladenoff D.J. 2001. The original Public Land Survey records: their use and limitations in reconstructing presettlement vegetation. J. Forestry 99(10) 5-10.
0 12.5 25 50 75 100
Miles
Kilometers
0 20 40 80 120 160

APPENDIX E-19 Hayward Project WISCLAND 2 Cover Type Maps

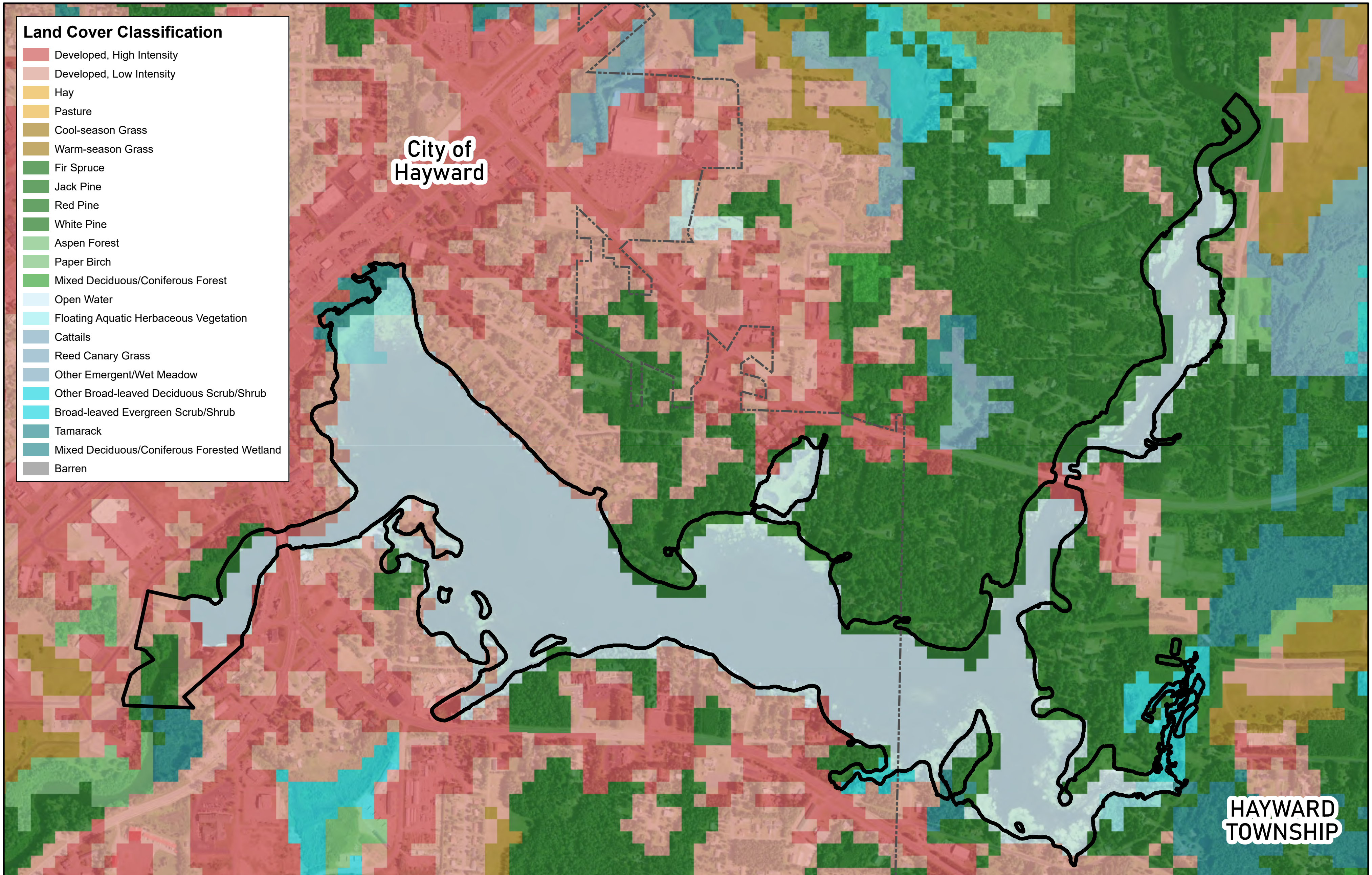


Xcel Energy

Mead & Hunt

Hayward Hydroelectric Project
Major Land Cover in Vicinity of
Current Project Boundary
FERC No. 2417

Source Layer: Wisconsin Department of Natural Recourses WISCLAND 2019 update, WI 2022 NAIP (natural color, 0.6-meter resolution)



Xcel Energy

Mead & Hunt

Proposed Project Boundary

Municipal Boundary

Note: the impounded Proposed Project Boundary is established at elevation 1,187.5 feet NGVD 1929.

N

0 800 1,600 Feet

Hayward Hydroelectric Project
Major Land Cover in Vicinity of
Proposed Project Boundary
FERC No. 2417

Source Layer: Wisconsin Department of Natural Recourses WISCLAND 2019 update, WI 2022 NAIP (natural color, 0.6-meter resolution)

X:\2400100\192923.01\TECH\Hayward and Trego\Project Maps\Hayward\DLA\PRO\Hayward_DLA_Maps.aprx

APPENDIX E-20 Hayward City Beach eBird Checklist

eBird Field Checklist

Hayward Beach

Sawyer, Wisconsin, US

ebird.org/hotspot/L7467018

82 species (+4 other taxa) - Year-round, All years

Date:______
Start time:______
Duration:______
Distance:______
Party size:______
Notes:

This checklist is generated with data from eBird (ebird.org), a global database of bird sightings from birders like you. If you enjoy this checklist, please consider contributing your sightings to eBird. It is 100% free to take part, and your observations will help support birders, researchers, and conservationists worldwide.

Go to ebird.org to learn more!

Waterfowl

___Canada Goose
___Trumpeter Swan
___Wood Duck
___Mallard
___Ring-necked Duck
___Greater/Lesser Scaup
___Bufflehead
___Common Goldeneye
___Hooded Merganser
___Common Merganser

Grouse, Quail, and Allies

___Wild Turkey

Grebes

___Pied-billed Grebe

Pigeons and Doves

___Mourning Dove

Nightjars

___Common Nighthawk

Swifts

___Chimney Swift

Shorebirds

___Killdeer

Gulls, Terns, and Skimmers

___Ring-billed Gull
___Herring Gull
___Black Tern

Loons

___Common Loon

Herons, Ibis, and Allies

___Great Blue Heron
___Green Heron

Vultures, Hawks, and Allies

___Turkey Vulture
___Osprey
___Sharp-shinned Hawk
___Bald Eagle
___Broad-winged Hawk

Kingfishers

___Belted Kingfisher

Woodpeckers

___Yellow-bellied Sapsucker
___Downy Woodpecker
___Hairy Woodpecker
___Pileated Woodpecker
___Northern Flicker

Falcons and Caracaras

___American Kestrel

Tyrant Flycatchers: Pewees, Kingbirds, and Allies

___Alder Flycatcher
___Least Flycatcher
___Eastern Phoebe
___Eastern Kingbird

Vireos

___Yellow-throated Vireo
___Warbling Vireo
___Red-eyed Vireo

Jays, Magpies, Crows, and Ravens

___Blue Jay

___American Crow
___crow/raven sp.

Tits, Chickadees, and Titmice

___Black-capped Chickadee

Martins and Swallows

___Tree Swallow
___Bank Swallow
___swallow sp.

Kinglets

___Ruby-crowned Kinglet
___Golden-crowned Kinglet

Nuthatches

___Red-breasted Nuthatch
___White-breasted Nuthatch

Wrens

___House Wren

Starlings and Mynas

___European Starling

Catbirds, Mockingbirds, and Thrashers

___Gray Catbird
___Brown Thrasher

Thrushes

___Eastern Bluebird
___American Robin

Waxwings

___Cedar Waxwing

Old World Sparrows

___House Sparrow

Finches, Euphonias, and Allies

___Evening Grosbeak
___Purple Finch
___House/Purple Finch
___Common Redpoll
___Pine Siskin
___American Goldfinch

New World Sparrows

___Chipping Sparrow
___Clay-colored Sparrow
___American Tree Sparrow
___Fox Sparrow
___Dark-eyed Junco
___Song Sparrow

Blackbirds

___Baltimore Oriole
___Red-winged Blackbird
___Common Grackle

Wood-Warblers

___Tennessee Warbler
___Nashville Warbler
___Common Yellowthroat
___American Redstart
___Yellow Warbler
___Palm Warbler
___Pine Warbler
___Yellow-rumped Warbler
___Wilson's Warbler

Cardinals, Grosbeaks, and Allies

___Scarlet Tanager
___Northern Cardinal

APPENDIX E-21 Hayward Project IPaC Official Species List

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Minnesota-Wisconsin Ecological Services Field Office
3815 American Blvd East
Bloomington, MN 55425-1659
Phone: (952) 858-0793 Fax: (952) 646-2873

In Reply Refer To: March 21, 2023
Project Code: 2023-0058040
Project Name: Hayward Hydroelectric Project FERC Relicensing

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

This response has been generated by the Information, Planning, and Conservation (IPaC) system to provide information on natural resources that could be affected by your project. The U.S. Fish and Wildlife Service (Service) provides this response under the authority of the Endangered Species Act of 1973 (16 U.S.C. 1531-1543), the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d), the Migratory Bird Treaty Act (16 U.S.C. 703-712), and the Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq*.).

Threatened and Endangered Species

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and may be affected by your proposed project. The species list fulfills the requirement for obtaining a Technical Assistance Letter from the U.S. Fish and Wildlife Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the ECOS IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS IPaC system by completing the same process used to receive the enclosed list.

Consultation Technical Assistance

Please refer to refer to our Section 7 website for guidance and technical assistance, including step-by-step instructions for making effects determinations for each species that might be present and for specific guidance on the following types of projects: projects in developed areas, HUD, CDBG, EDA, USDA Rural Development projects, pipelines, buried utilities, telecommunications, and requests for a Conditional Letter of Map Revision (CLOMR) from FEMA.

We recommend running the project (if it qualifies) through our **Minnesota-Wisconsin Federal Endangered Species Determination Key (Minnesota-Wisconsin ("D-key"))**. A demonstration video showing how-to access and use the determination key is available. Please note that the Minnesota-Wisconsin D-key is the third option of 3 available d-keys. D-keys are tools to help Federal agencies and other project proponents determine if their proposed action has the potential to adversely affect federally listed species and designated critical habitat. The Minnesota-Wisconsin D-key includes a structured set of questions that assists a project proponent in determining whether a proposed project qualifies for a certain predetermined consultation outcome for all federally listed species found in Minnesota and Wisconsin (except for the northern long-eared bat- see below), which includes determinations of “no effect” or “may affect, not likely to adversely affect." In each case, the Service has compiled and analyzed the best available information on the species’ biology and the impacts of certain activities to support these determinations.

If your completed d-key output letter shows a "No Effect" (NE) determination for all listed species, print your IPaC output letter for your files to document your compliance with the Endangered Species Act.

For Federal projects with a “Not Likely to Adversely Affect” (NLAA) determination, our concurrence becomes valid if you do not hear otherwise from us after a 30-day review period, as indicated in your letter.

If your d-key output letter indicates additional coordination with the Minnesota-Wisconsin Ecological Services Field Office is necessary (i.e., you get a “May Affect” determination), you will be provided additional guidance on contacting the Service to continue ESA coordination outside of the key; ESA compliance cannot be concluded using the key for “May Affect” determinations unless otherwise indicated in your output letter.

Note: Once you obtain your official species list, you are not required to continue in IPaC with d-keys, although in most cases these tools should expedite your review. If you choose to make an effects determination on your own, you may do so. If the project is a Federal Action, you may want to review our section 7 step-by-step instructions before making your determinations.

Using the IPaC Official Species List to Make No Effect and May Affect Determinations for Listed Species

1. If IPaC returns a result of “There are no listed species found within the vicinity of the project,” then project proponents can conclude the proposed activities will have **no effect** on any federally listed species under Service jurisdiction. Concurrence from the Service is not required for **no effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records.
2. If IPaC returns one or more federally listed, proposed, or candidate species as potentially present in the action area of the proposed project – other than bats (see below) – then project proponents must determine if proposed activities will have **no effect** on or **may affect** those species. For assistance in determining if suitable habitat for listed, candidate, or proposed species occurs within your project area or if species may be affected by project activities, you can obtain Life History Information for Listed and Candidate Species on our office website. If no impacts will occur to a species on the IPaC species list (e.g., there is no habitat present in the project area), the appropriate determination is **no effect**. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records.

3. Should you determine that project activities **may affect** any federally listed, please contact our office for further coordination. Letters with requests for consultation or correspondence about your project should include the Consultation Tracking Number in the header. Electronic submission is preferred.

Northern Long-Eared Bats
Northern long-eared bats occur throughout Minnesota and Wisconsin and the information below may help in determining if your project may affect these species.

This species hibernates in caves or mines only during the winter. In Minnesota and Wisconsin, the hibernation season is considered to be November 1 to March 31. During the active season (April 1 to October 31) they roost in forest and woodland habitats. Suitable summer habitat for northern long-eared bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥3 inches dbh for northern long-eared bat that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of forested/wooded habitat. Northern long-eared bats have also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat and evaluated for use by bats. If your project will impact caves or mines or will involve clearing forest or woodland habitat containing suitable roosting habitat, northern long-eared bats could be affected.

Examples of unsuitable habitat include:
- Individual trees that are greater than 1,000 feet from forested or wooded areas,
- Trees found in highly developed urban areas (e.g., street trees, downtown areas),
- A pure stand of less than 3-inch dbh trees that are not mixed with larger trees, and
- A monoculture stand of shrubby vegetation with no potential roost trees.

If IPaC returns a result that northern long-eared bats are potentially present in the action area of the proposed project, project proponents can conclude the proposed activities **may affect** this species **IF** one or more of the following activities are proposed:
- Clearing or disturbing suitable roosting habitat, as defined above, at any time of year,
- Any activity in or near the entrance to a cave or mine,
- Mining, deep excavation, or underground work within 0.25 miles of a cave or mine,
- Construction of one or more wind turbines, or
- Demolition or reconstruction of human-made structures that are known to be used by bats based on observations of roosting bats, bats emerging at dusk, or guano deposits or stains.

If none of the above activities are proposed, project proponents can conclude the proposed activities will have **no effect** on the northern long-eared bat. Concurrence from the Service is not required for **No**

Effect determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records.

If any of the above activities are proposed, and the northern long-eared bat appears on the user's species list, the federal project user will be directed to either the northern long-eared bat 4(d) D-key or the Federal Highways Administration, Federal Railways Administration, and Federal Transit Administration Indiana bat/Northern long-eared bat D-key, depending on the type of project and federal agency involvement. Similar to the Minnesota-Wisconsin D-key, these d-keys helps to determine if prohibited take might occur and, if not, will generate an automated verification letter. The 4(d) D-key streamlines consultation under the 2016 range-wide programmatic biological opinion for the 4(d) rule.

Please note: On November 30, 2022, the Service published a proposal final rule to reclassify the northern long-eared bat as endangered under the Endangered Species Act. On January 26, 2023, the Service published a 60-day extension for the final reclassification rule in the Federal Register, moving the effective listing date from January 30, 2023, to March 31, 2023. This extension will provide stakeholders and the public time to preview interim guidance and consultation tools before the rule becomes effective. When available, the tools will be available on the Service's northern long-eared bat website (https://www.fws.gov/species/northern-long-eared-bat-myotis-septentrionalis). Once the final rule goes into effect on March 31, 2023, the 4(d) D-key will no longer be available (4(d) rules are not available for federally endangered species) and will be replaced with a new Range-wide NLEB D-key (range-wide d-key). For projects not completed by March 31, 2023, that were previously reviewed under the 4(d) d-key, there may be a need for reinitiation of consultation. For these ongoing projects previously reviewed under the 4(d) d-key that may result in incidental take of the northern long-eared bat, we recommend you review your project using the new range-wide d-key once available. If your project does not comply with the range-wide d-key, it may be eligible for use of the Interim (formal) Consultation framework (framework). The framework is intended to facilitate the transition from the 4(d) rule to typical Section 7 consultation procedures for federally endangered species and will be available only until spring 2024. Again, when available, these tools (new range-wide d-key and framework) will be available on the Service's northern long-eared bat website.

Whooping Crane
Whooping crane is designated as a non-essential experimental population in Wisconsin and consultation under Section 7(a)(2) of the Endangered Species Act is only required if project activities will occur within a National Wildlife Refuge or National Park. If project activities are proposed on lands outside of a National Wildlife Refuge or National Park, then you are not required to consult. For additional information on this designation and consultation requirements, please review "Establishment of a Nonessential Experimental Population of Whooping Cranes in the Eastern United States."

Other Trust Resources and Activities
Bald and Golden Eagles - Although the bald eagle has been removed from the endangered species list, this species and the golden eagle are protected by the Bald and Golden Eagle Act and the Migratory Bird Treaty Act. Should bald or golden eagles occur within or near the project area please contact our office for further coordination. For communication and wind energy projects, please refer to additional guidelines below.

