Upper Twin Lake Management Plan
DOW #24003100
DRAFT – June 2019

DEPARTMENT OF NATURAL RESOURCES

Questions or send comments to Steve Kittelson at steve.kittelson@state.mn.us, or written comments to 35365 800th Ave., Madelia, MN 56062 by August 12, 2019

General Lake Information

Location: Upper Twin Lake lies about 1 ½ miles north of the Village of Twin Lakes, Townships 101 – 102 North, Range 22 West (Nunda and Pickerel Lake Townships), Sections 1, 2 (Nunda); 26, 35, 36 (Pickerel Lake) in Freeborn County, Minnesota.

Size: Upper Twin is a meandered lake of 699 acres.

Shoreline: There is about 5.7 miles of marshy shoreline. An extensive marsh at the north end of the lake connects to Church Lake about ½ mile north of the lake. Riparian uplands are gently to moderately rolling.

Access: There is a State Water Access located along the northeastern portion of the lake at 16789 720th Avenue. Upper Twin is also accessed from County Road 80 on the south side of the lake. Upper Twin Wildlife Management Area and Twin Lake Waterfowl Production Area provide additional shore access.

Watershed: Upper Twin Lake is in the Goose Creek (County Ditch 10) watershed, a headwaters tributary of the Shell Rock River (Cedar River) Watershed.

Watershed Area: The size of the catchment is about 6.5 square miles (including the lake). The drainage ratio is about 5:1.

Inlets: A drainage ditch enters the lake on the west side. Marshland seepage originating at Church Lake enters the lake at the north end. There are 4 inlets along the eastern shore providing outlets for tiles and swales. A small drainage system also enters the lake at the southeast shoreline. There may be other unidentified tiles or surface drains.

Land Use: The majority of the land in the lake's catchment area is devoted to row crop agriculture. Natural habitats include wetland, small hardwood groves and grasslands. A private campground is located on the south shore. Conservation lands include Upper Twin Wildlife Management Area (14 acres) on the northeast shore of the lake and Twin Lake Waterfowl Production Area (283 acres) on the south side of the lake.

Depth: At normal water level, average depth is about 2.5 feet (ft.) and maximum depth about 3 ft.

Outlet: Upper Twin Lake outlets through a 6'x6' box culvert to a large cattail marsh on the north side of Lower Twin Lake. In the past this outlet was ditched and the marsh partially drained for farmland, but is reverting to more natural conditions. Department of Natural Resources file information suggests that the outlet to Upper Twin Lake was lowered substantially sometime prior to 1922 and later restored by construction of a spillway in a concrete culvert. This spillway was at about 1259.2 ft. (1929 NGVD). The outlet was lowered again when that culvert was replaced in 1940 during a realignment of County Road 80 with a culvert having a floor elevation of 1255.84 ft. The marshland on the north side of Lower Twin has been ditched improving the efficiency of the outlet.

A MNDNR hydrographic survey in 1961 measured the upstream invert of the County Road 80 culvert at 1256.13 ft. and in February of 2018 a MNDNR noted the flow line near the upstream end of the culvert was 1256.5.

Runout elevation (all elevations are expressed as 1929 NGVD unless otherwise noted): Presently, the runout for Lower Twin ostensibly controls Upper Twin. The Lower Twin runout has been set at 1256.7 ft. Surveys indicate the runout was about 1257.1 ft. in 1961 and 1256.5 ft. in 1999.

Upper Twin Ordinary High Water Level: 1259.0 ft.

Upper Twin Lake has a semi-permanent water regime. In the last 50 years it has gone dry or nearly so due to natural droughts in the mid-1970s, late 1980s and most recently late summer – winter of 2012 (MNDNR files, J. Vorland, pers. comm.)

Water Quality

Upper Twin Lake is a hyper-eutrophic shallow lake. The MPCA has finalized the Shell Rock River Watershed Restoration and Monitoring and Assessment (Asmus, et. al. 2012) and the Shell Rock River Biotic Stressor Assessment Report (Carter 2014) summarizing water quality conditions and stressors. According to the Shell Rock Watershed District 2018 Clean Water Annual Report the 2018 summer-average phosphorus concentration (244 μg/l) in Upper Twin Lake was below the long-term average (300 μg/l) for the lake, and similar to 2016 and 2017. Summer average water clarity (0.8 ft.) was lower than the long-term average (1.2 ft.). Neither parameter meets MPCA standards for shallow lakes (<90 μg/l total phosphorous and >2.3 ft. Secchi depth). The 2016 Clean Water Annual Report noted that after drying out in the summer of 2012, water quality in Upper Twin Lake was improved for two seasons, but returned to pre-2012 levels.

