The Minnesota Department of Natural Resources is hosting a public information meeting to gather feedback on the management plan for Boot Lake in Jackson County.

The meeting will be held Wednesday, May 1st at 6:30 pm and take place at the DNR office in Windom, located at 175 County Road 26.

An overabundance of black bullheads and fathead minnows have degraded the water quality in Boot Lake, preventing the growth of aquatic plants that provide habitat to wildlife.

The DNR is proposing to aggressively stock predator fish in the lake to reduce undesirable fish populations. Lower black bullhead and fathead minnow populations should help improve water clarity, increase aquatic plant growth, and enhance fish and wildlife habitat in the basin.

Anyone wishing to comment on the plan who cannot attend the meeting is encouraged to contact Maggie Gross at margaret.gross@state.mn.us or 507-832-6016. Upon request, paper copies of the plan also can be provided.

Boot Lake Management Plan

Public Water No. 32-15 (32001500)

April 2024

General Information:

- County: Jackson
- Location: T103, R35, S31
- Size: 168 acres
- Maximum Depth: 7.80 ft. (2006)
- Average Depth: 5.40 ft. (across depth data collected during wildlife lake surveys)

- Main Basin approximate bottom elevation: 1480.34 ft.
- Fringe Wetland outlet notch elevation: 1485.05 ft.
- Main Basin OHW elevation: 1486.70 ft.

Note: All elevations are listed in NGVD 29 datum. To convert from NGVD 29 to NAVD 88, add 0.42 feet (ft.).

Public Land Association:

Most of Boot Lake is within Boot Lake Waterfowl Production Area (WPA; federally owned) and Bootleg Wildlife Management Area (WMA; state owned). There is a primitive public water access on the north side of the main basin, on the WMA. One other riparian landowner owns property on the southeast side of the fringe wetland (Attachment A). The riparian landowner does not own property on the main basin of Boot Lake.

History:

Boot Lake is a shallow lake in Jackson County that provides the public with both hunting and fishing opportunities. The basin is considered a “tweener” lake because it is a deeper shallow lake (i.e., average water depth > 5 ft.) that provides waterfowl habitat and sustains game fish intermittently. Tweener lakes also can provide a variety of recreation opportunities (e.g., hunting, fishing, kayaking, swimming), which vary among years depending on habitat conditions and water levels. Historically, habitat conditions in Boot Lake have been poor, despite the basin having a relatively small, intact watershed. Chronic poor water quality and limited aquatic vegetation have led resource managers to believe that habitat conditions in the basin are primarily being driven by fish population dynamics. The United States Fish & Wildlife Service (USFWS) and Minnesota Department of Natural Resources (DNR) have been discussing options to manage and enhance Boot Lake for a long time, but there is no simple solution. This management plan will outline a strategic approach with the goal of improving habitat conditions and recreational opportunities on Boot Lake.

Important Considerations:

The DNR Section of Wildlife is primarily responsible for management decisions on Boot Lake with significant input and assistance from the DNR Section of Fisheries. The USFWS also provides input on management decisions. Additionally, the DNR and USFWS provide the public with opportunities to comment on the management of Boot Lake.

Only non-motorized watercraft are allowed on Boot Lake because the basin is contained within a WMA and WPA. This motorboat restriction will be maintained on Boot Lake. Motor vehicles, excluding snowmobiles, and ice shelters are allowed on Boot Lake in the winter to provide ice fishing opportunities as dictated by Minnesota State Rule 6230.0250. State and federal resource managers are allowed through special provisions to use motorized equipment on WMAs and WPAs for management and/or research purposes.

Management Goal:

Goal: Improve water quality/clarity and increase aquatic plant growth to enhance fish and wildlife habitat.

Management Objective(s):

Objective 1: Re-establish aquatic plant communities and reduce undesirable fish populations using biomanipulation techniques (i.e., predator fish stocking). Sustain high predator fish abundances through regular stocking activities.

Objective 2: Periodically monitor the fish community structure and lake habitat conditions.