Migratory Birds - The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Service. The Service has the responsibility under the MBTA to proactively prevent the mortality of migratory birds whenever possible and we encourage implementation of recommendations that minimize potential impacts to migratory birds. Such measures include clearing forested habitat outside the nesting season (generally March 1 to August 31) or conducting nest surveys prior to clearing to avoid injury to eggs or nestlings.

Communication Towers - Construction of new communications towers (including radio, television, cellular, and microwave) creates a potentially significant impact on migratory birds, especially some 350 species of night-migrating birds. However, the Service has developed voluntary guidelines for minimizing impacts.

Transmission Lines - Migratory birds, especially large species with long wingspans, heavy bodies, and poor maneuverability can also collide with power lines. In addition, mortality can occur when birds, particularly hawks, eagles, kites, falcons, and owls, attempt to perch on uninsulated or unguarded power poles. To minimize these risks, please refer to guidelines developed by the Avian Power Line Interaction Committee and the Service. Implementation of these measures is especially important along sections of lines adjacent to wetlands or other areas that support large numbers of raptors and migratory birds.

Wind Energy - To minimize impacts to migratory birds and bats, wind energy projects should follow the Service's Wind Energy Guidelines. In addition, please refer to the Service's Eagle Conservation Plan Guidance, which provides guidance for conserving bald and golden eagles in the course of siting, constructing, and operating wind energy facilities.

State Department of Natural Resources Coordination
While it is not required for your Federal section 7 consultation, please note that additional state endangered or threatened species may also have the potential to be impacted. Please contact the Minnesota or Wisconsin Department of Natural Resources for information on state listed species that may be present in your proposed project area.

Minnesota
Minnesota Department of Natural Resources - Endangered Resources Review Homepage
Email: Review.NHIS@state.mn.us

Wisconsin
Wisconsin Department of Natural Resources - Endangered Resources Review Homepage
Email: DNRERReview@wi.gov

We appreciate your concern for threatened and endangered species. Please feel free to contact our office with questions or for additional information.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Minnesota-Wisconsin Ecological Services Field Office
3815 American Blvd East
Bloomington, MN 55425-1659
(952) 858-0793

PROJECT SUMMARY

Project Code: 2023-0058040
Project Name: Hayward Hydroelectric Project FERC Relicensing
Project Type: Dam - Operations
Project Description: Relicensing of the existing Hayward Hydroelectric Project in order to continue operating the project in a run-of-river mode for power generation. License application is due in 2023.
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@46.01419095,-91.47772929714314,14z

Counties: Sawyer County, Wisconsin

ENDANGERED SPECIES ACT SPECIES

There is a total of 5 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Canada Lynx *Lynx canadensis* Population: Wherever Found in Contiguous U.S. There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3652	Threatened
Gray Wolf *Canis lupus* Population: U.S.A.: All of AL, AR, CA, CO, CT, DE, FL, GA, IA, IN, IL, KS, KY, LA, MA, MD, ME, MI, MO, MS, NC, ND, NE, NH, NJ, NV, NY, OH, OK, PA, RI, SC, SD, TN, TX, VA, VT, WI, and WV; and portions of AZ, NM, OR, UT, and WA. Mexico. There is **final** critical habitat for this species. Species profile: https://ecos.fws.gov/ecp/species/4488	Endangered
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened
Tricolored Bat *Perimyotis subflavus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Dec 1 to Aug 31
Black Tern *Chlidonias niger* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3093	Breeds May 15 to Aug 20

NAME	BREEDING SEASON
Black-billed Cuckoo *Coccyzus erythropthalmus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Bobolink *Dolichonyx oryzivorus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Canada Warbler *Cardellina canadensis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Evening Grosbeak *Coccothraustes vespertinus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 15 to Aug 10
Golden Eagle *Aquila chrysaetos* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Jan 1 to Aug 31
Golden-winged Warbler *Vermivora chrysoptera* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8745	Breeds May 1 to Jul 20
Wood Thrush *Hylocichla mustelina* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

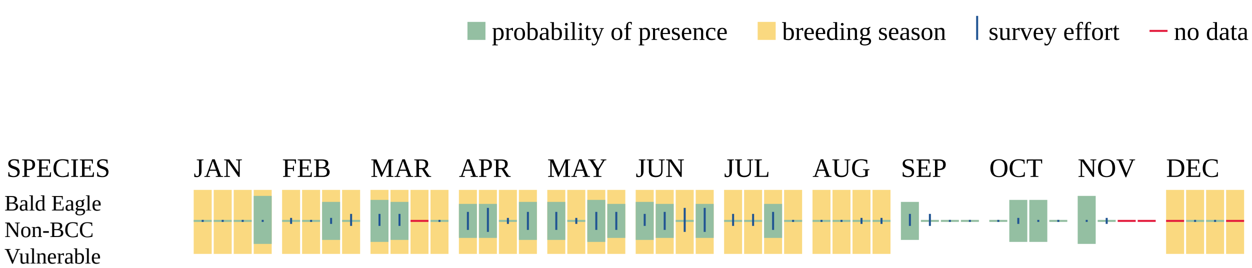
1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

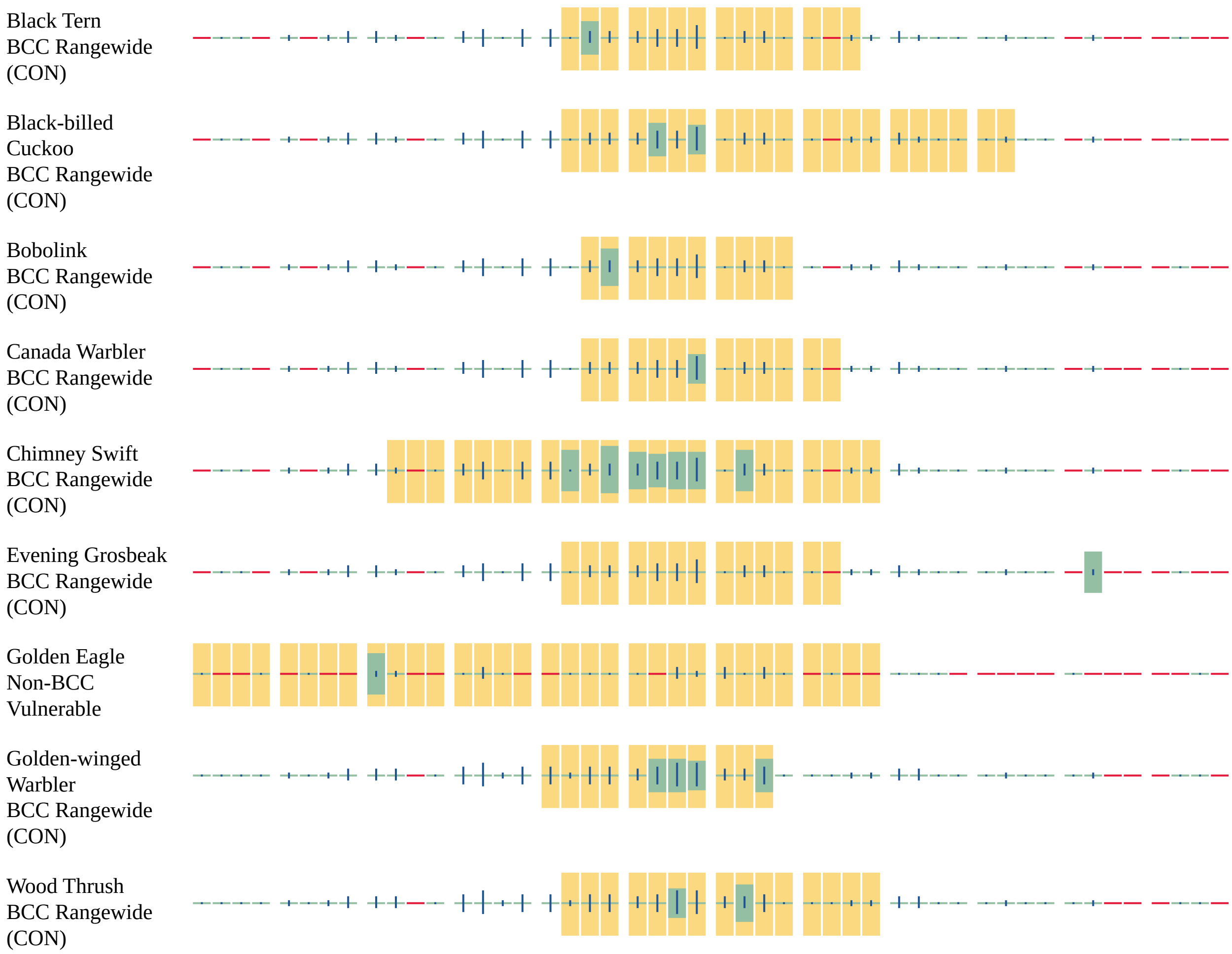
Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.





Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

MIGRATORY BIRDS FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?
The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);

2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects
For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities,

should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

LAKE

- L1UBH
- L2ABH

FRESHWATER FORESTED/SHRUB WETLAND

- PSS1/EM1Bg
- PFO1Bg
- PSS1Bg
- PFO4/SS3Bg
- PFO1/SS1Bg
- PFO1/EM1Bg
- PFO1/4Bg

FRESHWATER EMERGENT WETLAND

- PEM1C

FRESHWATER POND

- PUBH
- PUBGx
- PABG

RIVERINE

- R2UBH
- R5UBH
- R4SBC

IPAC USER CONTACT INFORMATION

Agency: Mead & Hunt
Name: Darrin Johnson
Address: 2440 Deming Way
City: Middleton
State: WI
Zip: 53562
Email darrin.johnson@meadhunt.com
Phone: 6084430313

APPENDIX E-23 Wood and Blanding’s Turtle Study Report

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gai consultants



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

Mead & Hunt

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:
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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 (*Glyptemys 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	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	FIGURE 1 HAYWARD HYDROELECTRIC PROJECT LOCATION MAP

SAWYER COUNTY, WI

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

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DRAWN BY: EMW | DATE: 8/30/2022
CHECKED: TDB | APPROVED: LLS

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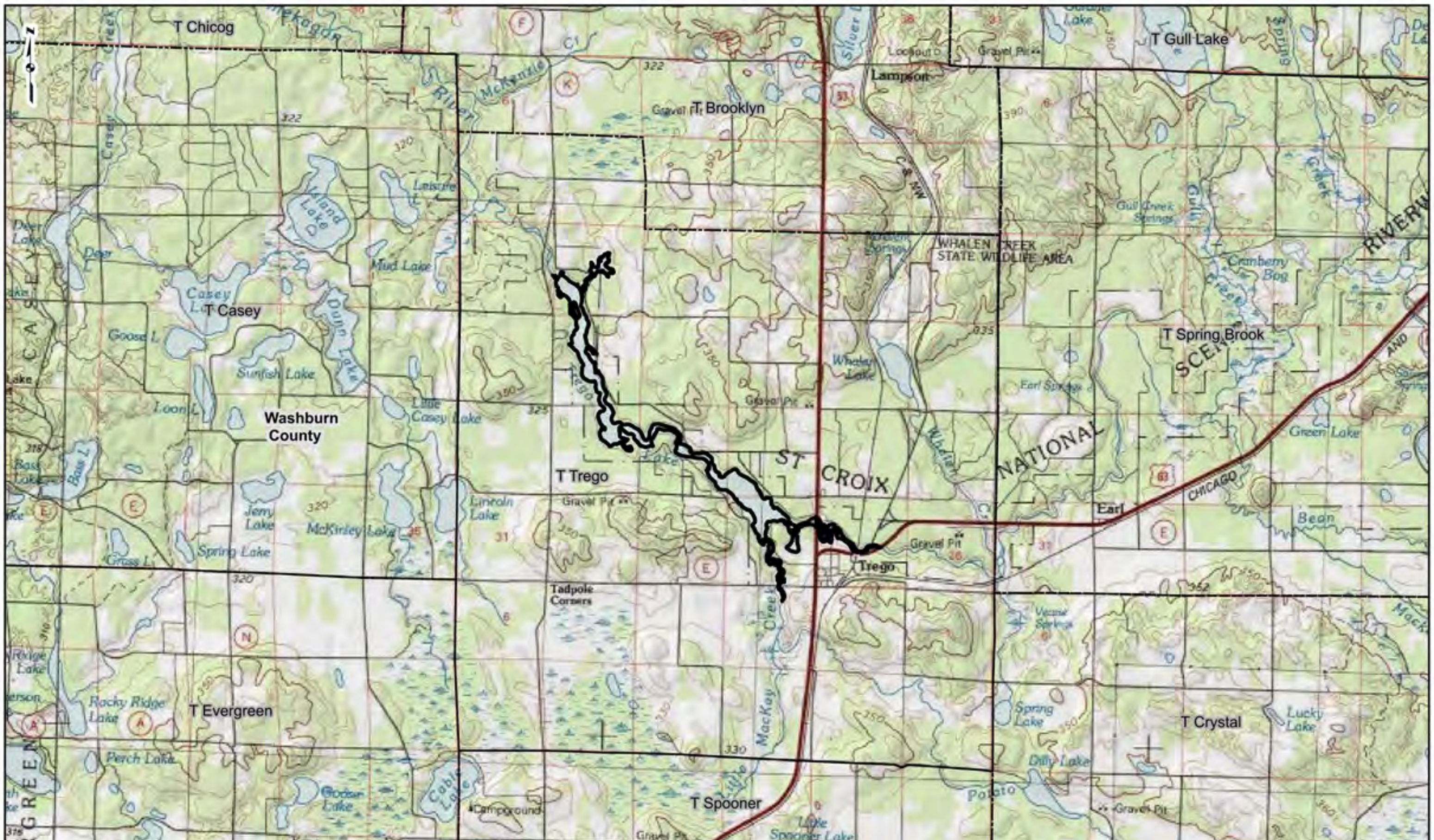
FIGURE 2