Some water quality parameters from samples taken during MNDNR habitat surveys are shown in Table 1. Total phosphorus ranged from 18 μg/l in 2004 to 357 μg/l in 2017. Secchi depths were equivalent to water depths in 2004 and averaged only 0.5 ft. (n=41) in 2017.

Fish and Wildlife Habitat

Upper Twin Lake is a designated wildlife management lake found in a chain of shallow lakes running from Rice Lake near Lake Mills, Iowa to Geneva and Freeborn Lakes in northern Freeborn County. Other nearby designated wildlife management lakes include Lower Twin and Bear. Upper Twin Wildlife Management Area (WMA) and Twin Lakes Waterfowl Production Area (WPA) protect lands riparian to Upper Twin. Nearby conservation lands include Ann and Leo Donahue, Bear, Magaksica, Bright's Lake/State Line Lake WMAs, Goose Creek WPA and White's Woods County Park on the south side of Lower Twin Lake. Freeborn County Pheasants and Habitat maintains a small wildlife area southeast of Lower Twin Lake and private conservation lands enrolled in short term and permanent conservation programs provide additional protected habitats.

Upper Twin Lake has a high ratio of shoreline length to basin area. Bottom sediments are silt and muck. The littoral zone covers 100% of the Upper Twin Lake basin. The lake is regarded as important for waterfowl, other water and marsh birds, turtles and amphibians, and aquatic furbearers. Upper Twin is an unstable habitat for fish and primarily serves as a seasonal habitat and/or habitat for species tolerant of hostile conditions such as shallow water, low dissolved oxygen, silty substrates, thermal extremes and high turbidity (tolerant species). The lake is connected to permanent habitats downstream and fishes regaining access quickly become abundant after mortality events.

The lake supports a broad fringe of robust emergent plants dominated by hybrid and narrowleaf cattails. Presently, the fringe is composed of canary grass, sedges, river bulrush, cane and cattails in near shore areas and is more cattail dominated along the open water edge where cattails have also formed dense root mats. White water lilies are abundant in the south bay of the lake. During and after drought periods emergent vegetation expands and diversifies with the addition of species such as softstem bulrush, arrowhead, nutsedge and beggarticks, then dies back due to muskrat grazing, water stress and common carp. The submersed aquatic vegetation component is variable with the year-to-year variation primarily attributed to the inter-related effects of nutrient enrichment, turbidity and common carp and other rough fishes. The lake will have abundant submersed vegetation and clearer water after winterkills or droughts then transitions toward a turbid state (see Van Geest, e.t al. 2007).

Six formal wildlife habitat surveys have been made of this lake, June 1948, September 1966, September 1998, August 2004, July 2015 and September 2017. A narrative report of a lake reconnaissance describes habitat conditions in August 1975. These reports document the lake can and does support good wildlife habitats, but also becomes turbid with suspended silts and abundant planktonic algae and little submersed vegetation to support wildlife uses.

Average depth of the lake was 2.4 feet in 1998, 2004 and 2015 and about 2 feet in 1948 and 1966 and only 1.5 feet in 2017. The entire lake bottom consists of very soft mud or muck-silt. Secchi disk readings were to the bottom in 1948 and 2004. The 1975 reconnaissance describes water as very clear in about half the basin and somewhat cloudy due to suspended algae in the rest of the lake. In 1966, 1998, 2015 and 2017 Secchi readings were reduced. Carp were noted in 1966, 1998 and 2017 surveys, although they were not cited in the 2015 habitat survey. No carp, only other minnows, were observed in the habitat surveys when clear water prevailed.

