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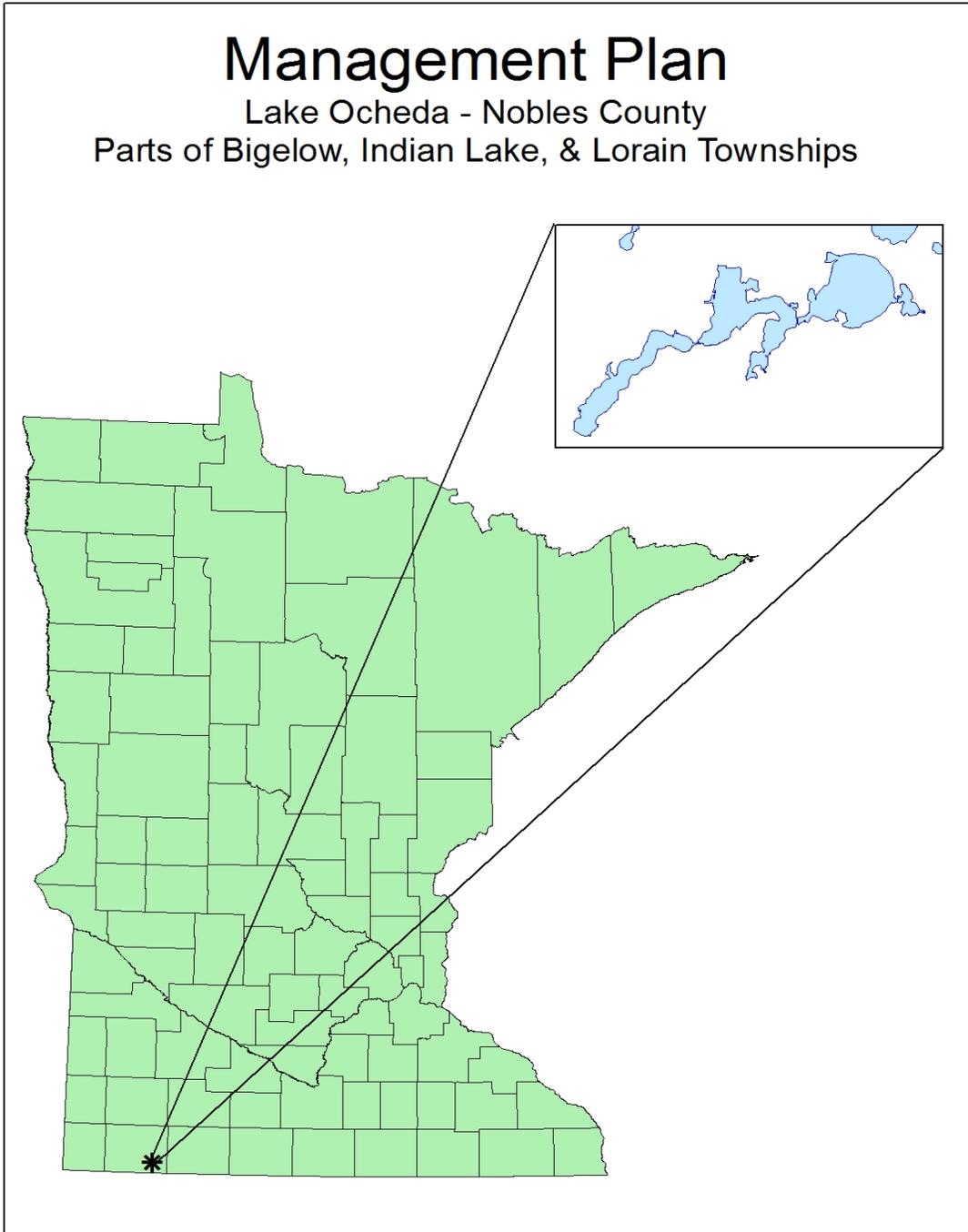
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Comments will be accepted through November 10, 2017



Lake Ocheda Comprehensive Management Plan (DRAFT)