Trego Hydroelectric Project Location Map



PROJECT LOCATION	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	FIGURE 1 TREGO HYDROELECTRIC PROJECT LOCATION MAP

WASHBURN COUNTY, WI

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

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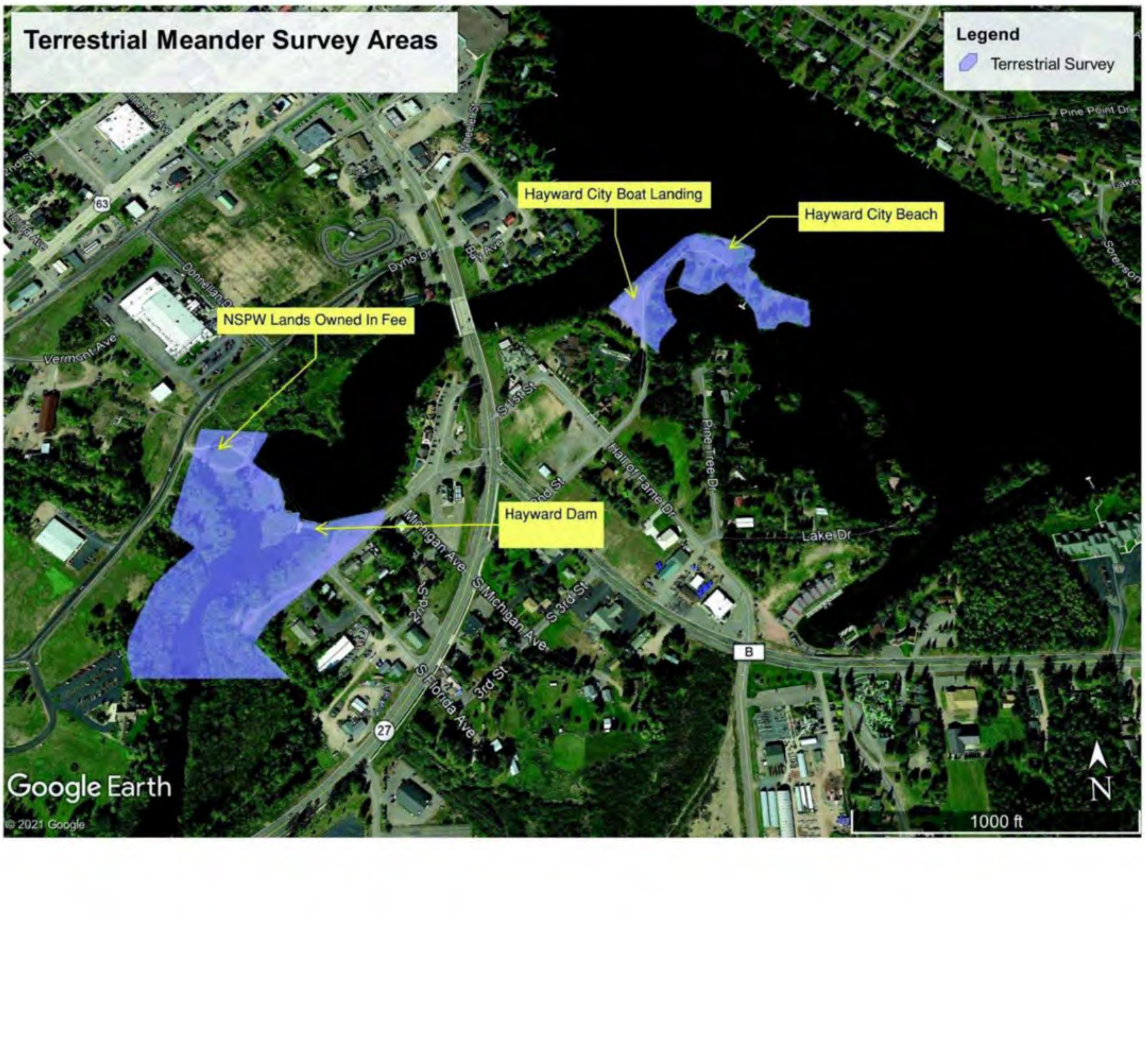
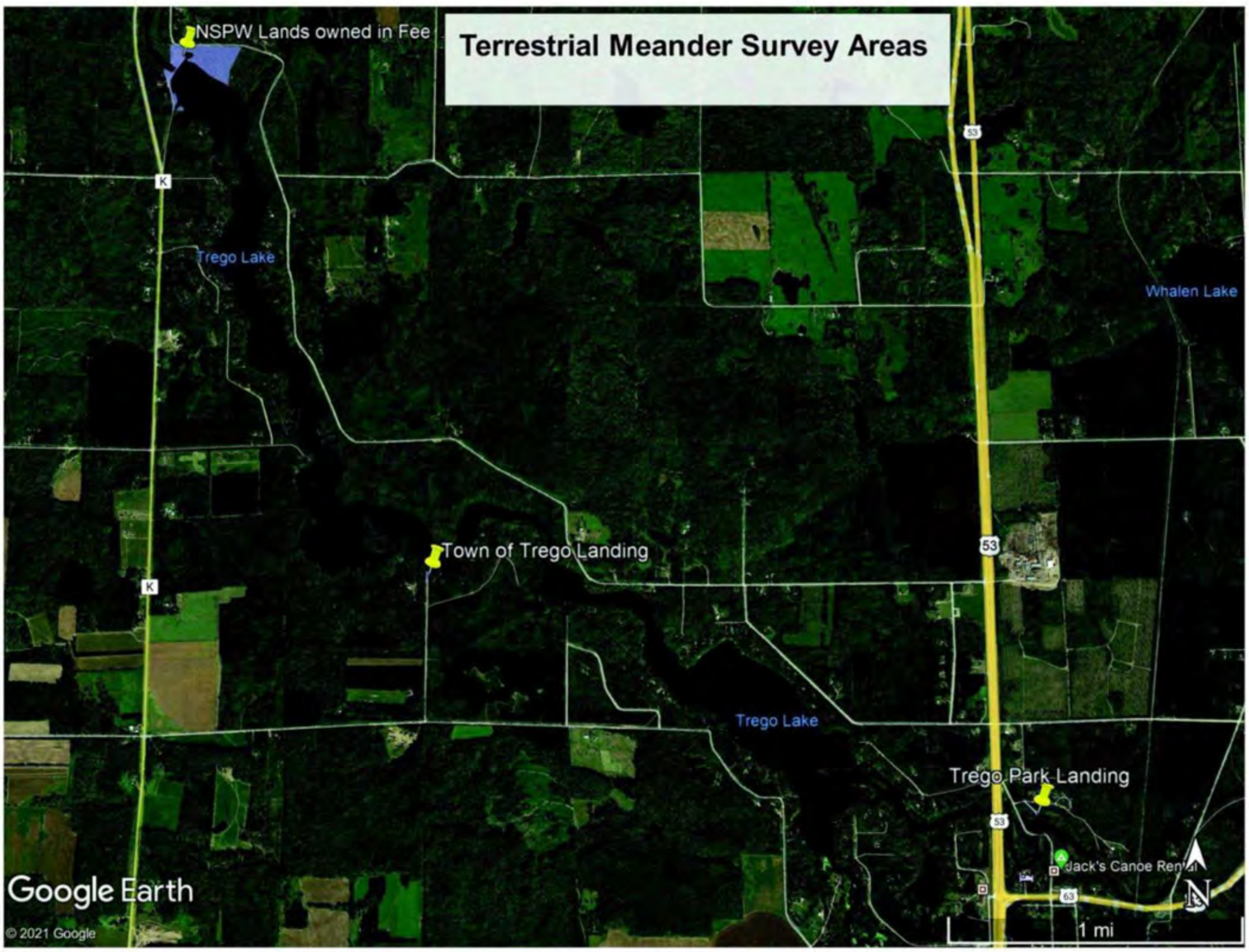
FIGURE 3

Hayward and Trego Lands Owned by Licensee and Open to the Public

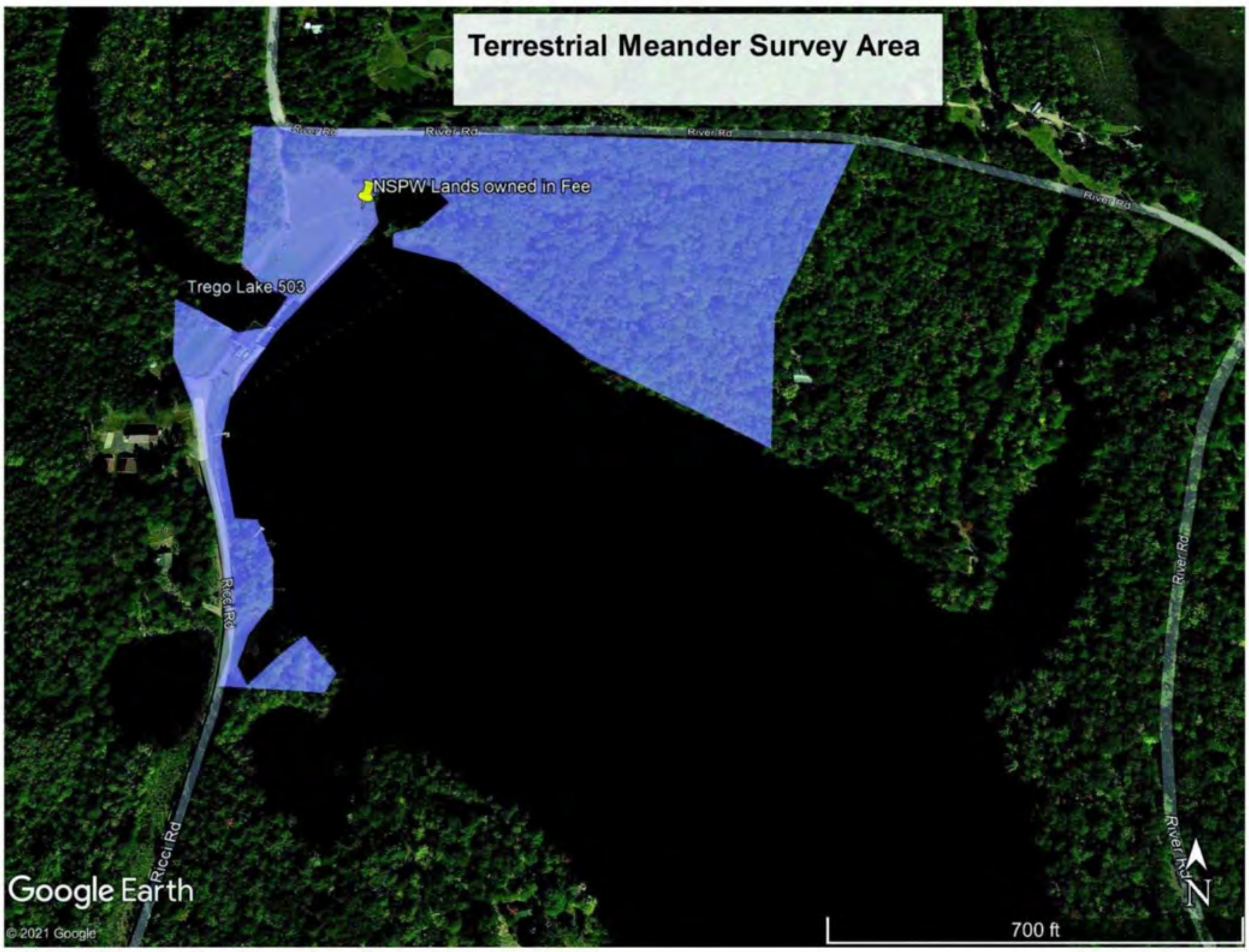
Hayward Hydroelectric Project



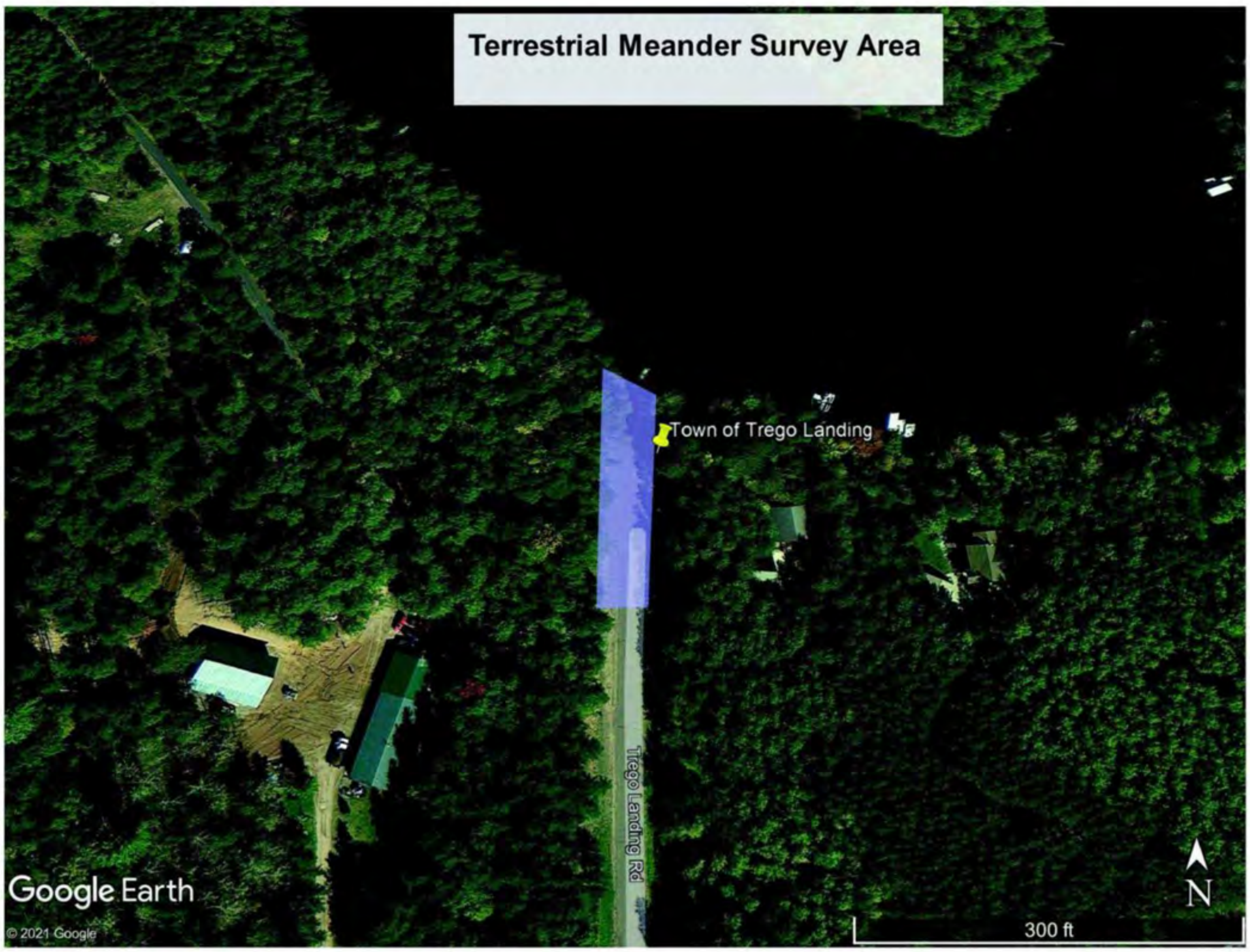
Trego Hydroelectric Project



Trego Hydroelectric Project

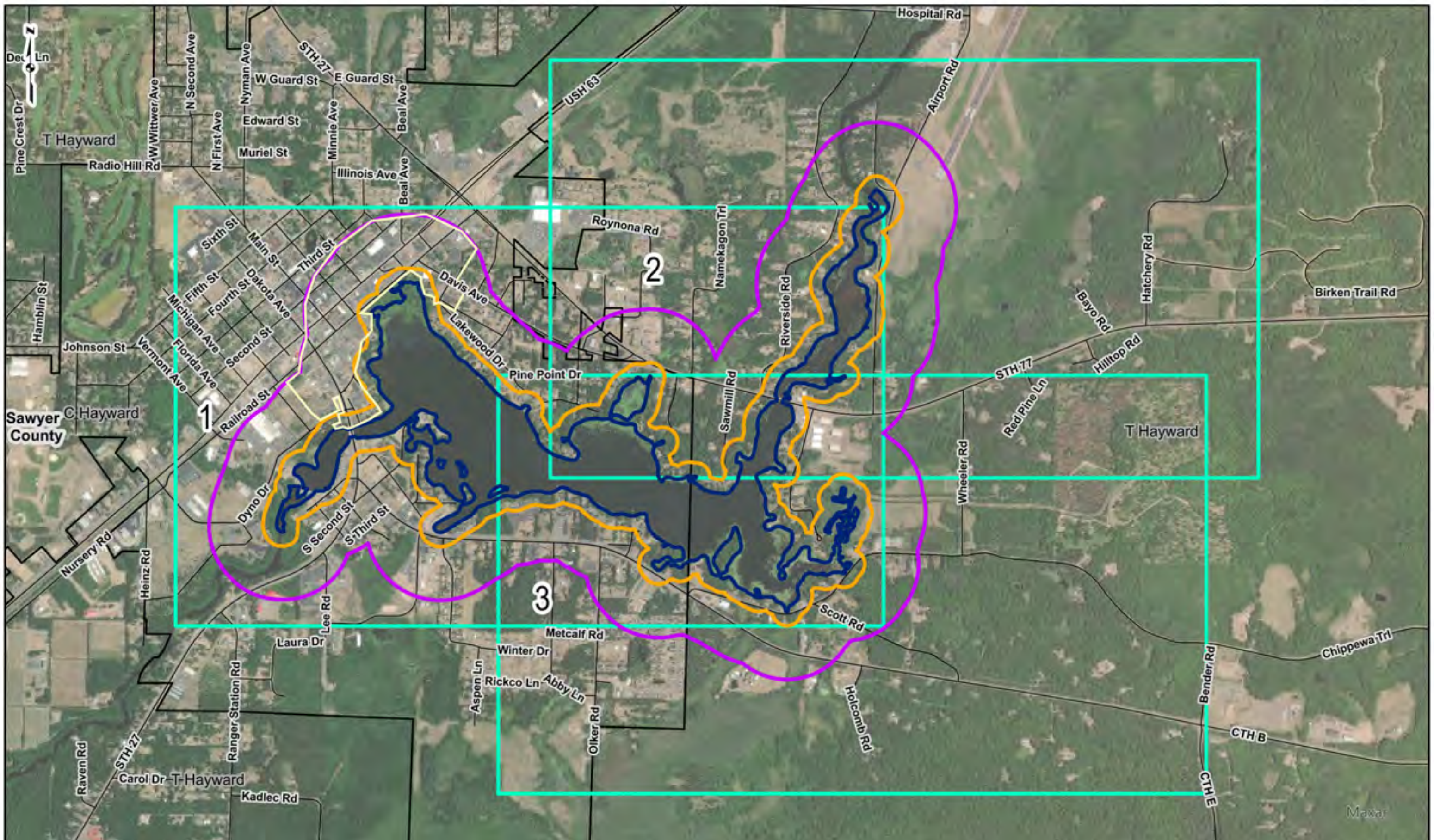


Trego Hydroelectric Project



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	Hayward Urban Area
984' Blanding's Buffer	Road Centerline
Shoreline within Project	Community Boundary
Sheet Index	County Boundary