Submersed aquatic vegetation was relatively abundant in 1948, 2004 and 2015. In 1966 and 2017 submersed vegetation was present, but sparse. Submersed vegetation was found on few survey points in 1998. In 2004 submersed vegetation was documented on less than half of the surveyed plots, but the growth was lush in places and the survey crew noted abundant beds between sampling stations. Filamentous algae was ubiquitous that year. Sago pondweed, an excellent duck food, was common in 1948, 1975 and 2015 and widespread, but sparse, in 2017. Other submersed plants often encountered during habitat surveys include coontail, narrow-leafed pondweeds, muskgrass, and bushy pondweed.

Habitat surveys have been primarily used to document vegetation in open water areas. These formal surveys provide only limited documentation of the dense emergent stands encircling the lake. Softstem and hardstem bulrush were described as abundant in the 1948 survey, but cattail was not recorded on the sample plots. Broad-leaved cattail was noted that year as a co-dominant with softstem bulrush in a solid stand occupying most of the southern bay of the lake. In 1966 standing emergent vegetation is estimated to occur over about 75% of the basin. Narrowleaf cattail is listed as abundant along the shoreline with river bulrush as a co-dominant. Other common emergents around the shoreline included arrowhead, softstem bulrush, giant burreed and cane. In 1975 it was noted that softstem bulrush, cattail and river bulrush were declining. Carp and wind action were cited as contributing factors where plants were rooted in soft mud. Over the past 70 years the cattail component has shifted from broad-leaved cattail to hybrid and narrow-leaved forms.

Analysis of aerial photos indicates that robust emergent vegetation covered about 420 acres or about 60% of the basin in 1991. Emergent vegetation was well distributed in the basin that year with many points, bays and islands of cover that is attractive to wildlife. By 2003/4 emergent cover occupied about

330 acres (47% of the basin) in a fairly uniform, closed stand around the perimeter of the lake with few openings or interspersion with open water habitats. The extent and distribution of robust emergent vegetation in the 2011, 2013, 2015 and 2017 aerial photos is very similar to that found in the 2003/4 photography.

Table 1. Summary of selected results from shallow lake habitat surveys for Upper Twin Lake.

Year	Avg. Depth (ft.)	Max. Depth (ft.)	Avg. Secchi Depth (ft.)	Max. Secchi Depth (ft.)	Percent Survey Plots with Macrophytes (number of stations)	Macrophyte Species Richness in Survey	Total P (ppb)	Sulphate Ion (ppm)
1948	2.0	4.5	2.0	ND*	100 (30)	13	ND	10
1966**	2.2	2.5	1.6	2.5	SAV 75 (16)	11	ND	ND
1998	2.4	3	0.9	1.6	27 (30)	12	140	ND
2004	2.4	3	2.4	3	96 (52)	10	18	ND
2015	2.4	3	1.2	2.5	98 (43)	6	328	4.95
2017	1.5	2	0.5	0.8	90 (41)	6	357	ND

*Only average Secchi is provided in the 1948 survey report, but the Secchi is noted as "to the bottom."
**1966 data shown in the average depth column is median depth. The percent plots with macrophytes is for submersed aquatic vegetation (SAV) only. Standing emergent vegetation was noted as occurring over about 75% of the basin that year.

Wildlife Use

When submersed vegetation is abundant the combination of cover and good food resources make Upper Twin a valuable breeding and migratory habitat for waterfowl and other wildlife. Waterfowl observed with broods during the various surveys include included blue-winged teal, ruddy ducks, wood ducks and trumpeter swans. Other waterfowl noted during summer habitat surveys include mallards, American wigeons, redheads, ring-necked ducks and Canada geese. American coots were regularly observed, especially during surveys in late summer when these birds begin to stage. Other wildlife noted on habitat surveys have included pied-billed grebes (with chicks), American white pelicans, double-crested cormorants, American bitterns, green herons, black-crowned night herons, great blue herons, Forster's terns, killdeer, lesser yellowlegs, ring-billed and Franklin's gulls, ring-necked pheasant, fox squirrel, muskrats, and snapping turtles.