Objective 3: Monitor the existing lake outlet on a routine basis to ensure the appropriate runout elevation.

Objective 4: Collaborate with local partners to promote Best Management Practices (BMPs) in the watershed.

Objective 5: Consider adaptive management techniques including additional habitat and water quality improvement tools to enhance Boot Lake.

Management Actions to Achieve Objectives:

Action 1: Develop a fisheries lake management plan for Boot Lake in coordination with the DNR Section of Fisheries. A fish lake management plan, which aligns with the goals of this wildlife management plan, is needed for Boot Lake. The DNR Section of Fisheries, in collaboration with the DNR Section of Wildlife, will develop a comprehensive fisheries lake management plan for Boot Lake. **The fisheries lake management plan will outline specific stocking rates and frequency while adhering to this general framework:**

- Walleye, northern pike, and yellow perch are the only fish species that will be considered for stocking in Boot Lake. If other species are considered in the future, they must be agreed upon between DNR Section of Wildlife and Section of Fisheries.
- Walleye will be stocked at a rate of 5,000 fry per littoral acre in 2024.
- It is anticipated that walleye stocking will occur annually depending on abundance and fry availability at a maintenance rate determined by DNR Section of Fisheries Fisheries.
- Anticipated fish stocking rates following any substantial fish mortality event:
    - Approximately 250 walleye fry per littoral acre.
    - Approximately 1,000 northern pike fingerlings and/or pre-spawn adults.

    - Approximately 400 lbs. of pre-spawn yellow perch.
- Northern pike fingerlings and/or pre-spawn adults will be stocked outside of substantial mortality events, if surplus fish are available.
- Fish presence/absence surveys will be conducted at least once every 5 years to monitor fish assemblages within Boot Lake. Fish stocking frequency and rates will be re-assessed following any fish surveys and adapted as agreed upon between DNR Section of Fisheries and Section of Wildlife.
- All fish management options, excluding aeration systems, will be considered (e.g., rotenone) to enhance Boot Lake, especially as new information or techniques become available.
- Boot Lake may be used for walleye rearing if these efforts are coordinated and mutually agreed upon between DNR Section of Fisheries and Section of Wildlife.

Predator fish (i.e., walleye, northern pike, and yellow perch) stocking has been effective at reducing or managing fish communities in shallow lake ecosystems where fish are present and not otherwise easily removed. Walleye and northern pike have been shown to help increase aquatic macroinvertebrate abundance and zooplankton over short time periods (Meijer et al. 1994; Herwig et al. 2004). Predator fish may mitigate the negative impacts of undesirable planktivorous and benthivorous fish, such as fathead minnows and black bullheads, and help create clear water conditions in shallow lake ecosystems (Zimmer et al. 2019). The DNR Section of Fisheries and Section of Wildlife agree that stocking predator fish in Boot Lake may help improve habitat conditions. It is important to know that sustaining a recreational fishery is not the primary goal of this management plan even though stocking predator fish may provide additional recreational fishing opportunities in Boot Lake.

The DNR Section of Fisheries has stocked northern pike in Boot Lake previously (Table 1) but not at rates or the intensity needed to help control fathead minnow and/or bullhead populations.

Year	Species	Size	Number	Pounds
2021	Northern Pike	Fingerlings	284	200.00
2017	Northern Pike	Adults	120	150.00
2016	Northern Pike	Fingerlings	1,455	21.10
2014	Northern Pike	Adults	263	159.20

Table 1. Stocking record for Boot Lake, Jackson County, MN, USA.

Action 2: Monitor water quality parameters, aquatic plants, and the fish community periodically to determine when additional management is necessary. The DNR Section of Wildlife will conduct bi-annual shallow lake surveys during the first 5 years that this plan is implemented. Bi-annual surveys will allow resources managers to closely monitor lake habitat conditions through vegetation sampling and collecting water quality/clarity information. Monthly water samples also will be collected June–September to record total phosphorous and chlorophyl-a levels. Water level elevations will be recorded as well. The DNR Section of Fisheries will conduct bi-annual fish surveys using trap nets to help understand the fish assemblages in Boot Lake during the first 5 years that this plan is implemented. These surveys will help determine the success of the plan and whether other alternatives for management should be more strongly considered. After the first 5-year period, surveys will be conducted every 3-5 years and water quality parameters will continue to be monitored on a regular basis.

