Devils Lake Water Improvement District

SUBMERGED AQUATIC VEGETATION (SAV) LAKE MANAGEMENT PLAN AND PERMIT APPLICATION

ADOPTED January 12, 2023

EXECUTIVE SUMMARY

Devils Lake is a 680-acre shallow coastal lake that is managed by the Devils Lake Water Improvement District (District). The District's primary funding source is ad valorem taxes, although the District has received other sources of revenue such as grants in the past. For the 2021/2022 fiscal year, the total taxes allocated to the District was $303,622.

The District's priorities are set forth in its Strategic Plan dated October 13, 2022. That plan describes the overall mission, current priorities, approach to lake management and historical information helpful for managing the lake. One of the District's main priorities is reducing aquatic invasive species such as parrotfeather and native nuisance species such as elodea canadensis (Canadian waterweed). These species present hazards to recreation, navigation, and water quality, as well as outcompeting other native species.

During the summer of 2021, several areas of the lake bottom were populated by eelgrass (vallisneria). Then in the spring of 2022, massive amounts of elodea suddenly appeared in Devils Lake; a plant that was virtually non-existent in the lake two years earlier[1] (See Attachment 1). By mid-summer 2022, the lake was 48.6 percent occupied by volume with elodea. Surface coverage of the weeds is 40.1 percent, with 100 percent of the bottom of the lake covered with elodea. Engineering estimates of the volume of material indicate as much as 116 million cubic feet of SAV present at the time of the survey (See Attachment 2).

In August 2022, for the first time in 5 years, Devils Lake saw a decrease in dissolved oxygen. It is suspected that one factor contributing to this decrease is the volume of SAV in the lake over the last year.

Elodea Canadensis

Elodea canadensis is a submerged aquatic plant of slower flowing rivers and lakes, native to North America, specifically around the St Lawrence Valley and the Great Lakes regions. It has been intentionally introduced into areas outside of its native range as an ornamental aquarium species. This species has a wide ecological tolerance and grows relatively fast. It is a perennial, overwintering in the deeper water, and reproducing asexually. Disturbance increases the dispersal of numerous buds, and the vigorous re-growth is enhanced through changes in availability of nutrients. Elodea canadensis can form dense mats which can interfere with recreational activities, navigation, and lake infrastructure. In addition to this, the dense mats outcompete native plant species and therefore decrease the biodiversity in an area. It also accentuates the accumulation of finer organic silts which enhances its growth further as nutrients are released. Elodea canadensis is considered invasive in Australia, New Zealand, Cuba, and Alaska.

The main growing season is between mid-April and October when turions or short, densely leaved resistant stems, develop. During autumn, turions cease to elongate and come to bear tightly clustered dark green leaves, which are released as large masses of plant material onto the waterbody surface. This calving is part of elodea's survival strategy. These large mats eventually sink to the bottom where they remain dormant until spring, when the leaves expand,

[1] A 2019 vegetation survey of the entire lake, Canadian waterweed (elodea canadensis) was located in a single sample near the boat launch facility at East Devils Lake State Park.

roots develop from the lower nodes, the axis elongates, and a new plant is formed. In the meantime, they act as a nearly impenetrable "reef" of material that can stop a boat in its tracks.

Additionally, branches are easily detached by waves, currents, foraging animals and boat traffic. New roots develop quickly on the nodes of these fragments which are carried away to form new stands. These two methods of propagation give Elodea canadensis a considerable advantage over annual species and resulted in its rapid spread throughout North America.

History of grass carp in Devils Lake

Concerns regarding the impacts that vegetative cover was having on the beneficial uses of Devils Lake led to the formation of the District in 1984. Shortly thereafter, the District petitioned ODF&W to allow the introduction of sterile grass carp into the Lake. Approximately 32,000 sterile grass carp were introduced between 1986 and 1993. The District was required, as a condition of those stockings, to monitor the Lake for a period of five years. Monitoring of the water quality conditions in the Lake continues to this day.