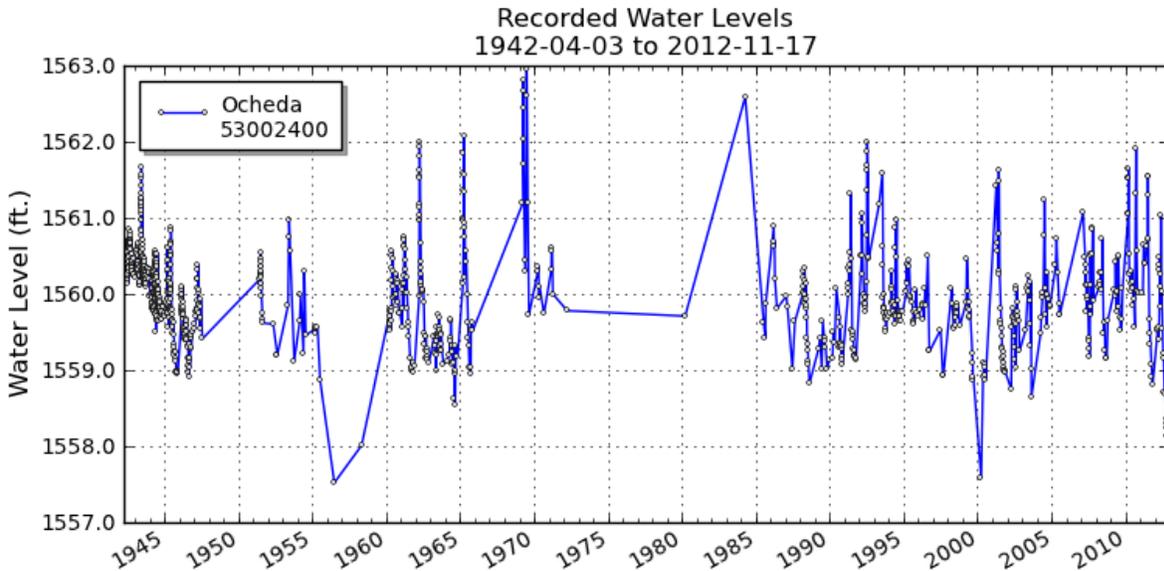
September 8, 2017

Survey Datum: To convert to NGVD 29 datum (NAVD 88 – 0.709 = NGVD 29). Please note that elevations may be referenced in either datum.

Lake Ocheda (DOW #53002400)

Lake Ocheda is located in Indian Lake TWP: T101N, R39W Sections 5 & 6, Bigelow TWP: T101N, R40W Sections 1, 2, 10, 11, 12, 15, & 16, and Lorain TWP: T102N R39W Sections 31 & 32 all in Nobles County, Minnesota near the City of Worthington. Lake Ocheda lies within the Missouri River (major) and Little Sioux River (minor) watershed.

- Size: 1,778 acres
- Shoreline: Lake Ocheda contains 21 miles of shoreline. Most of the shoreline borders agricultural crop fields or pasture and some is developed and has single family homes.
- Access: There are two public water accesses present. One is located on the north shoreline of the west basin and the other access is located on the west side of CSAH 5 on the east shore of the Middle Bay. (See attached overview map).
- Watershed:
 - Watershed to lake ratio: ~20:1
 - Inlets: The Ochedan River, located at the outlet of Lake Okabena in Worthington flows south and enters the north side of the Middle Bay of Lake Ocheda in the NE1/4 of Section 2 of Bigelow TWP. Judicial Ditch 10 flows east and enters the West Basin in the NE1/4 of Section 16 of Bigelow TWP. An unnamed stream flows southerly and enters the West Basin in the SW1/4 of Section 10 of Bigelow TWP. There is also a waterway that enters into the Middle Bay in the SW1/4 of Section 12 of Bigelow TWP.
 - Land Use: Land use in the vicinity is primarily agricultural with row crops dominating. There is some pasture land as well as residential development surrounding the lake.
- Depth: At normal water levels, average depth is approximately 3.0 feet and maximum depth is about 4.5 feet.
- Outlet: There is a variable-crest water control structure located at the south end of the West Basin. This water control structure was constructed in 1941. To our knowledge there have been very few, if any, prior management actions taken on Lake Ocheda. Water from Lake Ocheda flows into the Ochedan River which flows south into Peterson Slough and then into Lake Bella. Lake Bella is recharge basin for The City of Worthington's municipal well field.
- The runout elevation for Lake Ocheda is 1559.5 (NGVD 29) or 1560.2 ft. (NAVD 88)
- The Ordinary High Water Level for Lake Ocheda is 1561.0 ft. (NGVD 29) or 1561.7 (NAVD 88) and was determined in 1984.
- Water level readings: see graph below in NGVD 29 datum