Action 3: Monitor the existing lake outlet. Rountine monitoring (i.e., at least annually) of the outlet will allow us to work with the private property owner to maintain the appropriate runout elevation. The natural outlet for

Boot Lake is located on the east side of the fringe wetland (Attachment A). Maintaining the outlet at the appropriate runout elevation will help reduce shoreline erosion, promote near-shore native emergent vegetation, and limit localized flooding.

Action 4: Collaborate with local partners to identify strategic watershed management opportunities and promote BMPs in the watershed. Conservation work within the watershed is an important tool in shallow lake management. The protection of existing habitats and restoration of critical areas within the watershed are vital to sustaining water quality and habitat conditions within the lake. The DNR Division of Fish and Wildlife will continue to coordinate with local partners to target conservation programs and land stewardship improvements within the Boot Lake watershed.

Action 5: If noticeable water quality and habitat improvements have not been achieved after 5 years, consider other shallow lake management alternatives, including possible water level drawdown and installation of a water control structure(s). The DNR and USFWS have considered various alternatives for temporary water level management (i.e., drawdown) on Boot Lake. However, the complexity and cost of such a project did not seem appropriate at this time. Resource managers determined biomanipulation would be a more suitable first step toward trying to improve lake habitat and water quality conditions within Boot Lake. Common carp are not present in the basin, so resource managers suspect black bullhead and fathead minnow populations are currently driving turbidity in the basin. Predator fish stocking or biomanipulation has been successful in other shallow lakes in Minnesota, often resulting in lowered black bullhead and fathead minnow populations and an improvement in water quality. Managers may consider additional management alternatives if lake habitat and water quality improvements are not trending in a positive direction on Boot Lake after 5 years. Possible management alternatives include a water level drawdown that would require lake designation through Minnesota Statute (M.S.) 103G.408, along with other permitting and jurisdictional requirements.

Short-term Lake Management Goals (2-5 years):

- Average summer Secchi disk reading from June–September exceeds 1.50 ft.
- Average summer total phosphorus and chlorophyll-a levels from June–September showing improvement and trending downward.
- Submersed aquatic plant diversity and lake wide plant species richness of 2-3 species or more.
- Submersed aquatic plant coverage of 30% to 50% in areas of the lake ≤ 6 ft. deep using systematic point sampling stations.
- An increase in waterfowl use, especially during spring and fall migrations.
- A high predator fish population (i.e., walleye, northern pike, and yellow perch) established in the lake resulting in a low overall abundance of undesirable fish (i.e., fathead minnows, black bullheads).

Note: Past shallow lake surveys have indicated an average Secchi disk reading of around 1.0 ft. Low plant diversity also was recorded with an overall aquatic plant coverage of 16% of the lake or less using systematic point sampling stations.

Long-term Lake Management Goals (5-10 years):

- Average summer Secchi disk reading from June–September exceeds 2.30 ft.

- Average summer total phosphorus and chlorophyll-a levels from June–September are below MPCA impairment thresholds for shallow lakes in southwest Minnesota (i.e., total phosphorus < 0.09 mg/L and chlorophyll-a < 0.03 mg/L).
- Submersed aquatic plant diversity and lake wide plant species richness of 4 or more species.
- Submersed aquatic plant coverage of 50% or more in areas of the lake ≤ 6 ft. deep using systematic point sample stations.
- An increase in waterfowl use, especially during spring and fall migrations.
- A high predator fish population (i.e., walleye, northern pike, and yellow perch) established in the lake resulting in a low overall abundance of undesirable fish (i.e., fathead minnows, black bullheads).