Due to those historical stockings, vegetation was largely removed from the Lake, resulting in the decline of warm water species such as largemouth bass which prey on other fish species including native coho salmon.[2] But the near complete removal of vegetation caused by those stockings also resulted in large algae blooms. It is agreed by all parties that some level of vegetative cover is necessary to provide fish and wildlife habitat, absorb some of the nutrient levels in the Lake (thus preventing algae blooms), and improve water quality. Based on monitoring and research conducted by the District since the 1980s, it is assumed that a 15 to 20 percent vegetative coverage of Devils Lake would be optimal for the absorption of nutrients and to provide fish and wildlife habitat.

The District, since 2006, has been evaluating various means to manage SAV including mechanical harvesting, herbicides, grass carp, bottom barriers, drawdown, and hand pulling as well as more novel approaches such as diver-assisted suction harvesting, water dyes, and rotovation. Of these methods, only the ongoing use of sterile grass carp has been found to be economically and socially acceptable while limiting the impacts on the environment.[3]

[2] Largemouth bass, a non-native species in Devils Lake, is widely known as an ambush predator that uses submersed vegetation to prey upon other fish species.

[3] For a comparison of the various methods the District has evaluated see https://dlwid.org/pdf/Vegetation-Management-Comparison-Table.pdf

SUBMERGED AQUATIC VEGETATION (SAV) REDUCTION PLAN

The District is taking a three-pronged approach to controlling and reducing SAV invasive and nuisance species, as further outlined in its Strategic Plan. A summary of this approach is outlined below.

1. Herbicide Application. During the summer of 2022, the District applied the herbicide fluridone to the lakebed in three separate locations, which had limited success. Some vegetation was seen to die off in late summer but it is unclear if this is a result of normal calving which occurs each year or a result of the application. While fluridone is particularly effective at treating Eurasian watermilfoil, any impact takes 60-90 days to become evident and it must be re-applied every 1-2 years. An initial 100 acre application and one follow up treatment would cost approximately $1500-$2000/acre for a total cost of $300,000 - $400,000; the repeat applications necessary to achieve adequate SAV control would run into the millions.

2. Mechanical harvesting. Mechanical harvesting is not a long-term solution to the SAV problem as it will always have to be done again later when it grows back. Harvesters also fragment SAV which can further the spread of the plant because fragmented shoots can re-root to the bottom. Harvesters can pick up the cut vegetation, but this is not 100% effective, which can also lead to the spread and increase of certain aquatic plants.

In July and August 2022, the Devils Lake Neighborhood Association (DLNA) contracted with a harvester from southern Oregon (Western Shoreline Restoration) to perform mechanical harvesting for three weeks. While the main goal of that project was to gain on-lake experience with harvesting, the effort resulted in the removal of approximately 41.5 tons (83,000 pounds) of SAV from the lake. In October 2022, the District contracted with Aquatic Harvesting Inc. to lease a harvester for 4 years. While leasing a harvester will allow the District to proactively remove both new weed growth in late spring, along with the rafts of weeds which appear each fall, operating the harvester for just 15 hours per week will cost the District approximately $265,000 each year.[4] Ultimately, much like herbicides, harvesting is cost-prohibitive as a sole means of SAV control.

3. Introduction of sterile grass carp. Because the introduction of grass carp is the most effective biological control tool that has been identified for invasive and nuisance SAV[5], the District is pursuing a permit under OAR 635-056-0075(2) from ODF&W to introduce sterile grass carp. The District's permit application also serves as its management plan and sets forth the timelines, policies, and processes that will be used for the introduction and ongoing management of grass carp in Devils Lake. The District is proposing an initial stocking rate of 15 carp per acre which would equate to 10,200 fish. The cost for this initial stocking is $30 per fish or $306,000.

[4] The estimated costs to operate the harvester include $80 per hour for an operator, $92 per hour to lease the equipment, and $120 for each dumpster in disposal costs. The District intends to use volunteers to operate any other equipment necessary to remove the debris from the Lake.

[5] https://entnemdept.ufl.edu/creatures/BENEFICIAL/MISC/Ctenopharyngodon_idella.htm

APPLICATION FOR RELEASE OF TRIPLOID GRASS CARP

OAR 635-056-0075(2) allows the stocking of grass carp into Devils Lake subject to terms and conditions determined by ODF&W. Although that section does not require the District to meet the regulatory standards in OAR 635-056-0075(1)(a), the District has provided a response to those standards below. As outlined below, the District's application meets the purpose and intent of the OAR 635-056-0075(1)(a) standards (except those contained in OAR 635-056-0075(1)(a)(A)(i) and (ii)). Accordingly, there is ample support for issuance of a permit to the District to stock Devils Lake with grass carp as proposed.