The value of Upper Twin Lake as a staging area for waterfowl has been apparent to hunters and casual observers during spring migration and late summer. This lake gets good use by species such as teal, mallards, wigeon and coots when aquatic vegetation is abundant because of ample food supplies made available in shallow water. Diving ducks including ring-necks, scaup, redheads and canvasbacks have been observed in large numbers during both spring and fall migrations. In recent decades white-fronted geese have joined Canada and cackling geese as common spring migrants. Snow geese are far less common as spring and fall migrants than they were during most of the 20th century. Canada geese and more recently, trumpeter swans nest on the lake. The dense emergent fringe is important nesting cover for many other birds including sandhill cranes, rails, bitterns, black-crowned night herons, mallards, marsh wrens, red-winged and yellow-headed blackbirds. The fringe also provides thermal cover for migrant birds including swallows, yellow-rumped warblers and rusty blackbirds and in winter for

resident wildlife ranging from deer and pheasants to black-capped chickadees. Muskrats and beaver utilize the lake, but the shallow nature of the lake probably limits overwintering. Otter, mink and raccoons make extensive use of the lake's habitats and prey base. Painted and snapping turtles are the most commonly observed turtles and the lake is an important habitat component for amphibians that utilize marsh habitats, e.g., leopard frogs.

Minnesota's natural heritage information system includes recorded observations of several species of special concern and/or species of greatest conservation need including Forster's tern, black tern, American white pelican, common gallinule, sedge wren, red-necked grebe and yellow-headed blackbirds. These species, with the exception of white pelicans, make greatest use of the lake when emergent cover is interspersed with open water areas having abundant submersed vegetation and good water quality.

Fishery

Upper Twin Lake is prone to hypoxia and/or winter freeze-out and occasionally dries up, but is rarely fish free. The fish community is comprised of tolerant species such as fathead minnows, brook sticklebacks, and black bullheads. Common carp are adapted to recolonizing the lake after fish kills and then exploiting the warm shallows as reproductive habitat. Abundant and large carp are associated with loss of rooted aquatic plants and turbid water conditions. Other minnows are mentioned in most lake surveys and reconnaissance. There is little recreational fishing on Upper Twin, but the lake is utilized for minnow harvest. The lake does not have much history of commercial seining for carp or buffalo.

Some of the culvert crossings of Goose Creek downstream of Lower Twin Lake may be partial barriers to movements of some fish species, but are insignificant as barriers to common carp. In the past a rough fish barrier was installed below Lower Twin Lake and was credited as nearly eliminating the carp problem in the mid-1970s. At some point the barrier was removed and a rough fish barrier has not been present for decades.

Management Goals and Objectives

Goal: Provide quality breeding and migration habitat for waterfowl, marsh birds, aquatic furbearers and other wildlife and an area for the enjoyment of nature and understanding natural ecosystems.

Objective 1: Promote growths of aquatic plants which provide food and cover for waterfowl, aquatic furbearers and other wildlife.
Objective 2: Provide incentives for ducks to propagate on the lake and nearby areas.
Objective 3: Promote regulations which afford the best possible waterfowl hunting experience without endangering the resource.
Objective 4: Provide an area for the study of marshland ecology by educational institutions and for the pure enjoyment by interested people of a unique but disappearing wetland ecosystem.

Proposed Management Actions to Achieve Objectives

Minnesota Department of Natural Resources Commissioner's Order 1940 of the MNDNR formally designated Upper Twin Lake in January 1976 for wildlife management under the authority of Minnesota Statutes 97A.101 subdivision 2. The designation followed preparation of a lake management proposal and a formal public hearing. Once so designated the MNDNR may be permitted to temporarily lower lake levels periodically to improve wildlife habitat. In addition, the MNDNR has authority to regulate motorized watercraft and recreational vehicles on designated wildlife lakes. This plan updates the 1975 Management Plan for Upper Twin Lake.

Action 1: Install and/or modify water control structure(s) to facilitate manipulation of water levels to encourage desired aquatic plant species.

Stable, high water levels can be deleterious to water quality and wildlife habitats found in shallow lakes if maintained too long. A variable crest dam has been installed at the outlet of Lower Twin Lake allowing for water management on both lakes. Upper Twin can be lowered in conjunction with Lower Twin Lake to the sill elevation of the County Road 80 culvert (1255.84 ft.) or nearly a full drawdown, but it cannot be dewatered independently. Conversely, the current outlet configuration for Upper Twin does not provide for conservation of water levels in Upper Twin Lake if Lower Twin is artificially drawn down.

Strategies to improve Upper Twin water management include:

- Modify the Upper Twin outlet to incorporate a variable crest weir to allow water levels in Lower Twin to be lowered independently of Upper Twin.
- Modify of the Upper Twin outlet to incorporate a pumping station allowing water levels in Upper Twin to be lowered independently of water levels in Lower Twin.