It is important to note that in contrast to a water level drawdown, biomanipulation techniques are more passive and often result in a gradual transformation toward clear water and habitat improvement. Resource managers understand that this approach may take some time to develop but hope to see a positive trend toward improved water quality and habitat improvement within the first 5 years.

Management Summary:

The DNR and USFWS have extensively looked into management options for Boot Lake. Resource managers propose stocking predator fish in Boot Lake for the next 5 years as an attempt to improve lake habitat conditions and water quality. Given the challenges and expense of alternative options (e.g., temporary water level drawdown) predator fish stocking is the best first step towards enhancing the lake. Predator fish stocking is a low cost, high reward alternative to more aggressive management strategies. Other approaches, such as a water level drawdown, may be considered if managers are not seeing improvement in habitat conditions or water quality after 5 years. Utilizing portable pumps to dewater Boot Lake and the adjacent fringe wetland does not seem feasible due to logistics and cost. Installing a permanent water control structure(s) is possible but also provides challenges. These challenges include deep cuts to install pipeline, high installation costs, landscape/permitting hurdles, and management/maintenance obligations. Requirements for installing water level drawdown infrastructure in the future are: 1) Designation under M.S. 103G.408, which requires a public hearing process; 2) A joint powers agreement with USFWS identifying roles and responsibilities for infrastructure; 3) Securing necessary permits, which include a Public Waters Work Permit, National Environmental Policy Act (NEPA) review, Minnesota Wetland Conservation Act (WCA) review, United States Army Corps of Engineers (USACE) approval, and Minnesota State Historic Preservation Office (SHPO) review; and 4) Petitioning Jackson County for an outlet into Judicial Ditch #20.

As of right now, the DNR Section of Fisheries is planning on stocking Boot Lake with predator fish during the spring of 2024 and the following 4 years (i.e., 2025 -2029). Lake conditions will be closely monitored during this 5-year period and this plan will be revisited in 2029. The DNR will continue to stock predator fish on regular basis if this aggressive predator fish stocking approach is showing signs of success (i.e., short-term lake management goals are met). Resource managers may reassess management opportunities if lake habitat conditions do not start to improve over the initial 5-year period. The goal of this management plan is to improve fish and wildlife habitat on Boot Lake. Desired habitat improvements include increased water clarity/quality and abundance/diversity of submersed aquatic plants. The temporary water level drawdown management approach will be reconsidered for Boot Lake, regardless of the existing fishery, if predator fish stocking is not successful in improving lake habitat conditions and water quality. A water level drawdown or some other lake management technique may still be necessary to flip the basin to a clear water state. Predator fish stocking will continue to be

a part of the management plan for Boot Lake even if a water level drawdown is pursued in the future. The DNR will manage Boot Lake as a boom-and-bust fishery with no consideration for winter aeration.

Survey Summaries to Date:

- Game Lake Survey – 1949
- Wildlife Lake Surveys – 2006, 2012, 2019
- Fish Presence/Absence Survey – 2019

Note: See Attachments B and C for vegetation and depth data from the 2019 Wildlife Lake Survey.

Literature Cited

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Meijer, M. L., E. Jeppesen, E. van Donk, B. Moss, M. Scheffer, E. Lammens, E. van Nes, J. A. van Berkum, G.J. de Long, B. A. Faafeng, and J. P. Jensen. 1994. Long-term responses to fish-stock reduction in small shallow lakes: interpretation of five-year results of four biomanipulation cases in the Netherlands and Denmark. Hydrobiologia 275:457–466.

Zimmer, K., B. Herwig, D. Larson, N. Ganzel, C. Hegedus, and R. Klaras. 2019. Fish stocking following shallow lake rehabilitation – opportunities and consequences for shallow lake management. University of St. Thomas and Minnesota Department of Natural Resources (Final Report), Minnesota, USA.