Water Quality

Recent lake surveys indicate that total phosphorus levels have been 3 to 4 X higher than acceptable levels set by the Minnesota Pollution Control Agency (MPCA). In comparison total phosphorus levels measured in surveys back in 1947 and 1961 were at or below acceptable levels. Lake Ocheda is currently listed as impaired for aquatic recreation by the MPCA for nutrient/eutrophication biological indicators.

Lake Ocheda is located within the Western Corn Belt Plains of Minnesota. Impairment thresholds for nutrients in this area are set at Total Phosphorous >90 ug/l, Chlorophyll a >30 ug/l and water transparency <2.3 feet. Lake Ocheda currently does not meet those standards.

Fish and Wildlife Habitat

Lake Ocheda lies within the Northern Tall-grass Prairie Ecoregion. Other lakes in the immediate area include Lake Okabena to the north, and Lake Bella to the south. There are several State Wildlife Management Areas (WMAs) in the vicinity as well. James Willey WMA is located in the SW1/4 of Section 12 in Bigelow TWP and adjoins the Middle Bay. John Erickson, Peterson, Lake Bella, and Wachter WMAs are located south and east of Lake Ocheda. A State of Minnesota Wildlife Refuge also encompasses the East Basin of Lake Ocheda. (See attached overview map). Historically, Lake Ocheda provided quality habitat for migrating and brood rearing waterfowl.

Currently, water quality and habitat conditions on Lake Ocheda are exceptionally poor. This degraded state is due to sustained high water levels, invasive fish and lack of aquatic vegetation. (See recent lake surveys).

A 1947 DNR wildlife survey found no wildlife use, abundant carp, and occasional aquatic plants. A Secchi disk reading of 6 inches was noted. The total phosphorus was measured at 50 ug/l.

On July 14-16, 1961 DNR wildlife staff recorded 150 Redheads, one canvasback, 120 Ruddy ducks, 28 Blue-winged Teal, 15 Mallards, 5 Lesser Scaup, one Northern Shoveler, and 750 American Coot. Based on the survey 68% of the survey points had submersed aquatic vegetation and Secchi readings averaged 2.4 feet. The total phosphorus was 94 ug/l.

On August 28, 1985 DNR wildlife staff found submersed aquatic vegetation at 57% of the sample points with Sago Pondweed being the dominant species observed. Secchi disc readings averaged 0.6 - 0.8 feet. The survey crew observed 200 Canada geese, 100 Mallards, 225 Wood Ducks, 200 "other" ducks, 430 American White Pelicans, and 65 Double Crested Cormorants. The crew noted a lack of emergent vegetation along the shoreline in the East and West basins and a small shoreline fringe in the Middle basin.

On August 1-2, 2005 DNR wildlife staff noted 21% of the sample points had submersed vegetation, a mean Secchi depth of 0.6 feet and total phosphorus of 371 ug/l. Wildlife observations included 12 adult Blue-winged Teal, 60 Canada geese, and 19 adult Wood ducks.

On August 10, 2011 DNR wildlife staff could not find any submersed vegetation at the 62 sample points surveyed. The mean Secchi depth was 0.5 ft. and the total phosphorus was 283 ug/l. Wildlife observations included 45 Canada geese, 30 American White Pelicans, 5 Great Blue Herons, 1 Forster's tern and 5 Ring-billed gulls.