OAR 635056-0075(1)(a) – Complete permit applications shall be submitted to Department headquarters at least 60 days before proposed stocking. A fee of $250.00 (plus a $2.00 license agent fee) shall be charged for each Grass carp permit issued.

It is the District's intention to stock Devils Lake in April 2023 thus this permit application is timely. The District will also provide ODF&W with at least 7-day notice prior to the proposed release date. Included with this application is a check for $252.

OAR 635-056-0075(1)(a)(A)(iii) - Public use of the water body must be restricted to prevent removal of grass carp (by angling or otherwise) by unauthorized persons. At a minimum, the water body must be closed to angling and other use by the general public.

Devils Lake will not be closed to the public as current ODF&W regulations already prohibit fishing for or removing grass carp from Devils Lake.[6] The lake contained grass carp for many years and no known removal, transfer or escape of those fish has been documented. But because the inadvertent removal of grass carp from Devils Lake could occur during angling, the District will take the following actions to educate the public regarding the grass carp removal prohibition:

a. The District will work to develop agreements allowing the posting of signs regarding the removal of grass carp and transportation of SAV on watercraft with the following parties who own or operate public lake access points:
   City of Lincoln City
   Lincoln County
   Oregon State Parks
b. The District and the Devils Lake Neighborhood Association will provide direct outreach to property owners through emails and direct mailings on the prohibited removal of grass carp and SAV management.
c. In May 2021, the District purchased the property and building located at 4006 NE West Devils Lake Road in Lincoln City, which was the former location of Blue Heron Landing Marina. The District has, for the first time, permanent lakefront access to Devils Lake and a site for the eventual construction of a new facility which it intends to call the Center for Applied Freshwater Ecology (CAFÉ). The CAFÉ will be a permanent educational and research center, focused on limnology and living in the watershed.

[6] See page 28 of the 2023 Oregon Sports Fishing Regulations which prohibits the harvesting of grass carp. https://www.eregulations.com/assets/docs/guides/23ORFW.pdf

Additionally, the District intends to allow public access to the Lake from the property. The District will provide information on the prohibited removal of grass carp and the transportation of SAV on watercraft at the former marina.

OAR 635-056-0075(1)(a)(A)(iv) – Stocking shall not detrimentally affect any population of species listed as threatened or endangered by the federal or state government.

Oregon Coast Coho salmon are currently listed as threatened under the federal Endangered Species Act.[7] ODF&W holds its own statewide list which ranks the Bald Eagle (Haliaeetus leucocephalus) as threatened. Neither of these species will be detrimentally affected by the introduction of grass carp into Devils Lake. An important element of the previous stocking of grass carp was monitoring and research to evaluate the effects of grass carp on Devils Lake. That research shows that there has been no detrimental effect on the threatened species. The bald eagles continue to nest on the shores of Devils Lake. Based on assessments conducted in Rock Creek by the District, the coho run increased over the period from 1986 to 2013.[8]

Numerous other species use Devils Lake and its surrounds for their home. ODF&W stocks Devils Lake with rainbow trout. In addition to trout and the aforementioned bass, the lake also has a fluctuating population of yellow perch, crappie, bluegill, and catfish. The forests and marshes surrounding Devils Lake are home to millions of insects, birds, frogs, and mammals. The forests within the watershed support deer, elk, chipmunks, rabbits, raccoons, and possums. Every year, a few residents report black bears in remote areas of the Lake. The watershed that feeds Devils Lake supports populations of beaver, muskrat, nutria, and otter. Populations of geese, wood ducks, mallards, blue herons, and egrets use Devils Lake as their home, whether permanently or migratory. Additionally, osprey, eagles and vultures are frequently observed in trees around the perimeter of the lake.

Although it not specifically required by the regulations, the District also consulted with NOAA Fisheries who informed the District that a consultation was not required. (See Attachment 4).

OAR 635-056-0075(1)(a)(A)(v) - Stocking shall occur only in water bodies with fish screens ….