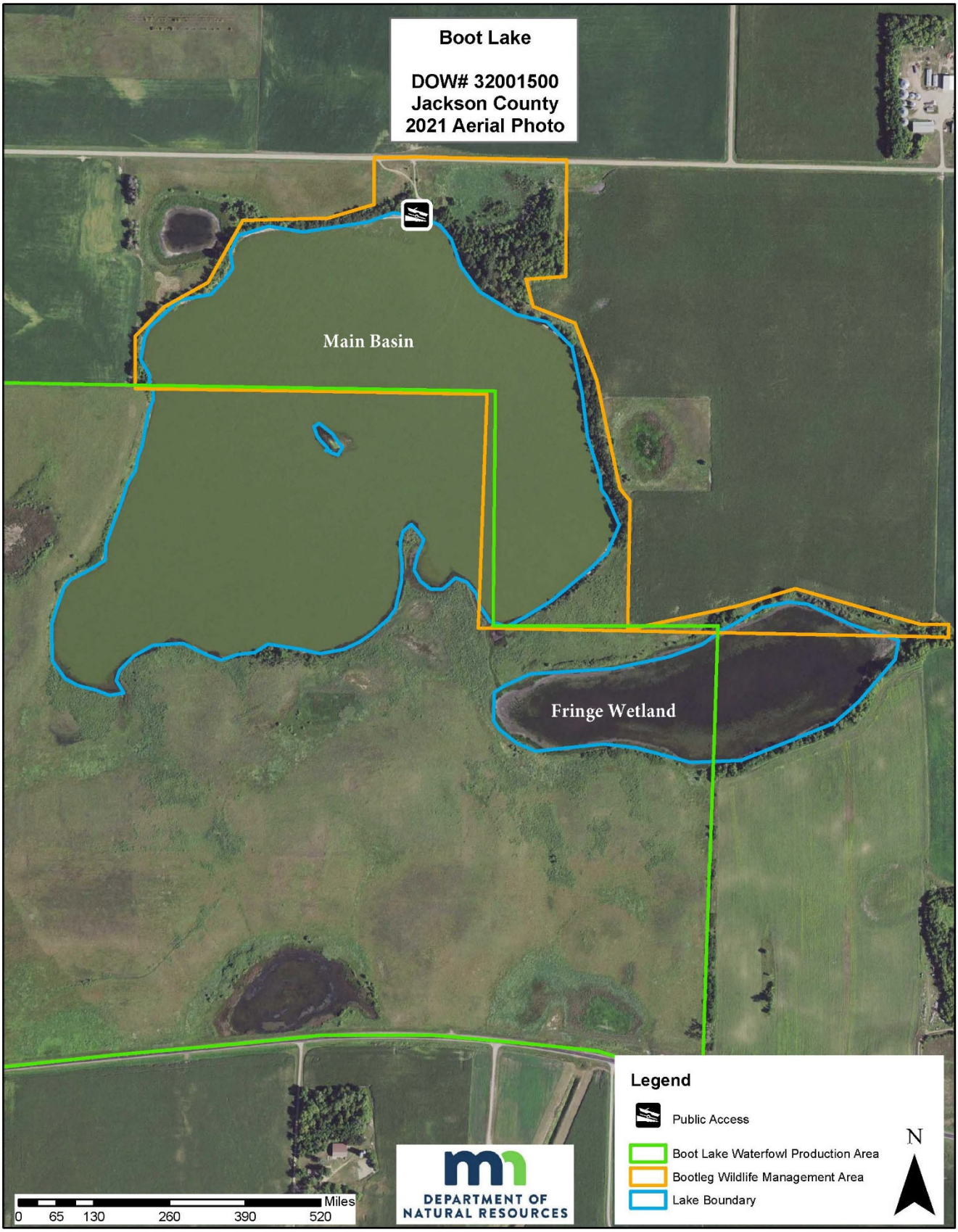
Boot Lake (DOW# 32001500), Jackson County