As indicated above trends in water clarity and the presence/absence of submersed aquatic vegetation can directly influence wildlife use. Waterfowl are typically the canary in the coalmine, but habitat conditions affect all fish and wildlife species.

Fish Summary

Limited stocking of walleyes and northern pike have been pursued on Lake Ocheda in the past with varying levels of success. Fish are also able to access Lake Ocheda directly from Lake Okabena immediately upstream.

Common carp are abundant in Lake Ocheda. Observations include many juvenile and young of the year fish. Fish species that are more tolerant to low dissolved oxygen and poor water quality such as common carp, black bullheads and fathead minnows can directly and indirectly contribute to the continued poor water quality in Lake Ocheda.

Presently there is limited recreational fishing, although occasionally, Lake Ocheda has notable opportunities for walleye, northern pike, and perch.

Predator game fish management in Lake Ocheda will be considered as a complimentary management tool with the purpose of prolonging the positive effects of winterkill and/or reclamation events in maintaining a clear water condition. Game fish stocking, rapid fish growth, and relatively quick return of stocked fish will provide recreational opportunity during

appropriate conditions between winterkill and/or reclamation events. Lake Ocheda will not be considered as a candidate for future aeration. Management of game fish species that are tolerant of low dissolved oxygen levels including primarily northern pike and perch will be considered for stocking when available. Predator species other than northern pike may also be considered in consultation with the DNR Area Wildlife Manager and other interested parties. By restoring ecological functions and improving habitat and water quality conditions in Lake Ocheda we anticipate a more productive and diverse fish community.

Wildlife Summary

In addition to providing critical migratory and breeding habitat for waterfowl and other waterbirds, quality shallow lakes are important habitats for furbearers, including: muskrat, mink, beaver, and otter. They are also important for non-game wildlife, including several rare and threatened species. According to the DNR, at least 20 species of the greatest conservation need use shallow lake habitats.

Unfortunately, Wildlife use has diminished substantially on Lake Ocheda over the years due to turbid water and lack of aquatic vegetation. As suggested above wildlife and waterfowl use fluctuates with the presence/absence of submersed aquatic vegetation. (See also prior lake surveys).

Aquatic Vegetation

Lack of plants is indicative of an unhealthy, turbid water condition in a shallow lake. A shallow lake without aquatic vegetation typically has few invertebrates and contains poor wildlife habitat and is generally compromised of tolerant fish species that further perpetuates poor water quality and marginal lake habitat.

Aquatic vegetation is crucial to a shallow lake ecosystem for several reasons:

1. Plants help maintain a clear water state by stabilizing the bottom sediments in a basin and reducing the impact of wind action, thus increasing water clarity and thereby improving probability of aquatic vegetation germination in the bottom sediments of the lake which in the end lowers turbidity;
2. Aquatic plants further serve to maintain a clear water state by uptaking nutrients from the water column and thereby tie nutrients that would otherwise be available for algal production;
3. Waterfowl and other wildlife utilize submerged aquatic plants as a direct food source. In addition, this vegetation provides habitat for invertebrates that are an important protein source for waterfowl;
4. Macroinvertebrates found in aquatic vegetation are grazers of excess algae, which aids in improving water clarity by reducing phosphorus;
5. Emergent vegetation, such as bulrush, provides breeding and nesting cover for waterfowl and other fish and wildlife. Many non-game species of birds also nest in dense stands of emergent vegetation and are dependent on them for food and cover;
6. Presence of aquatic vegetation will improve fish and wildlife habitat.

Management Goals and Objectives

Goal: Improve water quality and clarity in Lake Ocheda by reducing undesirable fish populations and stimulating the growth of submersed aquatic vegetation.

Specific Objectives to Achieve Goal

Objective 1: Improved water quality and clarity

Objective 2: Re-establish submersed aquatic vegetation

Objective 3: Improve fish & wildlife habitat

Objective 4: Reduce undesirable fish populations

Objective 5: Maintain habitat and water quality improvements

Proposed Management Actions to Achieve Objectives

Action 1: Obtain legal authority to temporarily lower water levels

Work with local citizens, lakeshore property owners, Okabena-Ocheda Watershed District, Worthington Public Utilities and Minnesota DNR in partnership to obtain the legal authority under Minnesota Statute 103G.408 to conduct periodic temporary drawdowns as per an approved comprehensive management plan. (See 103G.408 statute attached).