0 1,000 2,000 4,000 Feet

FIGURE 4
HAYWARD OVERVIEW MAP

HAYWARD WOOD AND BLANDING'S TURTLE NESTING HABITAT STUDY

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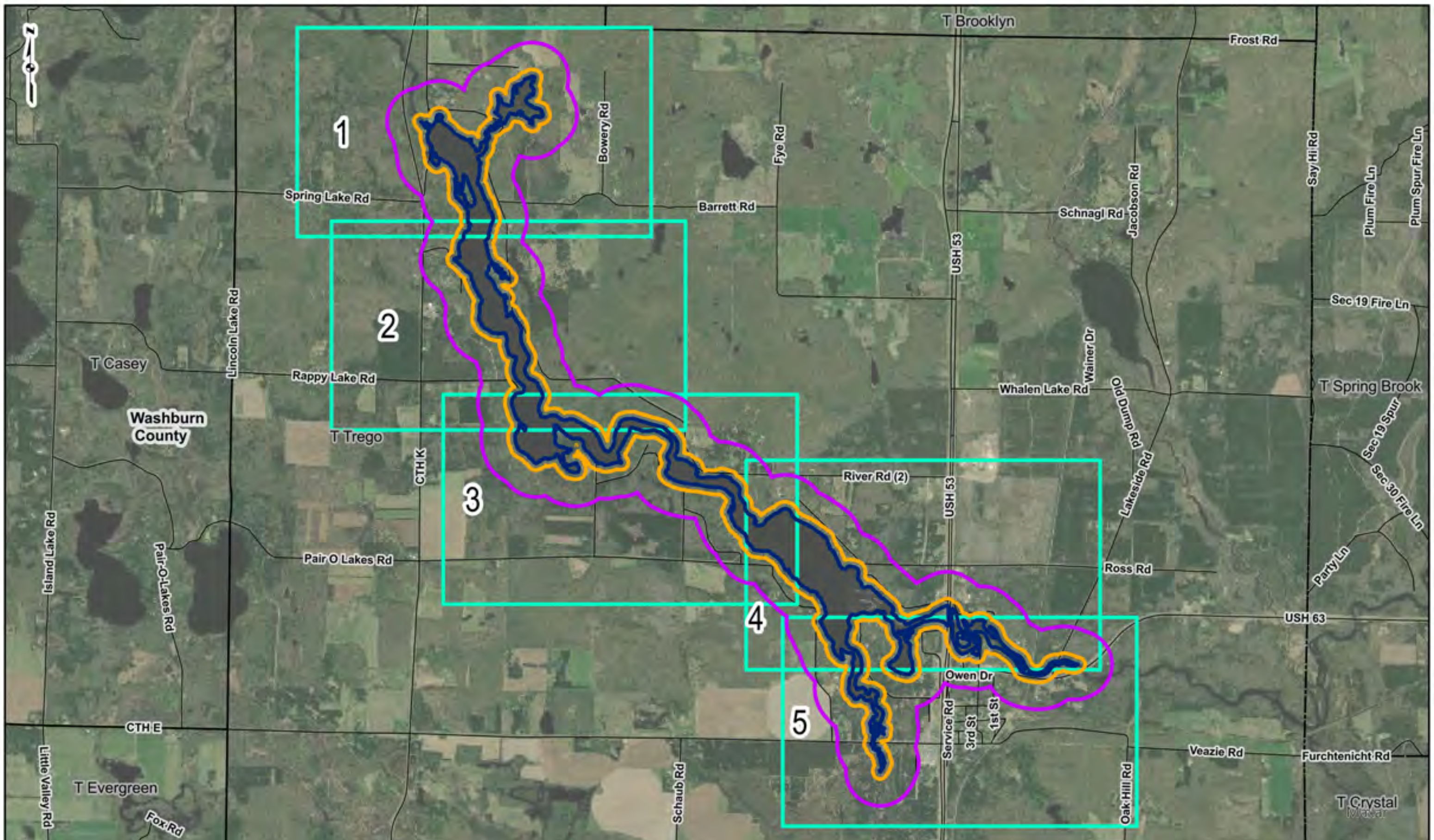
FIGURE 5
Trego Overview Map



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

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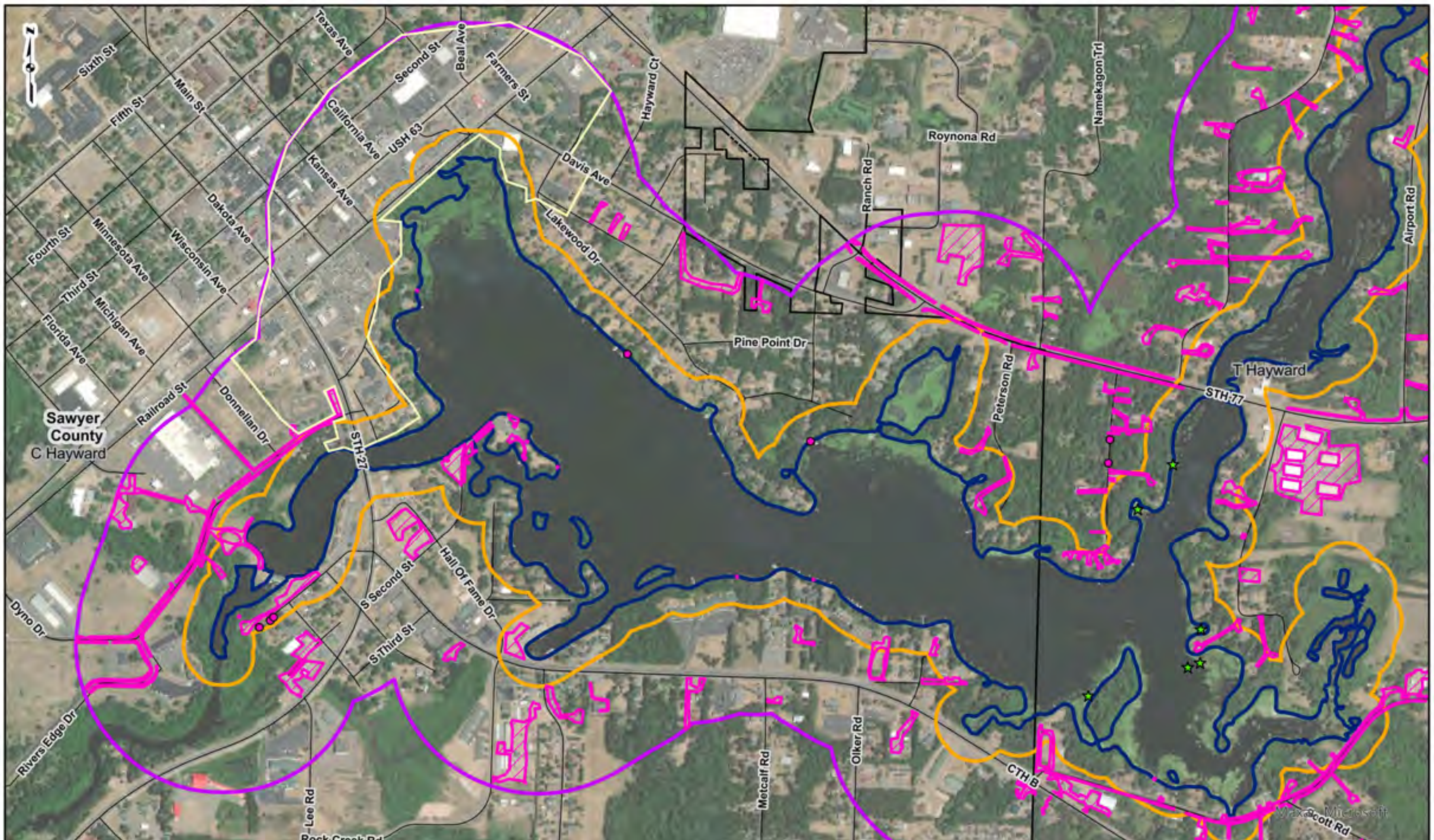
FIGURE 6
Hayward Wood and Blanding's Turtle Nesting Habitat and Basking Areas



PROJECT LOCATION

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	Shoreline within Project Area
Turtle Nesting Habitat	Hayward Urban Area
Turtle Nesting Habitat	Road Centerline
200' Wood Turtle Buffer	Community Boundary
984' Blanding's Buffer	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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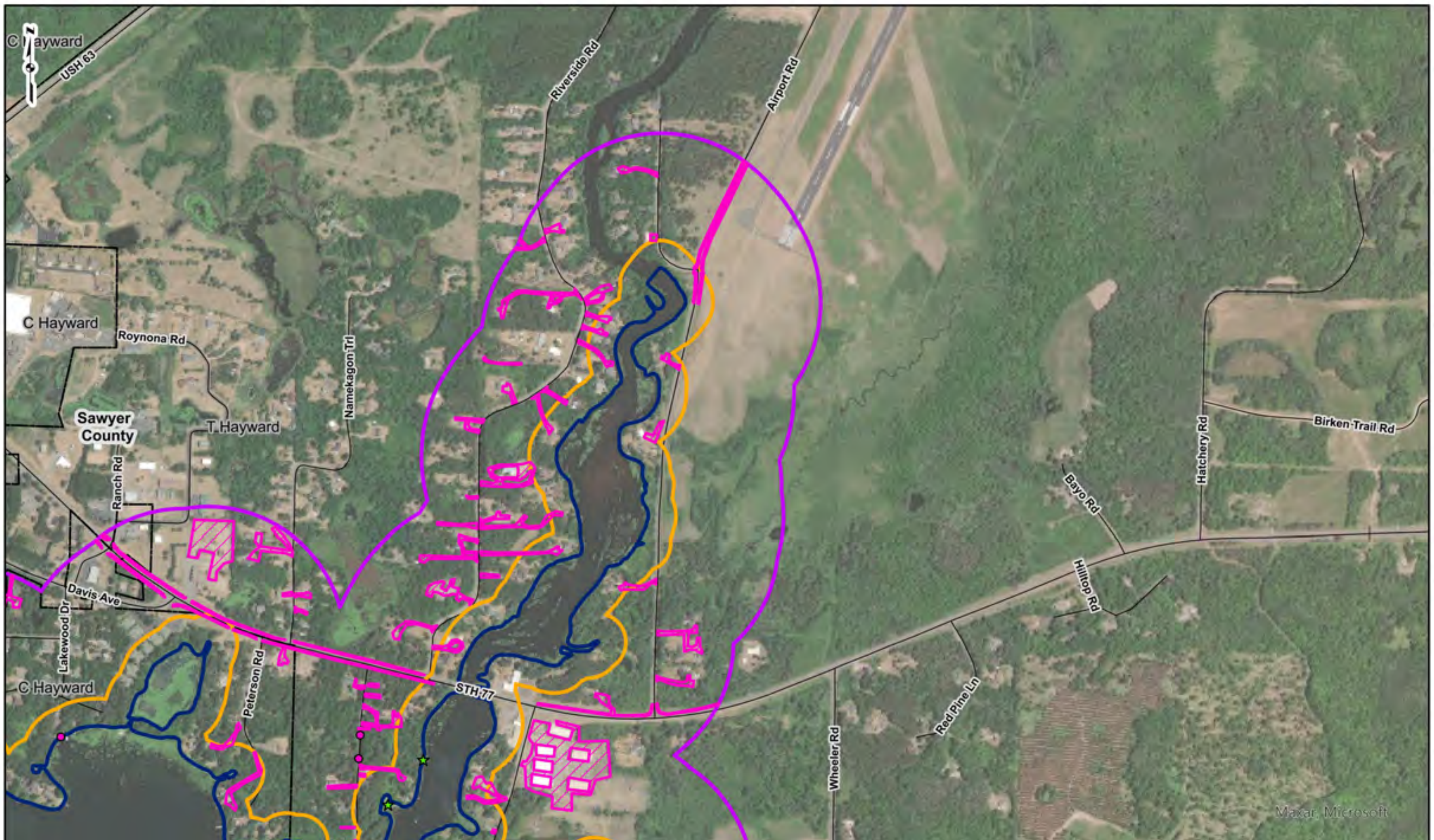

PROJECT LOCATION

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	Shoreline within Project Area
Turtle Nesting Habitat	Hayward Urban Area
Turtle Nesting Habitat	Road Centerline
200' Wood Turtle Buffer	Community Boundary
984' Blanding's Buffer	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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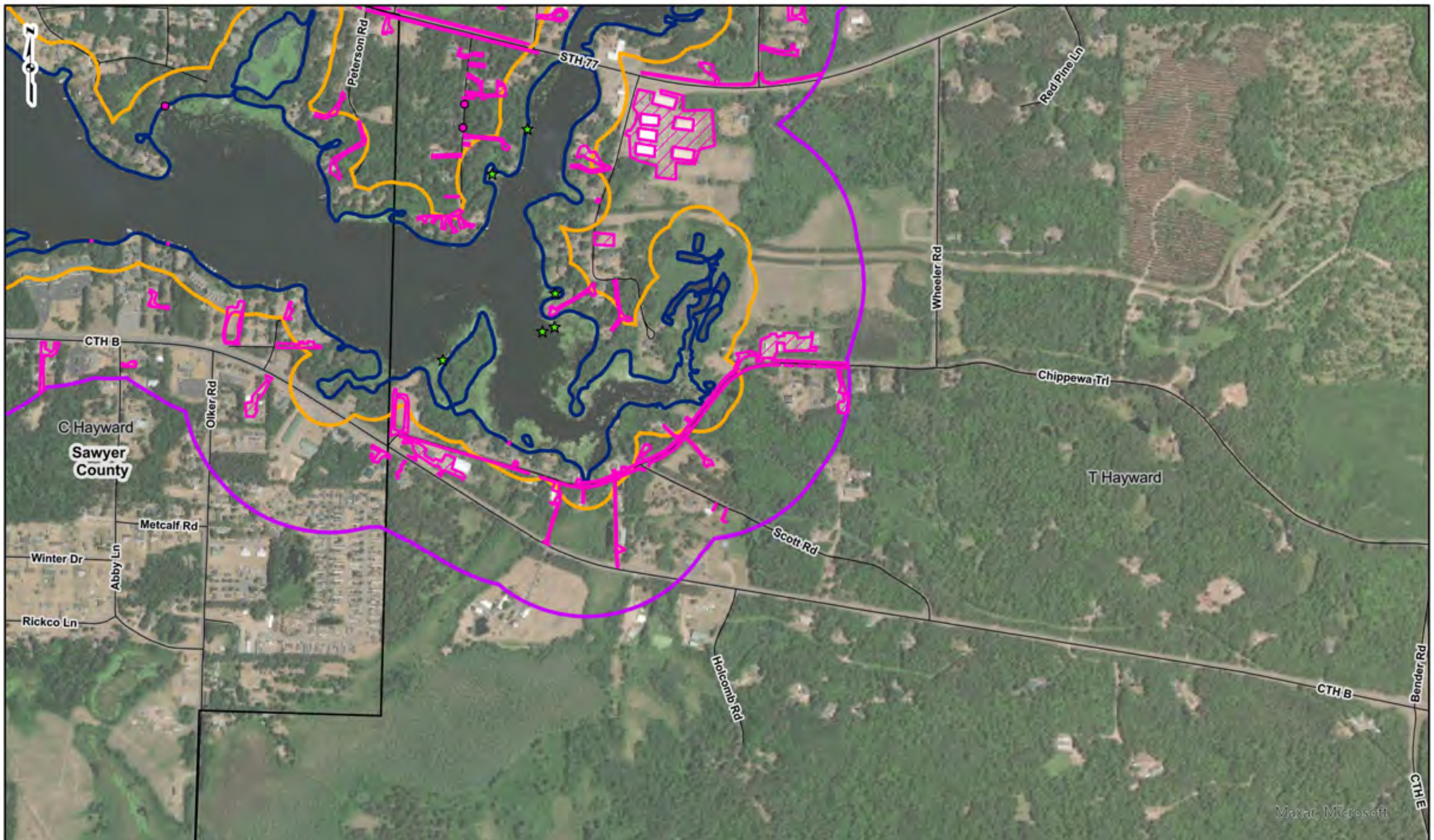