Modifications of the Upper Twin outlet require permits from the U.S. Army Corps of Engineers, public waters work permits from the Department of Natural Resources and, potentially, approvals from the local government unit administering the Wetland Conservation Act. Modifications that impact County Road 80 or affect land owned by the U.S. Fish and Wildlife Service (FWS) require consent and agreements from Freeborn County and/or the FWS.

Desired Outcomes: Modifications to the outlet of Upper Twin Lake will allow management strategies to be targeted. It is expected that at times Upper and Lower Twin Lakes will have similar management needs that warrant simultaneous management (e.g. carp infestations). Nevertheless, there are significant advantages to maintaining the ability to preserve water levels in one lake when the other is drawn down.

- Drawdowns can be more effective as water discharges necessary to achieve desired levels are substantially reduced if the lakes are managed independently.
- Benefits will accrue to wildlife with limited dispersal ability by providing a nearby water refuge.
- Managing the lakes in different successional stages benefits a broader suite of wildlife at any given time and conveys additional opportunities for wildlife-based recreation.
- A pumping station can provide for precision water management capacity that is difficult to achieve with gravity flow alone in this low gradient system.

Action 2: Install and maintain a barrier to the upstream movements of rough fishes.

Certain fish species including common carp have a negative impact on water and habitat quality and exert a strong influence on wildlife uses and the food web in shallow lakes. Due to changes in water flows and the low gradient of downstream areas fish screens no longer provide reliable barriers to rough fish movements and are labor intensive to maintain. Other designs such as a velocity culvert, rock weir, or electric fish barriers may be a feasible replacement for fish screens.

Management Thresholds: Operation of a functional fish barrier is indicated by the presence of common carp or other invasive, exotic fish species upstream of U.S. Highway 69.

- Engineering surveys will determine the best type and location for a fish barrier for Upper and Lower Twin Lakes.
- Installation of a fish barrier requires permits and permissions to maintain a barrier to the movements of fish and other aquatic species.

Depending on the design and location, permits from the U.S. Army Corps of Engineers, public waters work permits from the Department of Natural Resources and approvals from the responsible government unit administering the Wetland Conservation Act may be needed. Consent and agreements from the owner or administrator of lands where a barrier is located will be necessary.

Desired Outcomes: Turbidity should be reduced with the absence of carp and additional growths of submersed aquatic vegetation. Planktonic algae problems should be minimized and water quality measures improved. Benefits will accrue to lake through a reduction in destructive feeding actions and nutrient inputs. Habitat improvement will result in greater utilization of the lake by waterfowl, increased wildlife and water-based recreation.

Measures of management effectiveness may include:

- Common carp or other invasive carp are absent.
- Average Secchi disk measurements > 2.3 feet (or to the bottom) during mid-summer.
- Total phosphorous < 90 μg/l.
- Aquatic vegetation (both submersed and emergent) should be found at > 80% of standard sample stations.
- Presence of leopard frog and/or American toad tadpoles.

Action 3: Implement a drawdown when indicated.

Managed drawdowns are used to mitigate the effects of climate change, eutrophication and invasive species, including common carp. Managed drawdowns require a public waters work permit. Drawdowns occur in nature during periods of drought and function as natural rejuvenation mechanisms for shallow lakes. Depending on extent, timing and severity, low water levels can restructure the aquatic community. Fish communities are modified or eradicated. Aquatic plant communities change in response to changes in growing conditions and the food web is modified. Wildlife populations are affected by the changes in food, cover and water depths.

Managed drawdowns emulate the drawdown effects of natural droughts. As occurs under natural conditions, a management drawdown may be partial (water levels unusually low, but some water remains in deeper parts of the basin) or full (the basin is dry or nearly so). Drawdowns may vary in

length and be seasonal or be maintained for up to 2 years to accomplish different or multiple objectives. For example, a drawdown may be conducted over winter to eliminate problem fishes allowing aquatic invertebrates and submersed aquatic plants to flourish. Drawdowns resulting in mudflats during the growing season are used to stimulate new growth of emergent aquatic plants and affect nutrient dynamics.