Action 2: Modify the existing outlet structure to improve water level management capability and augment the downstream fish barrier

Partner with the Okabena-Ocheda Watershed District to modify the existing outlet structure to improve drawdown capacity and develop a more functional fish barrier. The existing structure was built in 1941 with a full service level of 1560.2 (NAVD 88). Gravity drawdown is possible to elevation ~1558.0 (NAVD 88) allowing for approximately +/- 2.0 feet of maximum water level drawdown. The Minnesota DNR owns the outlet dam and will be primarily responsible for all management and capital maintenance. The Okabena-Ocheda Watershed District controls land access to the structure through fee title ownership. A cooperative agreement between the Minnesota DNR and the Watershed District is necessary to outline future project roles and responsibilities. (See Memorandum of Understanding).

Pumping options have also been discussed but will not be considered as part of this initial plan. If the goals of this plan are not met using the modified outlet structure, the Okabena-Ocheda Watershed District may investigate alternative options including pumping under the advisement of the Minnesota DNR.

Action 3: Conduct periodic temporary drawdowns to the maximum extent possible

A managed lake drawdown is the temporary lowering of lake water levels, in this case via removal of outlet structure stoplogs. Drawdowns are used to mimic natural droughts, which occur less frequently than in the past. The ecological functions of shallow lakes and wetlands have adapted to periods of low water or drought, and such systems often deteriorate during periods of high water or absence of drought. Essentially, a temporary drawdown will reset the ecological clock and beneficial functions of a degraded shallow lake basin. As prairies depend on fire for health and vigor, prairie shallow lakes depend on drought and fluctuations in water

levels to promote diverse healthy plant and invertebrate communities. Drawdowns are an effective tool used to manage shallow lakes and wetlands for improved fish and wildlife habitat and water quality.

Temporary drawdowns on shallow lake basins enhance the abundance and diversity of aquatic vegetation. Bottom sediments hold a large, viable seed bank from aquatic plants that the lake has supported in the past. The life history of most species of emergent aquatic vegetation requires a period of drying before seeds will germinate. Bottom sediments are consolidated and organic material is broken down during a drawdown, which can provide a more suitable substrate for a greater diversity of aquatic plants. A temporary drawdown may also reduce or eliminate the existing undesirable fish community. Increased abundance of submersed aquatic plants should also increase aquatic invertebrate abundance. An abundant and diverse aquatic plant community along with increased numbers of invertebrates will improve water clarity and provide quality habitat for a variety of fish and wildlife species.

Important Legal Considerations: A drawdown is a temporary lowering of lake water levels. Water levels will be returned naturally to the managed pool elevation following water level management. Managed drawdowns could extend up to two consecutive years per Minnesota Rule (M.R.) 6115.0271. Drawdowns would not, according to M.R. 6115, be done at times that would cause any downstream flooding damage to private property or roads.

Any drawdown or installation of new outlet structure requires a permit from the Minnesota DNR Division of Ecological and Water Resources (EWR). The Section of Wildlife will work with EWR to meet all permit requirements written in M.R. Chapter 6115. All drawdown techniques will be contingent on existing habitat conditions, precipitation patterns, and downstream flooding conditions. The lake would not be drawn down during periods when the area is experiencing flooding or high water. As proposed the existing runout elevation and/or outlet capacity is not being changed. Water level elevations can be managed and artificially lowered via removable stop-logs. There should be no adverse impacts to upstream or downstream landowners as a result of this project. Drawdowns would be conducted in a manner to minimize adverse impacts to non-target species including native species dependent on these shallow lake habitats. Initial drawdown to elevation 1558.0 ft. (NAVD 88) would be implemented as soon as conditions permit.

Ongoing and Long Range Procedures and Management Thresholds

Shallow lake conditions are not static. Additional management will be needed to maintain good water quality and aquatic habitats. The following procedures are recommended to maintain improvements attained through initial actions. Thresholds are identified below that would trigger additional actions.