PROJECT LOCATION

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 3 of 3

HAYWARD WOOD AND BLANDING'S TURTLE NESTING HABITAT STUDY

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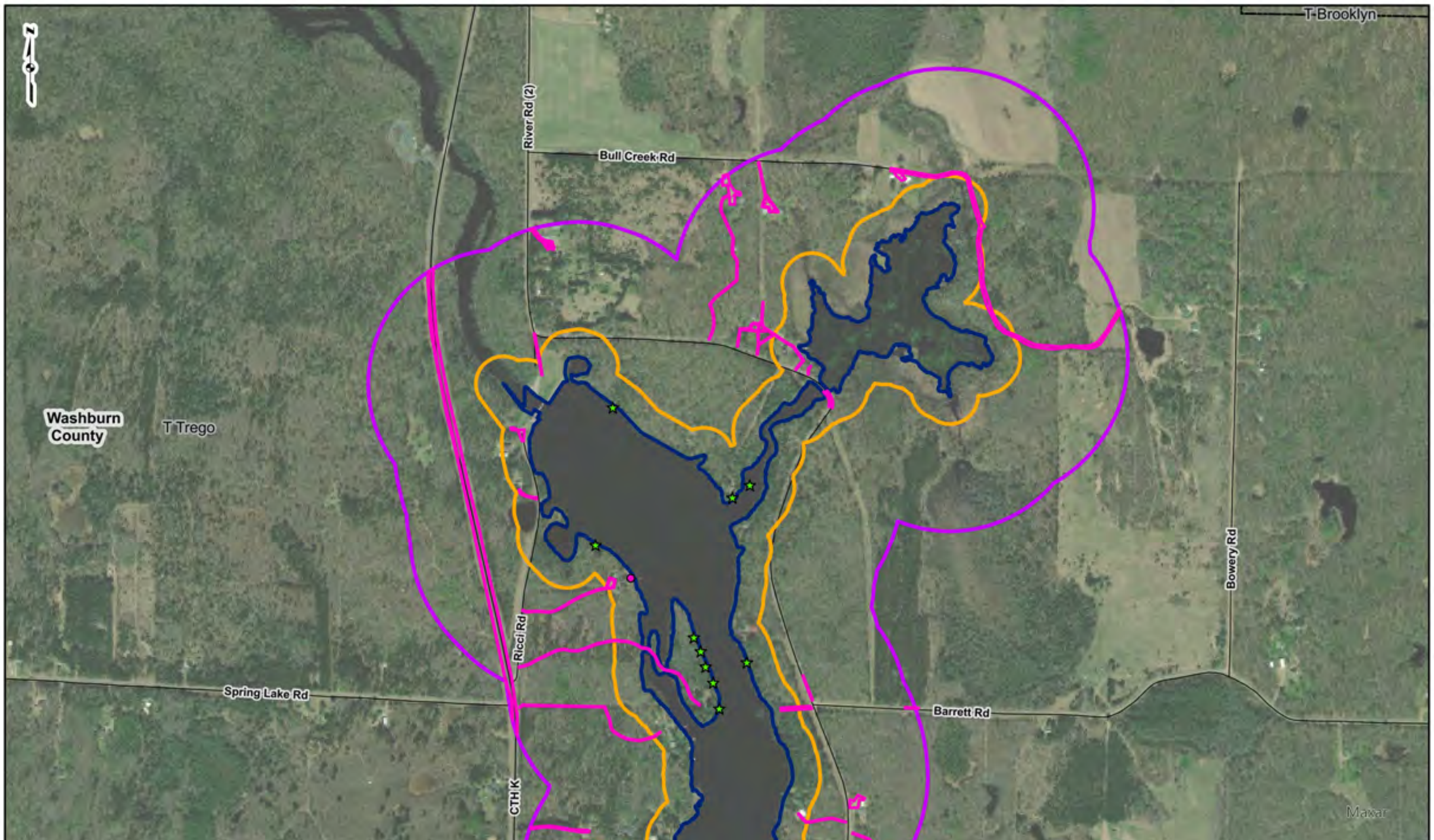
FIGURE 7
Trego Wood and Blanding's Turtle Nesting Habitat and Basking Areas



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	Shoreline within Project Area
Turtle Nesting Habitat	Road Centerline
Turtle Nesting Habitat	Community Boundary
200' Wood Turtle Buffer	County Boundary
984' Blanding's Buffer	

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

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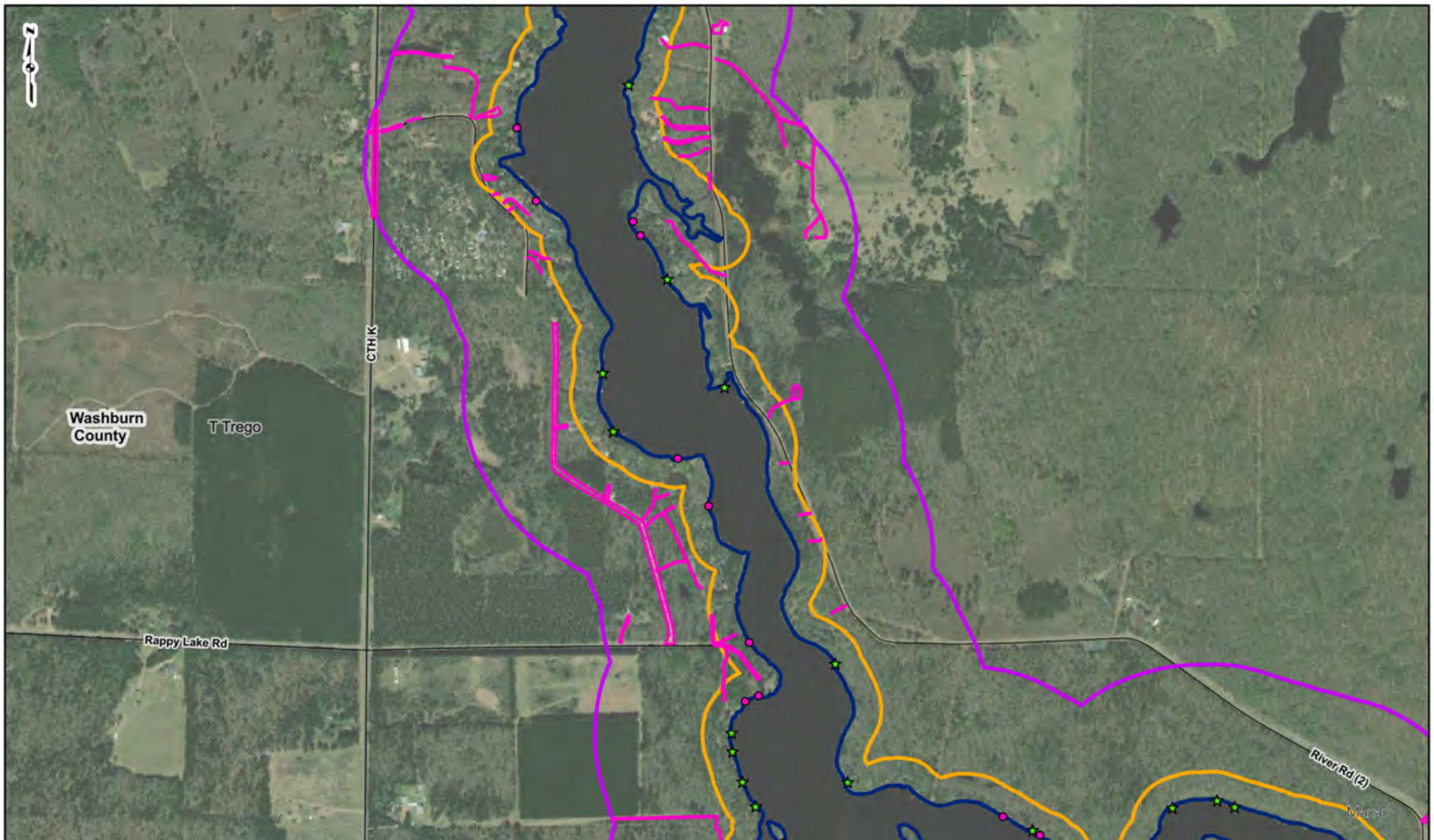

PROJECT LOCATION

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
- Turtle Nesting Habitat
- Turtle Nesting Habitat
- 200' Wood Turtle Buffer
- 984' Blanding's Buffer
- Shoreline within Project Area
- 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 2 of 5

TREGO WOOD AND BLANDING'S TURTLE NESTING HABITAT STUDY

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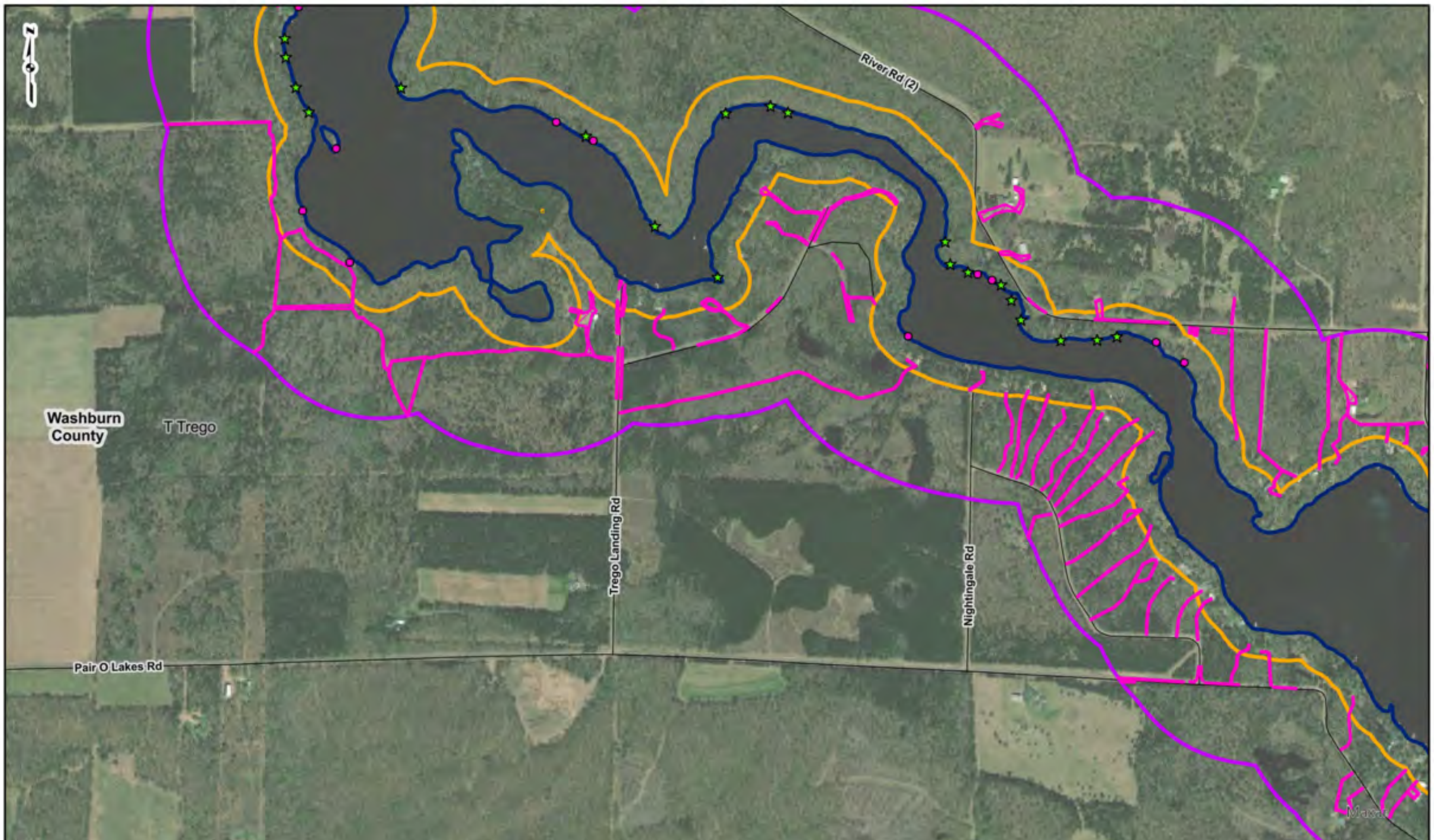


PROJECT LOCATION

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	Shoreline within Project Area
Turtle Nesting Habitat	Road Centerline
Turtle Nesting Habitat	Community Boundary
200' Wood Turtle Buffer	County Boundary
984' Blanding's Buffer	

0 500 1,000 2,000 Feet

FIGURE 7
TREGO WOOD AND BLANDING'S TURTLE NESTING HABITAT AND BASKING AREAS
SHEET 3 of 5

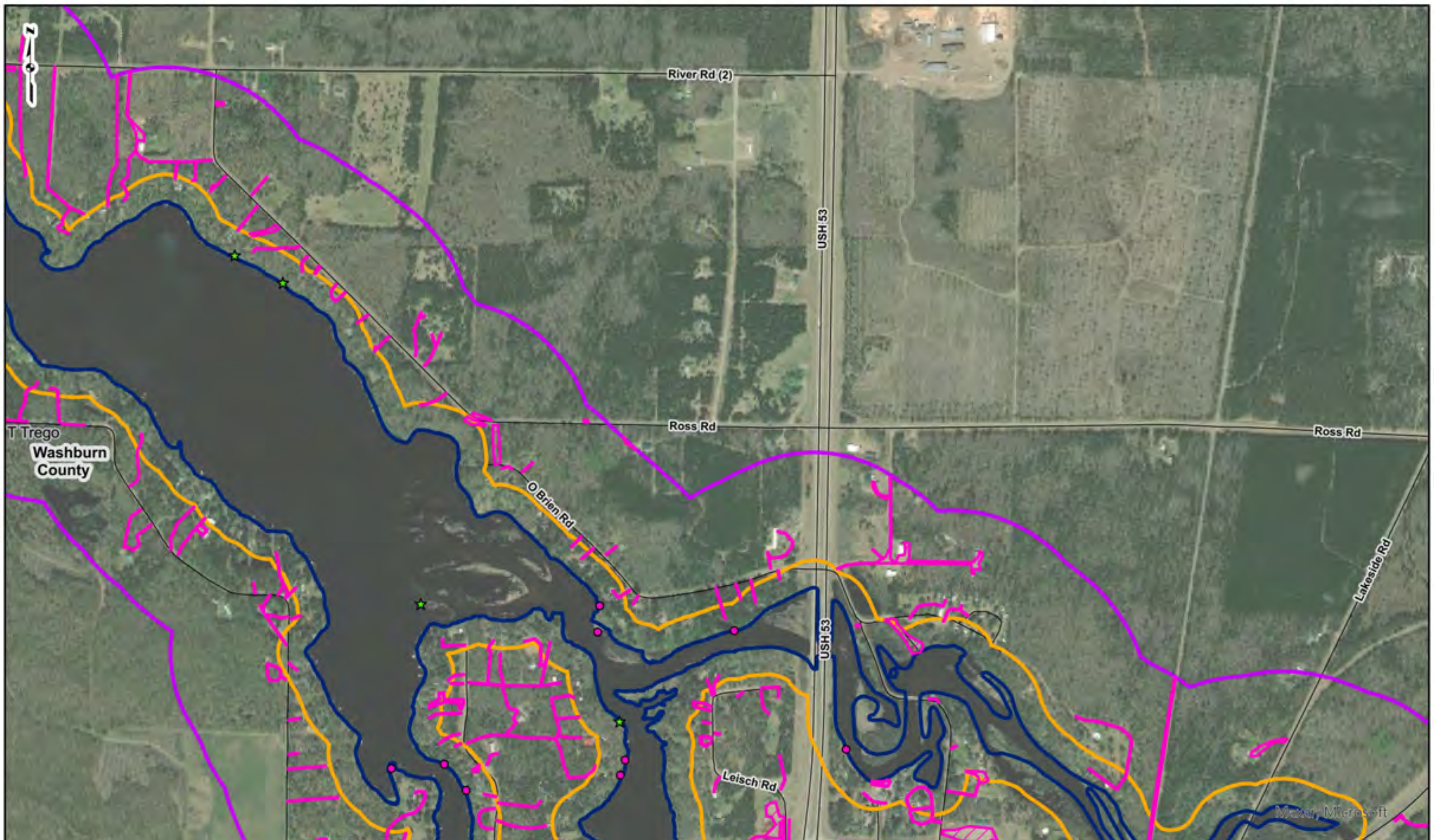
TREGO WOOD AND BLANDING'S TURTLE NESTING HABITAT STUDY

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



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
Turtle Nesting Habitat
Turtle Nesting Habitat
200' Wood Turtle Buffer
984' Blanding's Buffer
Shoreline within Project Area
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 4 of 5