As feasible managed drawdowns will take into account life histories of wildlife dependent on shallow lake and marsh habitats. For example, it is desirable to initiate winter drawdowns in late summer after overwater nesting species such as pied-billed grebes have completed brood rearing but before resident aquatic wildlife have initiated overwintering. Lower water levels in early fall will provide shallow water and mudflats attractive for staging puddle ducks while encouraging muskrats, turtles and frogs to use alternative habitats for overwintering.

Action 3 A: Implement a major drawdown.

During a major drawdown, lake levels would be lowered as far as possible, exposing bottom soils. As sediments dry they will consolidate and oxidize. If exposed during the growing season these conditions stimulate germination of emergent vegetation. During major growing season drawdowns receding water levels create unique conditions especially valuable for migrating shorebirds, although some species dependent on deep marsh habitats may be disadvantaged in the short term. New growths of mudflat annual plants and perennial aquatic plants may occupy nearly all of the basin providing high quality food resources for waterfowl and other wildlife. Major drawdowns are expected to be used infrequently. Water quality parameters, aquatic plants and the fish community will be surveyed periodically to monitor management response and determine when management is necessary.

Management Thresholds: Major drawdowns may be conducted when any two of the following conditions are met.

- Emergent aquatic plants occupy < 50% of the basin.
- Aquatic plant, emergent and submersed, coverage is < 80% within the basin as determined by lake survey using standard survey stations.
- Secchi readings average < 2.2 feet for 2 consecutive growing seasons.
- Total Phosphorous >90 μg/l.
- Common carp or other deleterious fish species are present.
- Curly-leaved pondweed occurs on >30% of standard survey points.

Action 3 B: Implement partial drawdown to 1257.2 ft.

Partial drawdowns can achieve some of the same objectives of major drawdown while maintaining some water in the basin for wildlife use and to encourage beneficial submersed plants. For example lower water levels in winter can be used to decrease overwintering fishes. Lower water levels in the growing season can help improve light penetration to the bottom and early warming to benefit submersed plants.

Management Thresholds: Partial drawdowns may be conducted when any one of the following conditions is met.

- Aquatic plant, emergent and submersed, coverage is < 80% within the basin as determined by lake survey using standard survey stations.

- Submersed aquatic plant species richness is less than 7.
- Secchi readings average < 2.2 feet.
- Total Phosphorous >90 μg/l.
- Common carp or other invasive carp are present.

Desired Outcomes: Maintaining the proper amount of submersed and emergent aquatic vegetation should reduce turbidity and improve food resources for wildlife. Planktonic algae problems should be minimized and water quality measures improved. Habitat improvement will result in greater utilization of the lake by waterfowl, species of greatest conservation need and other marsh denizens and increased wildlife and water-based recreation.

Measures of management effectiveness may include:

- Average Secchi disk measurements > 2.3 feet or to the bottom during mid-summer.
- Total phosphorous < 90 μg/l.
- Aquatic vegetation (both submersed and emergent) should be found at > 80% of standard sample stations.
- Species richness for native aquatic macrophytes > 9.
- Common carp or other deleterious fishes are absent or uncommon.

Action 4: Maintain relatively stable water levels during non-drawdown.

Midwestern shallow lake ecosystems are naturally variable environments. However, changes in land use, drainage patterns and climate can result in rapid and extreme changes in water levels occurring with increasing frequency. These fluctuations can result in significant habitat losses and damage wildlife populations and the recreational uses derived from these habitats and populations. If conditions allow, there are times it may be desirable to change flows in order to minimize unusual fluctuations.

Management Threshold: Upper Twin Lake water level >1259.5 ft., Lower Twin water level is less than 1258.0 feet and discharge rates from Lower Twin are less than 16 cubic feet per second as measured or calculated at the U.S. Highway 69 culverts.

Desired Outcomes: Protection and restoration of critical habitats are important tools for sustaining water quality. Benefits will accrue to lake through a reduction in destructive high water, wave or ice action and uprooting emergent plants, water and nutrient inputs. Food resources and other habitat improvements will result in greater utilization of the lake by waterfowl, increased wildlife and water-based recreation.

Action 5: Obtain legal authority to restore outlet levels to 1259.2 or legal elevations as determined by engineering surveys.