Action 4: Conduct additional drawdowns when needed to maintain or attain water quality standards, fish community and/or habitat objectives. Water quality parameters, aquatic plants and the fish community will be surveyed periodically to monitor management response and determine when additional water level management is necessary. Lake conditions are not

static and we understand given some of the watershed challenges and fish assemblages in Lake Ocheda that ongoing water level management is necessary to maintain healthy lake conditions. Drawdown scenarios and triggers defining management actions are listed below.

Full Winter Drawdown

Under this scenario Lake Ocheda would be drawn down to the maximum extent possible on or after August 1st and then gradually refilled the following spring. This management action would be used to restructure existing fish populations in Lake Ocheda and to help maintain and improve habitat and water quality conditions in the lake. Full winter drawdown would be the primary tool used for enhancing lake conditions as it would not promote hybrid cattail growth or disrupt summer recreation.

If hybrid cattail becomes overly abundant due to drawdown activities project managers can pursue necessary permits and consider available tools to help control it. Tools may include mechanical removal and/or approved chemical treatments. Landowners would also have the ability to pursue individual Aquatic Plan Management (APM) permits.

A project advisory team comprised of Minnesota DNR, Okabena-Ocheda Watershed District, Worthington Public Utilities and other stakeholders will coordinate as needed to discuss ongoing management objectives and goals of the project. This group will ultimately help guide future water level management actions on Lake Ocheda.

Active water level management will be considered when at least two of the following criteria are met. Samples will be collected as needed to determine present conditions. Average summer levels will be based on one sample per month June – September.

- Average summer Secchi disk reading <1 foot
- Average summer Total Phosphorous levels exceed 90ug/l
- Average Summer Chl-a levels exceed 30ug/l
- Submersed aquatic plant coverage: at less than 35% lake wide coverage using present day systematic point sample stations

Desired Outcomes:

- Average summer Secchi disk reading >2.3 feet
- Average summer Total Phosphorous levels <90ug/l
- Average Summer Chl-a levels <30ug/l
- Submersed aquatic plant coverage: at least 65% lake wide coverage using present day systematic point sample stations

- Note: The term ug/l refers to micrograms per liter and is a measure of a concentration. It is more commonly known as parts per billion (ppb). One part per billion equals 1 part in 1,000,000,000 parts.

Adaptive Management

At this time the Lake Ocheda project partnership consists primarily of staff from Minnesota DNR, Okabena-Ocheda Watershed District, and Worthington Public Utilities. This partnership will establish a structure whereby clear lines of communication between all parties can occur effectively to successfully implement and manage the project. Adaptive management will require the right resources being coupled at the right time in support of the plan to improve water quality along with fish & wildlife habitat. Proper coordination of management actions will be necessary for this project to be successful.

A project advisory team will be established to meet periodically to discuss Lake Ocheda, assess habitat and water quality conditions, and help plan ongoing management activities. Representatives from the Minnesota DNR, Worthington Public Utilities, Okabena-Ocheda Watershed District, Nobles County Commissioners and two community members will be included. Up to ten management team members will be appointed following the approval of a management plan.

Monitoring

When conditions fall below the outlined thresholds, the proposed management actions will be considered and implemented. Vegetation will be monitored when degradation is suspected by conducting shallow lake surveys, using systematic point sampling, calculating aquatic plant distribution, diversity and abundance. Water clarity and water quality parameters will be monitored periodically using an approved water quality sampling regime and fish population composition will be verified by periodic test netting. In addition to pre-drawdown sampling, these efforts will be duplicated and tracked following all drawdowns to determine success. MN DNR will install a water level gauge on Lake Ocheda to closely monitor and record water levels and measure downstream conditions during any drawdown period (stipulated by M.R 6115.0221).

Management Plan Revisions

The management plan will be revisited every 10 years to assess effectiveness and determine if changes or updates need to be made. Modifications to this management plan would be made in cooperation with MN DNR Okabena-Ocheda Watershed District, Worthington Public Utilities and other stakeholders. Landowners are included in the revision process through notification by letter.