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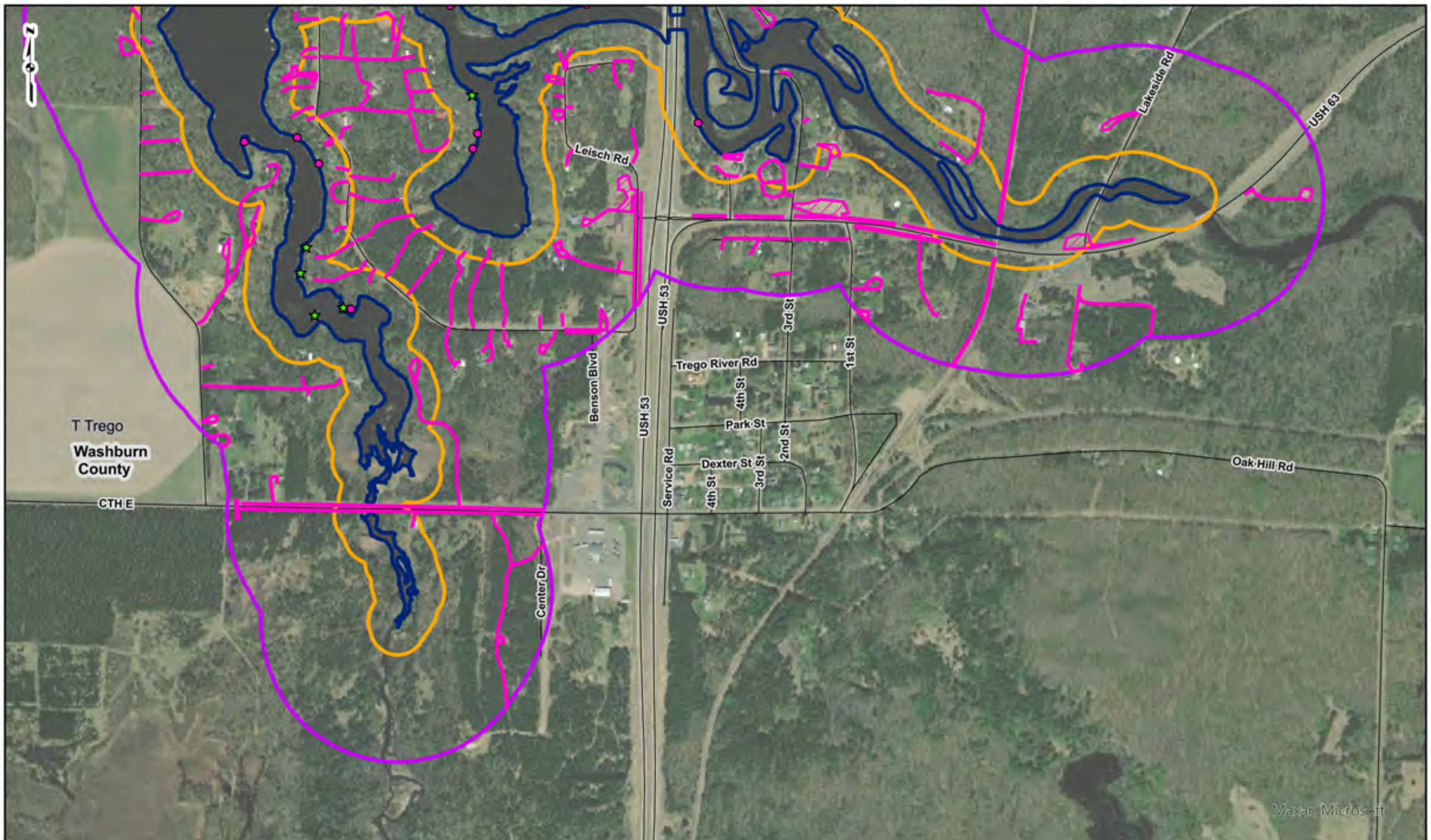
DRAWN BY: EMW | DATE: 8/30/2022
CHECKED: TDB | APPROVED: LLS

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



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
- Turtle Nesting Habitat
- Turtle Nesting Habitat
- 200' Wood Turtle Buffer
- 984' Blanding's Buffer
- Shoreline within Project Area
- 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 5 of 5

TREGO WOOD AND BLANDING'S TURTLE NESTING HABITAT STUDY

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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

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

APPENDIX E-24 BITP/A for Wisconsin Cave Bats

Broad Incidental Take Permit and Broad Incidental Take Authorization for Wisconsin Cave Bats

Conservation Plan - November 2022

During this COVID-19 pandemic, there is increasing concern that symptomatic or asymptomatic humans could inadvertently pass the virus that causes COVID-19 disease in humans to mammals, including bats, during handling. As a reminder, any handling of bats by a pest control operator requires an Endangered/Threatened (E/T) Species Permit (this is not required for a landowner). In addition, please be sure to continue following disinfection protocols for any equipment used during bat removals or exclusions (see Appendix 4).

The department has issued this broad incidental take authorization (used by state agencies) and broad incidental take permit (used by non-state agencies and individuals), as provided for under s. 29.604, Wis. Stats., to allow for the incidental taking of state listed cave bats in Wisconsin that may occur as a result of specific public health concerns, bat removals, building demolitions, tree cutting, bridge demolitions, miscellaneous building repairs and wind energy development projects.

This permit and authorization cover the above activities only if the associated minimization measures are followed and take is reported (where required). These measures must be followed when a bat is present or suspected to be present (e.g., evidence of bat presence, Endangered Resources Review). Please note that the northern long-eared bat is currently listed as threatened in Wisconsin and threatened with 4(d) rule at the federal level by the United States Fish and Wildlife Service (USFWS, http://www.fws.gov/Midwest/endangered/mammals/nleb/index.html). For the activities listed above, this Conservation Plan includes both state and federal requirements. The state cannot permit or authorize take of a federally listed species, however this Conservation Plan was written to incorporate both state and federal requirements.

For activities not listed above, contact the Wisconsin Department of Natural Resources' Endangered Resources Review Program (DNRERReview@wi.gov) for more information on state and federal requirements. Please note that building demolition, tree cutting, bridge projects, miscellaneous building projects and wind energy development typically require a full Endangered Resources Review http://dnr.wi.gov/topic/ERReview/Review.html to determine impacts to other wildlife species as well.

An incidental take permit or authorization is typically issued on a project-by-project basis, however a broad incidental take permit and broad incidental take authorization were created for this situation so that neither an application nor a permit fee are required. An individual following the minimization measures listed below is automatically covered by this broad incidental take permit/authorization. Take will be minimized by following specific minimization measures and the Department has concluded that the projects covered under this permit/authorization are not likely to jeopardize the continued existence and recovery of the state population of these bats or the whole plant-animal community of which they are a part; and has benefit to the public health, safety or welfare that justifies the action.

Project Location

Statewide

Project Information

This permit/authorization cover specific public health concerns, bat removals, building demolitions, forestry activities, bridge demolitions, miscellaneous building repairs and wind energy development projects as described in *Minimization Measures.*

Species Information

This permit/authorization cover all cave bats currently listed in Wisconsin (NR 27.07, Wis. Admin. Code):

- Big brown bat (*Eptesicus fuscus*) – State Threatened
  The big brown bat is a large insectivorous bat, weighing 15.0-26.0 grams. Fur color is russet to dark brown, and the muzzle is black and hairless. In summer, big brown bats commonly roost in artificial structures such as barns, but these bats will also use crevices in trees and rock faces. Big brown bats migrate short distances to caves and mines where they will hibernate for the winter.
- Tricolored bat (*Perimyotis subflavus*) – State Threatened
  The tricolored bat (formerly eastern pipistrelle) is Wisconsin's smallest bat weighing 4.0-8.0 grams. Fur color ranges from golden brown to reddish brown, and the wing membrane is black with red forearms. The tricolored bat is an insectivorous bat. In summer, these bats commonly roost in the branches of deciduous trees disguised as a leaf. This species migrates short distances to caves and mines in the fall where they hibernate over the winter.
- Little brown bat (*Myotis lucifugus*) – State Threatened
  The little brown bat is a medium-sized member of the genus *Myotis*. This insectivorous bat weighs 5.0-12.5 grams, and has tan, reddish-brown or dark brown fur. This species commonly uses artificial structures such as attics and barns as summer roosting sites, but will also roost in crevices and cavities of trees. In fall, little brown bats make local long-distance migrations of up to 279 miles to caves and mines where they will hibernate for the winter.
- Northern long-eared bat (*Myotis septentrionalis*) – State Threatened and Federally Threatened The northern long-eared bat is dark brown with a gray belly, weighing 5.0-8.0 grams and is insectivorous. In summer this bat roosts in trees behind loose bark and in cracks/crevices/holes along the trunk of the tree. It rarely roosts in artificial structures. Unlike most of the state's bats, this species commonly forages in forest interior. In fall the northern long-eared bat migrates to caves and mines where they will hibernate for the winter.

Likely Impact to Species

Although minimization measures to protect the big brown, tricolored, little brown and northern long-eared bats are incorporated into this broad incidental take permit/authorization, it is not possible to fully avoid incidental take of these species in all situations. Due to the nature of activities covered under this permit/authorization, it is difficult to determine the exact number of individuals that could be taken as a result of the project; however take will be minimized by following specific minimization measures. The Department has concluded that the take allowed for under this permit/authorization is not likely to jeopardize the continued existence and recovery of the state population of these bats or the whole plant-animal community of which they are a part.

Alternative Actions

The following alternatives were considered for this permit/authorization:

Alternative 1: Do not allow for any take of cave bats.

> This alternative was determined to not be feasible, due to the large number of affected activities, and is not an appropriate public health decision.

Alternative 2: Do not allow for any take of cave bats during the summer roosting period but allow for some take throughout the remainder of the year.

> This alternative was determined to not be feasible, due to the large number of affected activities that occur during the summer roosting period, and is not an appropriate public health decision.

Alternative 3: Allow for some take of cave bats, with minimization measures in place, during the summer roosting period and throughout the remainder of the year.

> This option was the preferred alternative because it addresses public health concerns; protects a large number of bats; and allows for most affected activities to continue as planned, or with minimal modifications.

Minimization Measures

This permit/authorization covers the activities listed below only if the associated minimization measures are followed and take is reported (where required). These measures must be followed when a bat is present or suspected to be present (e.g., evidence of bat presence, Endangered Resources Review). Please note that the northern long-eared bat is currently listed as threatened in Wisconsin and threatened with 4(d) rule at the federal level by the United States Fish and Wildlife Service (USFWS, http://www.fws.gov/Midwest/endangered/mammals/nleb/index.html). For the activities listed below, this Conservation Plan includes both state and federal requirements. The state cannot permit or authorize take of a federally listed species, however this Conservation Plan was written to incorporate both state and federal requirements.

For activities not listed below, contact the Wisconsin Department of Natural Resources' Endangered Resources Review Program (DNRERReview@wi.gov) for more information on state and federal requirements. Please note that building demolition, tree cutting, bridge projects, miscellaneous building projects and wind energy development typically require a full Endangered Resources Review http://dnr.wi.gov/topic/ERReview/Review.html to determine impacts to other wildlife species as well.

Note: Take covered under this permit/authorization must be reported within 5 working days (where required below). Take not reported within 5 working days is not legally covered and is in violation of the Wisconsin Endangered Species Law (s. 29.604, Wis. Stats.). Reports can be submitted via email (DNRBats@wi.gov), or by submitting a sick/dead bat report using the form: http://wiatri.net/Inventory/Bats/Report/BatForm.cfm. When using the form, state that you are reporting take in the "Additional Comments" section.

A. Health Exceptions

The landowner, rather than the DNR, is allowed to determine if they believe there is a health risk under this section (Section A).

Centers for Disease Control and Prevention (CDC) protocols should be followed for all situations where rabies or histoplasmosis is a possibility or may become a possibility if action is not taken (see Appendix 1).

Additionally, exclusions completed from June 1 through August 15 must be reported to the Department by submitting a Health Exemption Form in order to be covered under this permit or authorization. The landowner is responsible for completing and submitting the form, which is available online (http://dnr.wi.gov/topic/erreview/itbats.html). This form must be completed and submitted to the Department within **5 working days of start of work**.

If an activity qualifies as a health exception, it is exempt from timing minimization measures, and maximum take limits, but exclusions done during the non-exclusion period for human health reasons must still minimize take by following the approved exclusion protocols listed in Appendix 5. Exclusion practices used that are not described in Appendix 5 are in violation of this permit/authorization.

B. Bat Removals and Exclusions

Exclusion is defined as the process of allowing a colony of bats to leave the structure but not re-enter (i.e., use of one-way doors, see Appendices 2 and 5). Physically removing the colony of bats is not included in the definition of exclusion and is not covered under this section of the permit/authorization. Bats may be removed from the living space of a building at any time (see B.1. below).

Approved exclusion practices may be reviewed in Appendix 5. Exclusion practices used that are not described in Appendix 5 are in violation of this permit/authorization

If bats must be handled or transported for any reason during the exclusion process, the person conducting the exclusion must possess a valid Endangered/Threatened (E/T) Species Permit (http://dnr.wi.gov/topic/endangeredresources/permits.html). By obtaining the E/T Permit, the pest control operator can assure the landowner that practices used by the pest control company are in accordance with state law and no fines should incur while exclusion is completed. If bats must be handled during the exclusion, an E/T Permit holder (i.e. a rehabilitator or licensed pest control operator) may be contacted to handle the bats.

Practices that cause intentional take of the bats (i.e., sticky traps, sealing the entry/exit points to the roost with bats inside, large-hole netting that traps bats) are not considered exclusion methods, are not covered under this permit/authorization and are in violation of Wisconsin's Endangered Species Law (s. 29.604, Wis. Stats.).

1. Living Space or Place of Work

A living space is defined as a place of residence that is routinely and consistently inhabited. A living space does not include attics that are empty or used as storage.

If individual bats (5 or fewer) enter a living space or place of work, reasonable attempts must first be made to remove or exclude the bats alive and unharmed (see Appendix 2). If individual bats cannot realistically be removed unharmed, up to 5 bats may be killed for the purpose of removing them from a living space or place of work. No more than 5 bats may be killed within any 24 hour period and a maximum of 10 bats may be killed from June 1 – August 15 (**take report recommended – see “Note” above**).

Removals and exclusions from June 1 – August 15 are allowed in hospitals, medical clinics, day cares centers, nursing homes, assisted living facilities and restaurants.

2. Storage Areas, Attics, Barns, etc.

   Bats found in storage areas, attics, barns, etc., may be excluded from the area August 16 – May 31 (see Appendix 2). Exclusion may not occur from June 1 – August 15 unless a health exemption report form is filed (see Section A).

3. In an effort to help curb the spread of white-nose syndrome (WNS), bat exclusion professionals and pest control operators must follow these guidelines concerning cleaning equipment (NR 40, Wis. Admin. Code.):

   - Equipment used outside of Wisconsin should be thoroughly cleaned and disinfected before use in Wisconsin following the protocols in Appendix 4.
   - Equipment used at multiple sites within Wisconsin should be cleaned thoroughly and disinfected between uses following the protocols in Appendix 4. Materials that come in direct contact with bats such as bat cones or exclusion devices should not be used at multiple sites and should be discarded after use.

C. Building Demolition

Please note that timing restrictions in this section vary slightly from those listed for other activities. Bats typically leave summer roosts (in buildings or other locations) in late fall and begin to return in early spring. However, one bat species in Wisconsin is known to hibernate in buildings in winter. Bats are not actively flying during winter hibernation and can appear dead. As a result, traditional exclusion methods do not work.

1. For projects occurring where there is no evidence of bat presence (see Appendix 3), there are no restrictions.
2. For building demolition occurring from June 1 – August 15, where there is evidence of bat presence (see Appendix 3):
   - Building demolition and bat exclusions are generally not permitted during this time period in order to protect flightless pups in the roost. Exclusion and subsequent demolition may occur only if the bats are considered by the landowner to be a health risk. In these situations, a health exemption form must be completed within 5 days of starting work (see section A).
3. For building demolition occurring from August 16 – October 31 or March 16 – May 31, where there is evidence of bat presence (see Appendix 3):
   - Bats must be excluded from the building for at least 7 consecutive days immediately prior to demolition. Full exclusion is not required if the building is unsafe to enter, however reasonable attempts should still be made to exclude as many bats as possible while keeping all people safe. (Report required for unsafe buildings – see “Note” on Page 3.)
4. For building demolition occurring from November 1 – March 15, where there is evidence of bat presence (see Appendix 3):

- For any bats found prior to demolition work or encountered during the demolition phase, attempts must be made to transfer the bats to a wildlife rehabilitator for the remainder of the hibernation period OR the DNR's bat biologists must be consulted for additional options (Paul White, 608-267-0813 and john.white@wi.gov, or Heather Kaarakka, 608-266-2576 and heather.kaarakka@wi.gov).

D. Tree Cutting

Northern long-eared bats are federally protected in trees that are known maternity roosts (from June 1 – July 31) and in areas where known hibernacula could be impacted (including tree removal within 0.25 miles of a hibernacula entrance). If you will be cutting trees, please have an Endangered Resources Review http://dnr.wi.gov/topic/ERReview/Review.html conducted to determine if known northern long-eared bat maternity roosts or hibernacula exist near your project. If the Endangered Resources Review states that these areas do not exist near your project, there are no restrictions for tree cutting; however special consideration should be given to protecting snags or dying trees, particularly from June 1 – August 15.

E. Bridge Projects

The process for assessing transportation project impacts to listed species and the associated minimization measures will follow existing protocols.

1. Bridge repairs or demolition occurring from August 16 – May 31 do not have any restrictions. If bats are present, reasonable attempts should be made to prevent take by excluding the bats from the structure prior to demolition.
2. Emergency bridge repairs or demolition occurring from June 1 – August 15 are covered under this permit/authorization but must be reported within 5 working days (**report required – see "Note" above**).
3. Non-emergency bridge repairs or demolition may not occur from June 1 - August 15 unless bats are excluded prior to April 1 to prevent bats from using the bridge during the maternity period.

F. Miscellaneous Building Projects (e.g., roofing, painting, siding)

1. For projects occurring where there is no evidence of bat presence (see Appendix 3):
    - Full bat exclusions are not required.
    - If roofing, painting or siding and bats are found incidentally under shingles or roof vents, or behind shutters or siding, set the shutters or siding down and leave the area. Once the bats have left, continue with repairs. If bats do not leave, attempts should be made to transfer the bats to a wildlife rehabilitator OR the DNR's bat biologists should be consulted for additional options (Paul White, 608-267-0813 and john.white@wi.gov, or Heather Kaarakka, 608-266-2576 and heather.kaarakka@wi.gov).
2. For projects occurring from June 1 – August 15, where there is known bat presence (see Appendix 3):
    - Building projects with the potential to impact bats and bat exclusions are generally not permitted during this time period in order to protect flightless pups in the roost. Exclusion and subsequent building repairs may occur only if the bats are considered

by the landowner to be a health risk. In these situations, a health exemption form must be completed within 5 days of starting work (see section A).