Previous restoration efforts established a runout elevation of 1259.2 or about 0.1 ft. higher than the average water elevation recorded for Upper Twin Lake (MNDNR, Feb. 2018, 202 gage readings August 1961 – August 2017) and about 0.2 ft. above the determined ordinary high water level. The invert of the outlet culvert currently is 1256.5. Voluntary restoration would require additional surveys, public involvement and flowage agreements or other legal authorities.

Desired Outcomes: Seasonal, yearly and long-term water level fluctuations within the lake's natural range of variability are critical to ecosystem function. Muskrats are expected to increase if lake levels are raised. Muskrats are an economically important wildlife species. They also serve a keystone role in shallow lake ecology through their grazing and house building activities. Breeding waterfowl and marsh birds benefit from additional nest sites and brood habitats associated with changes in the abundance and distribution of emergent aquatic plants due to muskrat activity and increased water depths. Other wildlife such as mussels, snapping turtles and leopard frogs benefit from improved winter habitat and other aquatic and terrestrial furbearers benefit from a greater variety of habitat and edge.

Measures of management effectiveness may include:

- Increased lake area with water depths between 2.5 and 3 feet to improve winter habitat for aquatic wildlife.
- Increase heterogeneity of emergent habitats as determined by the degree of edge and interstitial open water habitats within emergent stands
- Species richness of aquatic vegetation > 9.

Action 6: Regulate recreational surface water uses to limit disturbance to wildlife and their habitats.

Certain water and recreational uses can disrupt wildlife use or damage habitats. Motorized watercraft have a greater impact than non-motorized watercraft due to speed and noise and the potential to uproot beneficial plants due to prop and wake action. As a result of new technologies use of motorized watercraft is not limited by shallow water and dense vegetation. The use of airboats is prohibited at all times on lakes designated for wildlife use. In addition, Upper Twin Lake is also a designated Waterfowl Feeding and Resting Area. When posted during open waterfowl hunting seasons (including early and late goose seasons and spring light goose conservation hunts) motor-propelled water craft may only use electric trolling motors. These restrictions do not apply during the primary breeding season. Other motorized restrictions (e.g., limitations on outboard motor size; no wake zones) could be implemented in addition to or as a substitute for feeding and resting area regulations to protect nesting wildlife and aquatic habitats at other times. Before the commissioner establishes perpetual restrictions a public meeting must be held in Freeborn County. Other waterfowl regulations and trapping regulations are intended to balance resource conservation and sustainable uses.

Desired Outcomes: Indigenous wildlife populations and the recreational and educational opportunities derived from them are readily available to people interested in wildlife viewing, nature study, hunting, trapping or to anyone who just appreciates being out in a marshland ecosystem for current and future generations.

Action 7: Local, state and federal agencies and citizen and non-profit groups target implementation of conservation programs and practices in the watershed of Upper Twin Lake.

The outlet of Upper and Lower Twin Lakes is Goose Creek, which flows east southeast and joins the Shell Rock River just north of the Iowa border. Conservation practices, including, but not limited to: conservation tillage and grazing, cover crops, water and sediment control, treatment buffers and wetlands, restored wetlands, grassed waterways, and nutrient management are effective solutions that can benefit Upper Twin Lake by making the results of in-lake management efforts last longer.

The Shell Rock River Watershed District was established for the purpose of improving water quality. Other agencies such as the Natural Resource Conservation Service and land grant University Agricultural Extension Services also exist to provide research and outreach to maintain sustainable land uses. Restoration and protection strategies can be enhanced, while also improving soil health and maintaining productive cropland through partnerships, education, outreach and funding mechanisms. Efforts to identify, target and implement projects and practices on private lands to increase ecological benefits associated with clean water, fish and wildlife habitat, recreational opportunities and sustainable agriculture will be important long term management strategies. Upper Twin Lake's fish and wildlife resources will benefit most from conservation practices that convey a wide variety of environmental services and incorporate a habitat component. Other strategies that can increase desired wildlife populations include shoreline management to improve upland nesting conditions, and strategically placed artificial nesting and loafing structures.

Desired Outcomes: Healthy soil, reduced nutrient losses to surface and shallow ground waters, decreased water yield during precipitation events, increased perennial vegetation on the landscape and improved breeding success for wildlife can be realized through targeted conservation efforts. Soil and water conservation practices, protecting and restoring critical habitats, and local partnerships are essential components to enhance water quality and improve wildlife habitats.