Management Plan

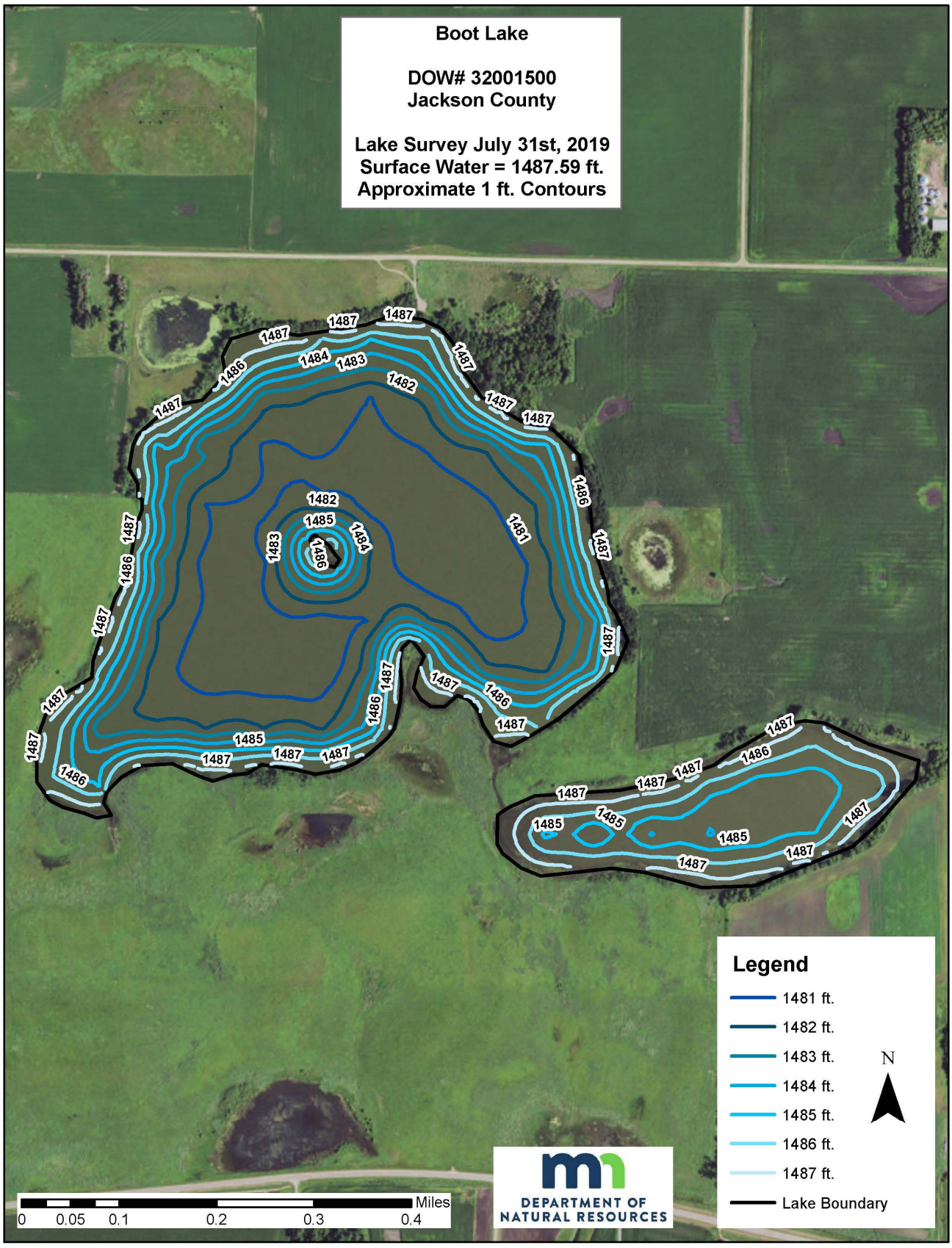
Signature/Approval Sheet

Signatures
X _____ Brian Nyborg Area Wildlife Manager
X _____ Ryan Doorenbos Area Fisheries Manager

Attachment A



Attachment B



Attachment C