- If roofing, painting or siding and bats are found incidentally under shingles or roof vents, or behind shutters or siding, set the shutters or siding down and leave the area. Once the bats have left, continue with repairs. If bats do not leave, attempts should be made to transfer the bats to a wildlife rehabilitator OR the DNR's bat biologists should be consulted for additional options (Paul White, 608-267-0813 and john.white@wi.gov, or Heather Kaarakka, 608-266-2576 and heather.kaarakka@wi.gov). Note that full bat exclusions are not required when bats are only incidentally found during miscellaneous building projects.

3. Projects occurring from August 16 – May 31 where there is known bat presence (see Appendix 3):

   - Take should be minimized during the course of the project by following applicable exclusion protocols listed in Appendix 5. Exclusion practices used that are not described in Appendix 5 are in violation of this permit/authorization.
   - If roofing, painting or siding and bats are found incidentally under shingles or roof vents, or behind shutters or siding, set the shutters or siding down and leave the area. Once the bats have left, continue with repairs. If bats do not leave, attempts should be made to transfer the bats to a wildlife rehabilitator OR the DNR's bat biologists should be consulted for additional options (Paul White, 608-267-0813 and john.white@wi.gov, or Heather Kaarakka, 608-266-2576 and heather.kaarakka@wi.gov). Note that full bat exclusions are not required when bats are only incidentally found during miscellaneous building projects.

G. Wind Energy Development

Wind energy projects typically affect tree bat species (not currently listed) and only impact cave bat species in certain situations (e.g., projects located near cave bat hibernacula may increase the occurrence of impacts to cave bats especially during fall migration in August and September). Further, there is not enough data at this time to determine the impact of potential mortality to local bat populations. Because of this uncertainty and the scope of impacts, no additional actions, above those currently requested by the Department, will be required of this industry at this time.

Mitigation

For every take of a cave bat that occurs, reasonable attempts must be made to prevent future take in the same area (e.g., exclusion of bats from the area, sealing of siding or eaves after bats are gone).

Responsible Parties

Landowners are responsible for all actions and costs incurred as a result of following this Broad Incidental Take Permit/Authorization.

Funding

Landowners are responsible for all costs incurred as a result of following this Broad Incidental Take Permit/Authorization.

Appendix 1: Health Information

Appendix 2: Removing and Excluding Bats

Appendix 3: Determining Bat Presence

Appendix 4. Cleaning and Disinfection Protocols for Bat Exclusion Professionals

Appendix 5. WDNR Exclusion Protocol

Appendix 1: Health Information

The following information was created by the Center for Disease Control and Prevention (CDC): http://www.cdc.gov/rabies/bats/contact/index.html. This information should be followed when handling or testing bats for rabies or histoplasmosis.

Recent data suggest that transmission of rabies virus can occur from minor, seemingly unimportant, or unrecognized bites from bats. Human and domestic animal contact with bats should be minimized, and bats should never be handled by untrained and unvaccinated persons or be kept as pets.

In all instances of potential human exposures involving bats, the bat in question should be safely collected, if possible, and submitted for rabies diagnosis. Rabies postexposure prophylaxis is recommended for all persons with bite, scratch, or mucous membrane exposure to a bat, unless the bat is available for testing and is negative for evidence of rabies.

Postexposure prophylaxis should be considered when direct contact between a human and a bat has occurred, unless the exposed person can be certain a bite, scratch, or mucous membrane exposure did not occur.

In instances in which a bat is found indoors and there is no history of bat-human contact, the likely effectiveness of postexposure prophylaxis must be balanced against the low risk such exposures appear to present. Postexposure prophylaxis can be considered for persons who were in the same room as a bat and who might be unaware that a bite or direct contact had occurred (e.g., a sleeping person awakens to find a bat in the room or an adult witnesses a bat in the room with a previously unattended child, mentally disabled person, or intoxicated person) and rabies cannot be ruled out by testing the bat. Postexposure prophylaxis would not be warranted for other household members.

If you woke up because a bat landed on you while you were sleeping or if you awakened and found a bat in your room, you should try to safely capture the bat and have it tested. The same precautions should be used if you see a bat in a room with an unattended child, or see a bat near a mentally impaired or intoxicated person.

The small teeth of the bat can make a bite difficult to find. Be safe and in these situations, try to safely capture the bat, have the bat tested, and seek medical advice.

Appendix 2: Removing and Excluding Bats

WISCONSIN
DEPT. OF NATURAL RESOURCES

Bat Exclusion

Method used by The Wisconsin Bat Program

A PROVEN SOLUTION

Do you have bats that you would like to remove from your living space? The following description is the widely accepted, non-lethal approach for excluding bats from your home. Killing the bats you will find does not solve the root problem which involves locating and sealing the actual access point that the bats are using. The remaining bats and future bats will still find their way into your attic or similar roosting space until you locate and seal all access points. Bats are NOT rodents and therefore will NOT chew their way into your house if you close off the opening. They use only existing openings.

As you may already know, bats are extremely beneficial to have in your neighborhood and many property owners spend a lot of effort trying to attract bats to their area by providing artificial roosts for them. If you have bats in your home you are half-way to experiencing the benefits of these insect-eating mammals without having to share your living space. The first step is already done; you have the bats interested in your location. The second step involves providing these bats with alternative roosting options that allows them to remain on the property without having access to your home. Finally, after a successful exclusion, the bats you saved will have a good chance of staying nearby. Why should you care if they stay? A single bat can eat 1,000 or more mosquito-sized insects in one hour and the equivalent of the bat's own body weight per night. As that is just a single bat, you can imagine what a colony of 20 to 100 bats can eat in one night.

Bats will NOT attack you while you are enjoying an evening on your porch. Instead, they are enjoyable to view as they capture 100's and 1,000's of insect pests that would normally be interrupting your relaxing night outside. They conduct this service to you for free. You simply need to provide these bats with an alternative place to live that is not in your home. Like bird houses, a bat house is relatively easy to build yourself, inexpensive to purchase, and readily available from a variety of organizations.

Let's get started with the process.

First of all, timing is important when excluding bats from the home. Do not attempt to exclude bats during the summer months when the colony is established and the young are unable to fly. Bat exclusions should not be conducted from May 1st through August 31. Exclusions occurring during this time period will separate mothers from their pups, leaving the pups to die of starvation. Frantic mothers, searching for an opening to reach their pups, may enter your living space and be more difficult to deal with than what you started with. By trapping the flightless young inside, you may also have created another unexpected problem involving the smell of dead animals.

Step 1: OBSERVE
Where are the bats entering?

At sunset or just before sunrise, have one or more persons located around the house observe where the bats are exiting the building. Observers should be able to see the entire structure without turning their heads; bats can exit and take flight in a matter of seconds. Make observations

Bat Guano

for several nights. This will ensure that all or most exit-points are identified. Pay special attention to areas in which bats commonly find access to your home: corners, eaves, louvers, loose siding, window air conditioners, and loose or damaged screens. Search the building for other various structural defects needing maintenance as the bats may search for alternative openings to their former roosting site after exclusion. It may take a second year of observation to ensure you have located all possible entry points.

Visible signs such as staining and guano (bat droppings) will also help identify openings. The body oils of bats can cause

Bat guano in front of garage

staining on the main access areas of the building, though you will need to look carefully because it is not always obvious. One of the best ways to find an opening is somewhat counter-intuitive: looking down instead of up. Guano found on the ground indicates bat activity from their opening above. When you find a concentration of these small droppings on the ground next to the foundation, you will often have a better chance of finding the access point.

Step 2: INSTALL
Can we still keep the bats here in my yard by putting up a bat house?

YES. Want to provide bats with a home, just not your own? We recommend installing an alternative roost, commonly referred to as a “bat house”, in the general vicinity of the entry-points. If you exclude in the fall, installing the bat house a year before the exclusion or during the start of summer, provides the best chance for

Two types of bat houses

success. As bats come and go, they will become familiar with the structure. Upon exclusion, this familiarity will provide the best possible chance for the successful inhabitation of the bat house by the recently excluded bats. If you are interested in purchasing or building bat houses, contact the Wisconsin Bat Monitoring program. The program staff can help you decide on where to purchase the best bat house design with proven success. The Wisconsin Bat Monitoring program can also give you instructions for building your own bat house. Read our information pamphlet titled: "Building a Bat House" to learn how to build and locate your bat house. Location and design are critical pieces as bats are more difficult to attract to a bat house than birds are to a bird house.

Step 3: EXCLUDE

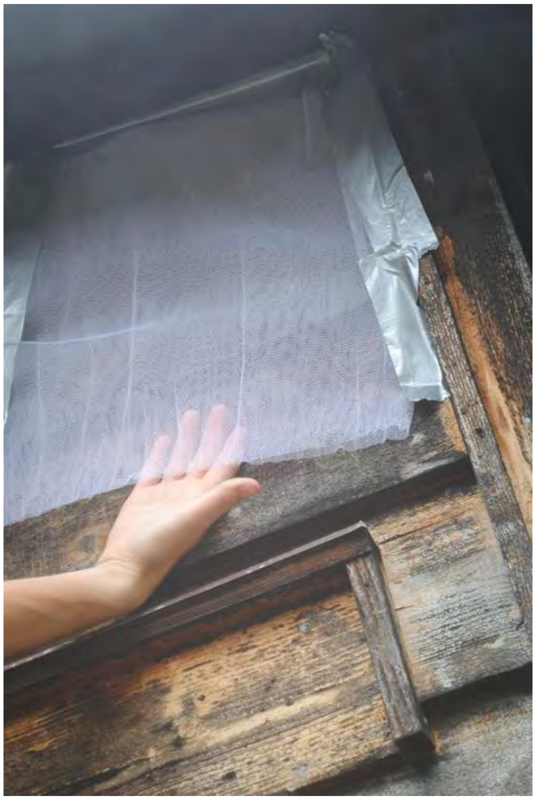
1. One-way doors 2. One-week wait, 3. Seal all of the holes.

After all openings have been discovered, install one-way exits. These exits will allow bats to leave, but will not allow them to re-enter. Keep in mind the time of year as you do not want to trap the flightless young inside. Avoid excluding bats between May 1^{st} and August 31^{st}.

One-way exclusion devices can be created using plastic netting with one-sixth inch (0.4 centimeter) or smaller mesh. Shape the plastic netting so that it covers the opening entirely and extends at least two feet below it. Using staples or duct tape, attach the top and side edges of the

Applying screen for one-way door

plastic netting to the building, leaving the bottom edge open. Be conscious of the netting's tautness; you should be able to slide your hand into the bottom opening though not so loose that the bats may easily crawl back up the opening. At sunset the following night, some of the bats will escape through the open, bottom portion. Leave the netting up for five to seven days; this will ensure that all bats have exited the building. After all bats have been excluded, you may then seal the openings permanently with appropriate construction materials.



Space on bottom for bats to escape

Remember that bats will not chew their way back inside your house. So, after you've found and sealed all of the access points you will have successfully excluded the bats from your living space.

Other materials can be used to create one-way exits, such as plastic sheeting or PVC pipe. Install the plastic sheeting in the exact manner as the plastic netting. A portion of PVC pipe, which should be similar in size to a tube of caulk, can be inserted into the opening. Seal the remaining portion of the opening that surrounds the outer rim of the pipe.

Clean-up

After the bats have been successfully excluded, most people will want to clean the guano out of the building. When cleaning enclosed spaces, there is one simple precaution you should take in protecting yourself from being exposed to a disease known as histoplasmosis. Histoplasmosis is a respiratory disease caused by a fungus that can grow on accumulations of bird and bat guano and may become airborne if disturbed during the cleaning process. The fungus is not necessarily present at your site; however it is best to approach any clean-up with some safety measures. Symptoms of histoplasmosis usually appear within 3 to 17 days after exposure, and may resemble a cold or chronic cough. The risk of histoplasmosis can be reduced and even prevented by wearing a face mask and gloves while working. Wash all clothes and equipment after cleaning out the previously occupied space. If you want nothing to do with a possible risk to your health there are professional cleaning services that can do this for you. Search online or in your phone directory for a local business. There are also a number of exclusion professionals that deal specifically with bat removal in the State of Wisconsin if you are not comfortable with the do-it-yourself method.

PVC one-way door

Summary

This is how you conduct widely accepted, non-lethal approach to excluding bats from your living space.

1. Observe your building around sunset or sunrise to detect all locations bats are using for access.
2. Install a bat house prior to conducting exclusion in order to maintain the beneficial insect-eating service of the bats in your back yard.
3. Install a one-way door over the opening(s) and wait a week until all of the bats have left.
4. Permanently seal the access points with appropriate materials.
5. Enjoy a night on your deck or patio and watch your relocated colony of bats eat 100's to 1,000's of mosquito-sized insects.
6. Let us know how it worked out as we would like to hear your success story about relocating bats from your attic to their own bat house.
7. For additional information on bats of Wisconsin check out our bat website.

Wisconsin Bat Monitoring Program
http://wiatri.net/inventory/bats

Bat Access points to your living space

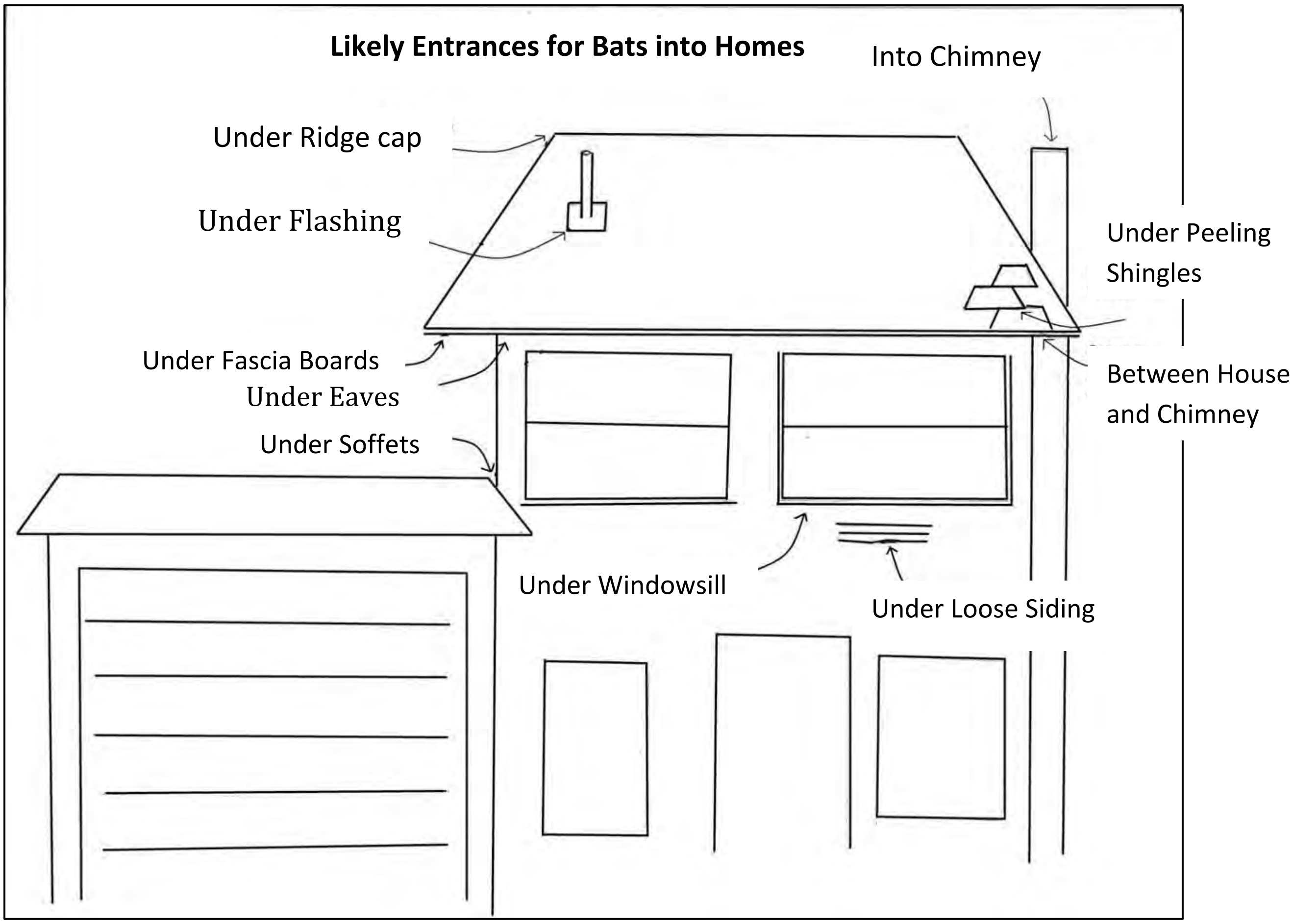


Figure 1: There are several common entry points for bats to find their way into your home. Check for guano piles and stains around these points first in locating the entry points.