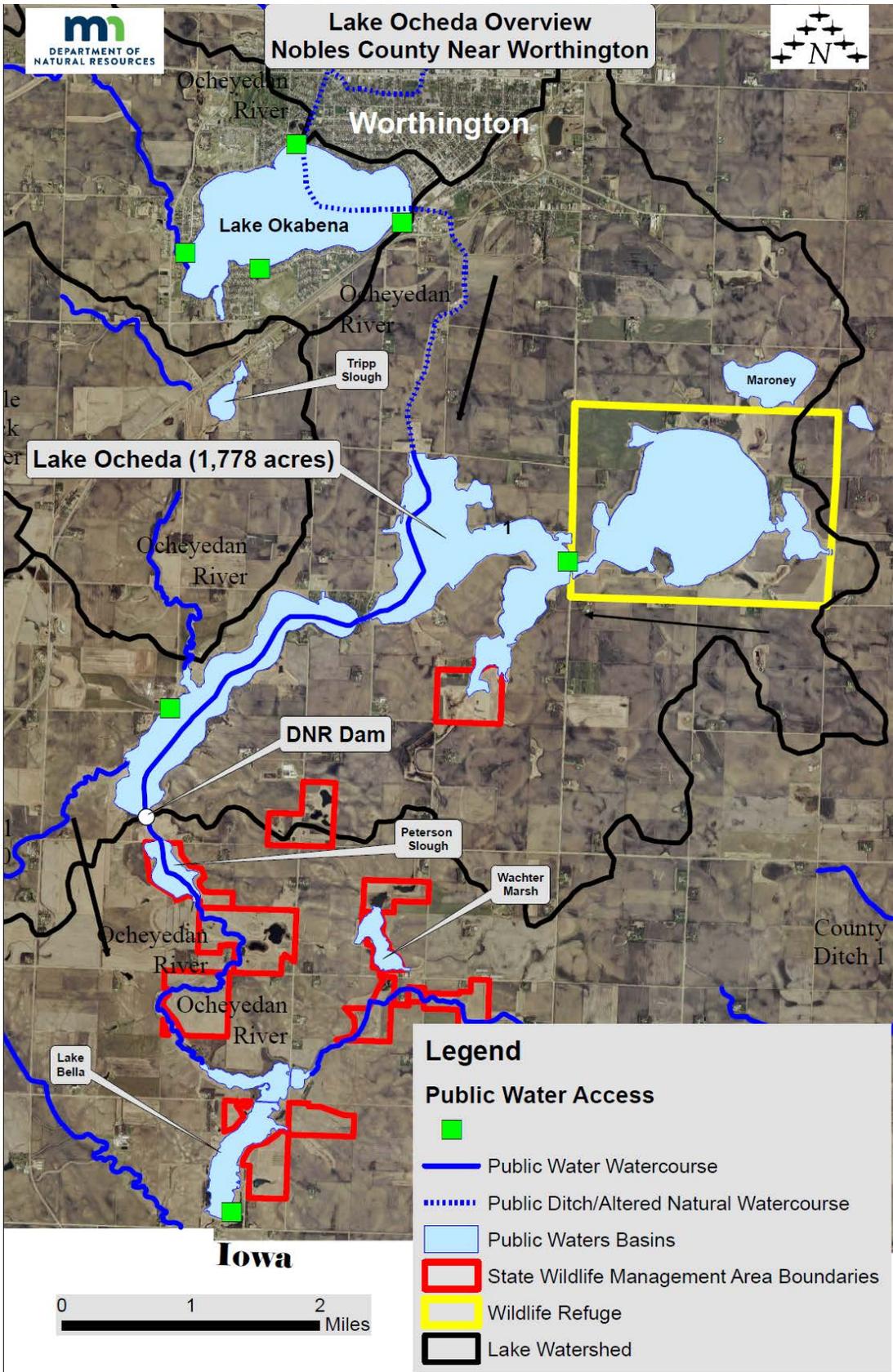


Figure 1. Lake Ocheda Project Overview Map