Citations

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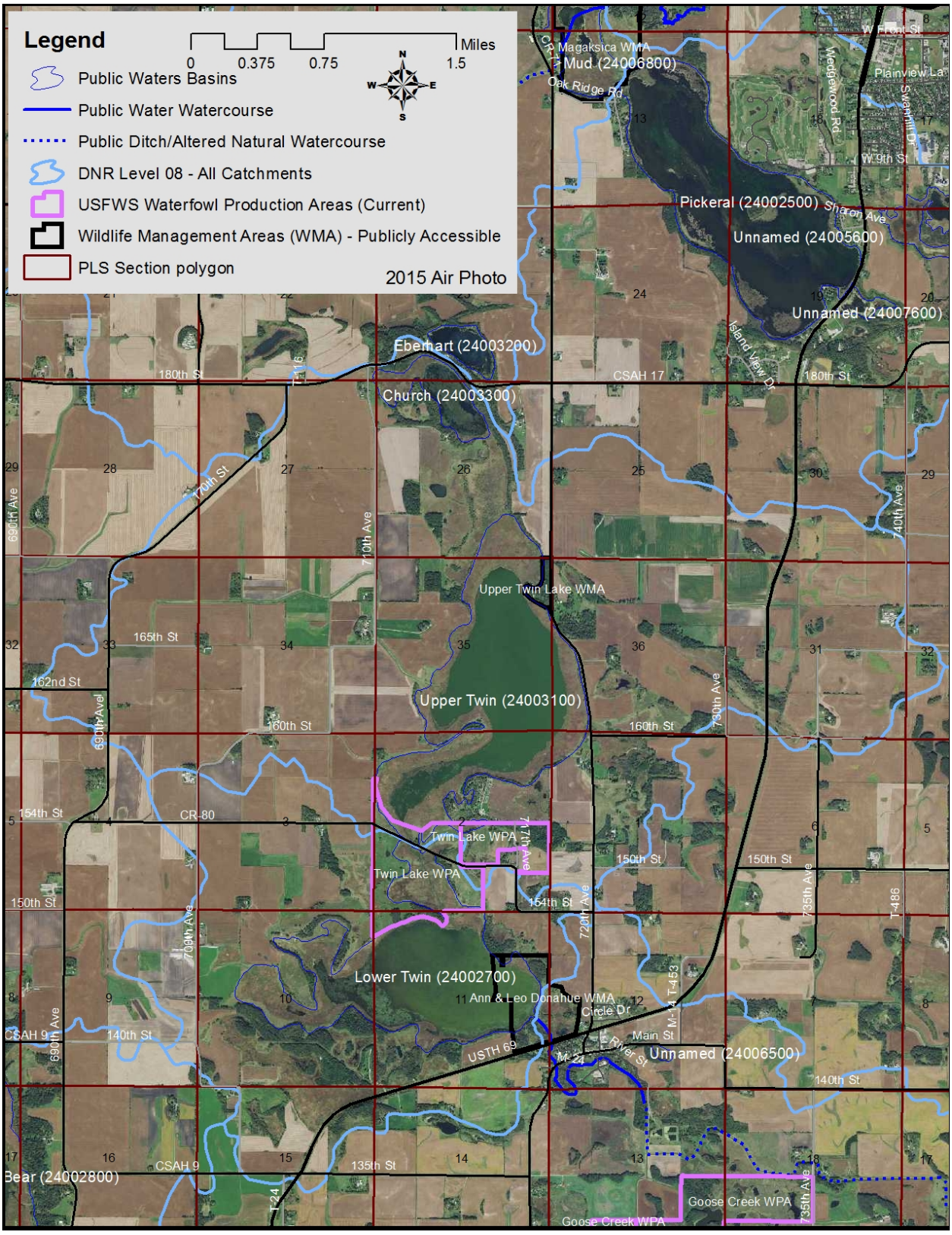

Figure 1. Upper Twin Lake and vicinity.

Enhancement Plan – Upper Twin Lake
Freeborn County, Minnesota
DOW# 24003100

SIGNATURE/APPROVAL SHEET

_____ Date_____
Area Wildlife Manager

_____ Date_____
Regional Wildlife Manager

_____ Date_____
Section Chief

_____ Date_____
Division Director