Exit Only

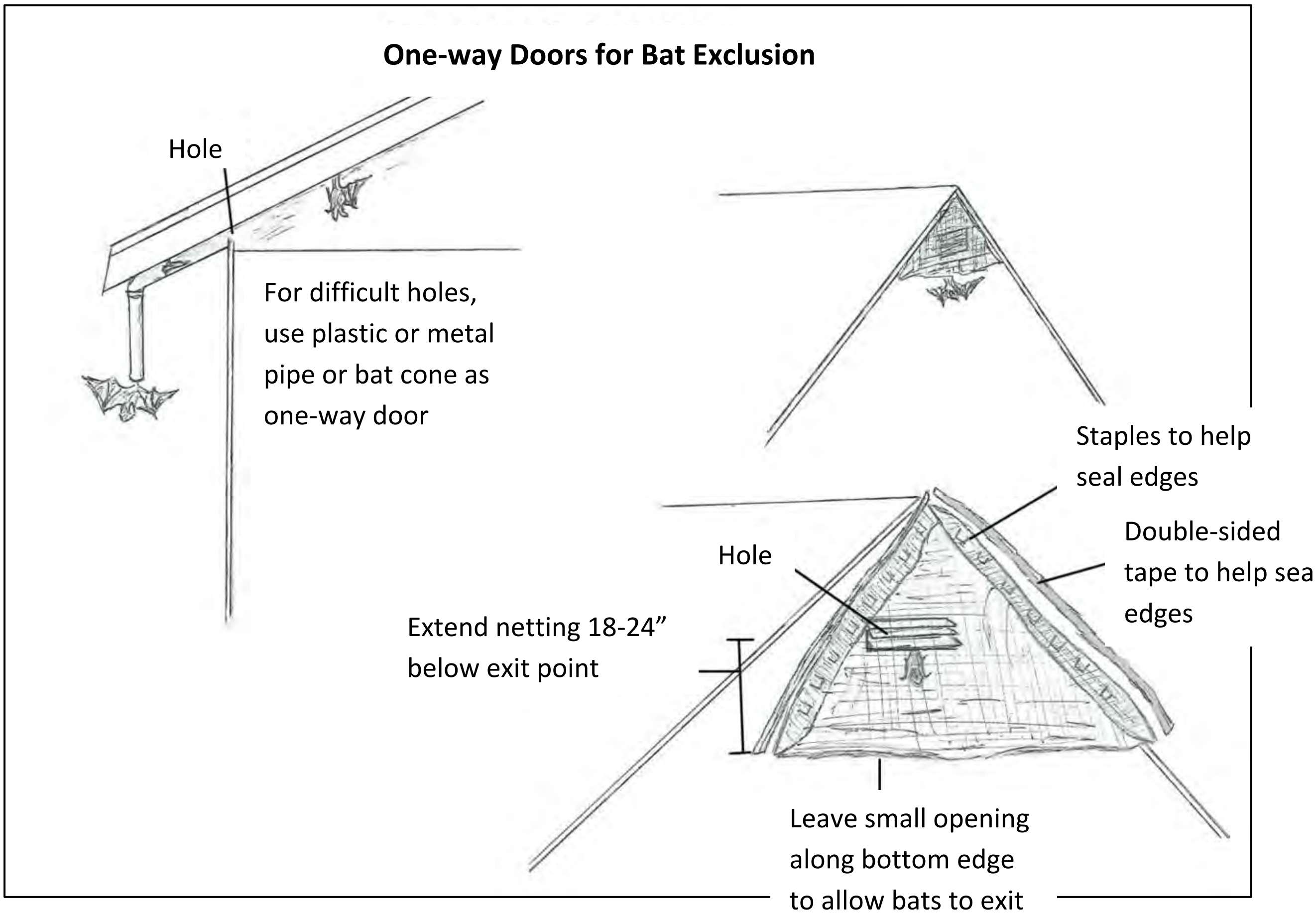


Figure 2: Two common one-way door designs: PVC tube for a small oddly-shaped hole, and netting or mesh for larger holes.

Appendix 3: Determining Bat Presence

1. Take note of places where bats are likely to enter your home. Bats can enter through holes smaller than a quarter in size. Places like fascia boards, where two buildings meet, between the building and a chimney, under loose shingles, under ridgecaps, under windows, through vents into attics, under flashing, under eaves and under loose siding are all common places for bats to enter.

2. Look for evidence on the ground. Bats will defecate while they roost, and piles of guano usually indicate where bats are roosting.

3. Look for evidence on the building itself. Places where bats enter and exit often have stains from urine and skin oils on the siding and holes. These can be good indications of where bats are entering.

4. Monitor in the evening. Even if no visible signs occur, bats may still be roosting in a building. Observe the building at dusk to see if any bats fly out of openings. Listening at this time can also alert the observer to the presence of bats. Bats will often become very vocal 5-10 minutes before they take flight to forage. Bats make an audible buzzing and clicking while they are roosting.

Appendix 4.

The WDNR is requiring cleaning of all equipment and clothing that comes in contact with cave bats and their habitat at any point during the year in an effort to control human transmission of white-nose syndrome. The fungus that causes white-nose syndrome, *Pseudogymnoascus destructans* was listed as prohibited invasive species in 2011 under NR. 40, and allow for the following control measures.

All equipment and clothing that is used outside of the state of Wisconsin and at multiple sites within the state during exclusion must be cleaned according to the protocols listed in appendix 4. Protocols are in accordance with U.S. Fish and Wildlife Service white-nose syndrome decontamination procedures: http://whitenosesyndrome.org.

Additionally, to minimize risk of possible transfer of the SARS-CoV-19 to North American bats, follow these guidelines for proper Personal Protective Equipment during work.

1. Per CDC guidelines for COVID-19, to block or minimize exchange of respiratory droplets wear a mask when doing work involving bats, including installation of one-way doors and cleaning of attics.
2. Use of disposable equipment and coverings (gloves, coveralls and booties) is highly recommended.
3. All equipment used during the exclusion process should be thoroughly scrubbed or brushed to remove all organic material.
4. Once scrubbed of organic material, clothing and equipment must be sealed in a plastic container or bag to be transported to a suitable site for cleaning. Anything that can be disposed of must be sealed in a plastic trash bag and discarded.
    a. All equipment and clothing that can be **completely submersed** must be washed with Woolite in wash cycle, rinsed, then
        i. submersed in hot water (>131 degrees F) for a minimum 20 minutes
        ii. soaked in 1:10 bleach solution for a minimum of 10 minutes,
        iii. soaked in 1:128 Lysol for a minimum of 10 minutes.
    b. All equipment that **cannot be completely submerged** in a solution or hot water or must be used immediately between sites must be scrubbed to remove all organic material and wiped with Lysol disinfecting wipes so that the entire surface is disinfected.
5. All equipment and clothing must air dry.
6. Prior to entering the vehicle, clean or remove clothing and footwear to avoid contaminating vehicles.

Appendix 5: WDNR Exclusion Protocol

Exclusion activities outside of the following protocol are not covered under the Broad Incidental Take Permit/Authorization and mortality may incur fines. The landowner and/or the pest control operator completing the work may be liable for fines.

Exclusion is the act of allowing bats to leave but not return to a building through the use of one-way doors. One-way doors may be comprised of the following materials and design:

1. **Tubing**- Tubes for exclusion may be plastic or metal and should hang down at least 10-15 inches from the opening. Netting may be installed at the end of the tube to prevent re-entry but the mesh must be plastic with holes smaller than 1/6th inch.
2. **Mesh or netting**- Netting may be installed over entry/exit points, but the netting must have holes 1/6th inch or smaller so as to not trap bats, and must extend at least two feet below the entry point. The mesh/netting must be open at the bottom to allow bats to exit under the screen.
    a. If it is found the netting used is tangling and trapping bats, the pest control operator must remove the bats and release them, and the netting must be replaced with smaller mesh or with a different type of one-way door.
3. **Plastic sheeting**- Plastic sheeting may be installed in a similar fashion to the mesh. There should be enough space behind the plastic to allow the bats to crawl out from behind the sheeting. It must be open at the bottom to allow the bats to exit.
4. **Changes to roosting environment**- changes can be made to the roosting habitat to discourage use by bats. These may include, but are not limited to, installation of windows to increase light in the roost, or installation of sheet metal on roosting surface to limit ability of bats to hang. Any changes to the roost environment must not cause take.

Exclusion devices must remain up for at least 5 days prior to sealing the openings, and there must not be bats in the roost when building is sealed.

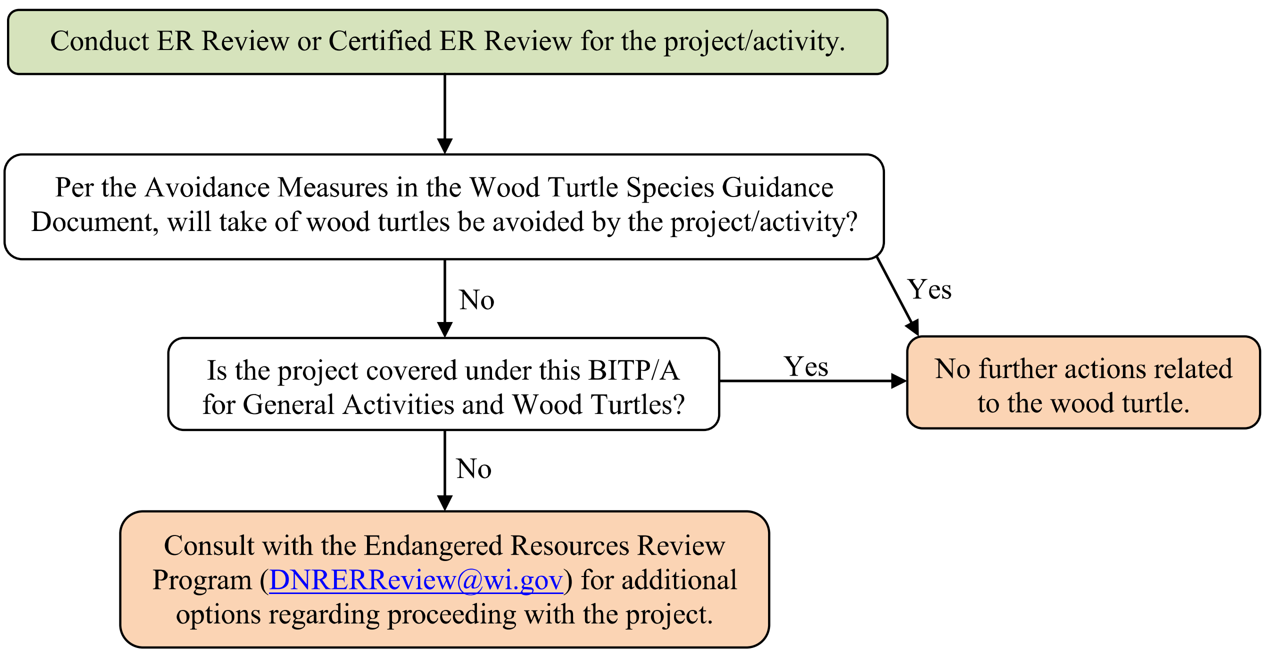
APPENDIX E-25 BITP/A for Wisconsin Wood Turtles

April 2016

Wisconsin Department of Natural Resources
Broad Incidental Take Permit/Authorization for Common Activities

General Activities
and
Wood Turtle (*Glyptemys insculpta*)

If an Endangered Resources (ER) Review or Certified ER Review has indicated the likely presence of the wood turtle and avoidance is not possible (per the Wood Turtle Species Guidance document: http://dnr.wi.gov/files/PDF/pubs/er/ER0684.pdf), this Broad Incidental Take Permit/Authorization (BITP/A) should be followed. In general, this BITP/A covers most activities that do not permanently impact habitat (e.g., land management, forestry activities, utility activities) but does not cover land conversion activities (e.g., commercial development, residential development, road expansion).



April 2016

The following activities are NOT covered under this Broad Incidental Take Permit/Authorization but may be eligible to apply for an individual Incidental Take Permit/Authorization or an Endangered/Threatened (E/T) Permit[1]:

1. Land conversion activities (e.g., commercial development, residential development, road expansion) that permanently alter or reduce habitat.
2. Ground disturbance, heavy equipment operation or supply/equipment storage within nesting habitat (exposed sand or gravel areas within 200 ft of a suitable stream/river) during the nesting season (May 20 – September 18), unless *erosion/sediment control fencing or amphibian/reptile exclusion fencing is installed around the project area during the inactive period (November 1 – March 14) to prevent turtles from accessing the work area.*
3. Prescribed burning during the egg laying period (May 20 – July 5) within nesting habitat (exposed sand or gravel areas within 200 ft of a suitable stream/river), unless *erosion/sediment control fencing or amphibian/reptile exclusion fencing is installed around the project area during the inactive period (November 1 – March 14) to prevent turtles from accessing the burn area.*
4. Instream work and drawdowns during the maximum overwintering period (October 1 – April 30). In stream work includes, but is not limited to, streambank/rip rap installation, ford installations, open cut trenching, and dredging.
5. Intentional killing or collection of wood turtles (includes eggs, hatchlings, juveniles and adults).

All projects not listed above are covered under this Broad Incidental Take Authorization if the following measures are followed:

1. Project personnel (individuals on site for project purposes rather than for the purpose of looking for turtles) must move any turtles observed on site out of harm's way.
2. Only the following herbicides may be used during periods when the turtles could be negatively impacted: 2, 4-D salt at concentrations of 40 ppm or less (2, 4-D ester should not be used), clopyralid (e.g., Transline), Cutrine without a surfactant, diquat (dibromide) at concentrations of 1.0 ppm or less, glyphosate without a surfactant (e.g., Aquaneat), hexazinone (e.g., Velpar), imazapyr (e.g., Arsenal, Chopper), Triclopyr ester and salt concentrations of less than 2.0 ppm. Other herbicides may be approved on a case by case basis by the Endangered Resources Review Program (DNRERReview@wi.gov). *Note – these herbicide brand names are only provided for reference and are not an endorsement of any specific brand.*

Voluntary Conservation Measures (these are strictly voluntary measures at the discretion of the landowner but would help to conserve this species, wherever possible):

1. For streambank stabilization/rip rap projects, it is recommended that all voids in exposed rock above the Ordinary High Water Mark be filled with soil and seeded with a native seed mix

1 Consult with the Endangered Resources Review Program (DNRERReview@wi.gov) for more information

appropriate for the habitat. It is recommended that any riprap not able to be top-dressed with soil and seeded will have the interstitial voids filled with 0.5 to 2.0 inch gravel to ensure that hatchling turtles cannot become entrapped in large voids between rocks.

2. It is recommended that activities during the turtle's active season that occur within 100 feet of a suitable wood turtle stream/river take place when 100% of the area is naturally snow covered.

3. It is recommended that activities during the turtle's active season that occur greater than 100 feet from a suitable wood turtle stream/river take place at any time of year when 50% or more of the harvest area is naturally snow covered.

4. Minimize work within wood turtle upland foraging areas (measured out from a suitable stream/river shoreline).

Dates*	**Wood Turtle Upland Foraging Area** (Recommend Minimizing Disturbance in These Areas)
Nov 1 - Mar 14	none
Mar 15 – May 14	0-75 m (0-264 ft)
May 15 – Sept 15	0-300 m (0-984 ft)
Sept 16 - Oct 31	0-75 m (0-264 ft)

**The dates listed can change each year based on annual weather conditions (e.g., cold spring, late snowfall, early frost). These changes will be posted on the DNR website: http://dnr.wi.gov/topic/WildlifeHabitat/Herps.asp#regs.*

***Uplands are defined as any area that is not a stream/river (i.e., not overwintering habitat).*

5. If erosion matting (also known as an erosion control blanket, erosion mat or erosion mesh netting) will be used, the following matting (or something similar) should be installed: Use matting that incorporate a "leno" or "gauze" weave (where strands have independent movement). Ensure the weave is loose and the strands have good mobility. American Excelsior "FibreNet" or "NetFree" products; East Coast Erosion biodegradable jute products; Erosion Tech biodegradable jute products; ErosionControlBlanket.com biodegradable leno weave products; North American Green S75BN, S150BN, SC150BN or C125BN; or Western Excelsior "All Natural" products. *Note – these brand names are only provided for reference and are not an endorsement of any specific brand.*

6. Nest site creation/restoration/enhancement (if you are interested in this option, please contact a District Ecologist or the Endangered Resources Review Team for more information).

7. Invasives clearing from a nesting or foraging area (if you are interested in this option, please contact a District Ecologist or the Endangered Resources Review Team for more information).

8. Install culverts under roads with turtle exclusion fencing (if you are interested in this option, please contact a District Ecologist or the Endangered Resources Review Team for more information).