The purpose of requiring fish screens is to prevent carp from entering other water bodies. There has been no documentation or other indication of grass carp migrating from Devils Lake into other water bodies. Grass carp have never been observed in the tributaries to Devils Lake throughout years of stream surveys and apparently spend their lifespan in the lake proper. The outlet from Devils Lake goes directly into the Pacific Ocean via the 120 foot long D River. Grass carp cannot survive in marine waters and die shortly after introduction into saline waters. For this reason, ODF&W staff previously concluded that no screens were required.

OAR 635-056-0075(1)(a)(A)(vi) – Stocking will not be allowed in water bodies within 100-year floodplains…

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[7] https://www.fisheries.noaa.gov/species/coho-salmon-protected

[8] Although this is increase is likely a result of multiple factors, research has shown that the population of warm-water species of fish such as largemouth bass which prey on fish such as salmon, declines dramatically with the loss of plant cover. See Attachment 3.

Although Devils Lake is located within a 100-year floodplain, the purpose of prohibiting stocking in these water bodies is to prevent carp from being washed into unpermitted water bodies during a flood. As explained above, all drainage from Devils Lake exits through the single outlet at the D River to the Pacific Ocean. Consequently, no grass carp are at risk of surviving if they were to escape the lake during a flood event.

OAR 635-056-0075(1)(a)(A)(vii) - Grass carp may only be purchased and imported from approved suppliers outside Oregon. Grass carp may not be propagated or held for further distribution within Oregon. Department pathologists shall approve suppliers. Approval will be based on ability to provide grass carp free of Asian tapeworms and meet health and disease requirements according to OAR 635-007-0555 through 635-007-0585.

The District will be purchasing grass carp from KEO Fish Farms Inc. located at 6444 US-165, Keo, AR 72083. Keo Fish Farm produces approximately 500,000 triploid sterile grass carp per year and is approved by ODF&W to import sterile triploid grass carp into Oregon. Prior to shipment, KEO Fish Farms will provide certification that the grass carp are free of Asian tapeworms and otherwise meet the requirements in OAR 635-007-0555 through 635-007-0585. (See *ODFW Fish Health Requirements for Importation of Fish or Eggs into the State of Oregon*).

OAR 635-056-0075(1)(a)(A)(viii) - Grass carp imported into Oregon shall be:

- *(I) Sterile triploids. Documentation from the U.S. Fish and Wildlife Service that each fish is triploid must be submitted to the Department prior to release;*
- *(II) At least 12 inches long;*
- *(III) Tagged with a Passive Integrated Transponder (PIT) tag of frequency 134.2-kilohertz. Each tag shall be programmed with a unique identification number. A list of unique tag numbers shall be submitted to the Department prior to release; and*
- *(IV) Stocked at a rate not exceeding 22 per affected acre.*

The District will provide ODF&W with documentation that each fish is triploid, along with a list of unique tag numbers at least 2 days prior to the release date. Additionally, all fish must be a minimum of 12 inches in length.

As further explained in Attachment 5, because Devils Lake is cooler than the lakes of the South where grass carp are predominately used as vegetation control, the Lake's SAV infestation of elodea is heavy, and the Lake currently has no productive grass carp, the District is recommending a stocking rate of 15 fish per acre which is significantly lower than the 22 grass carp per acres allowed under the current regulations. The initial stocking rate of 15 carp per acre would equate to 10,200 fish (15 fish for each of the 680 acres). The District is also proposing to conduct a SAV survey within five years and will use this survey to support any further stocking requests. (See Attachment 5).

OAR 635-056-0075(1)(a)(A)(ix)(I) - Applicant's name, address, and daytime telephone number.

Applicant: Devils Lake Water Improvement District (District)
PO Box 974
Lincoln City, OR 97367
541-994-5330
Executive Director: Joshua Brainerd

OAR 635-056-0075(1)(a)(A)(ix)(II) - Location of the water body, including township, range, section and quarter section, with map including written directions for access.

Devils Lake is located in Lincoln County and a portion borders the city limits of Lincoln City. The lake is accessed from multiple locations along Highway 101, East Devils Lake Road, West Devils Lake Road and lesser, ancillary roads. The public access points are set forth in Attachment 6.

OAR 635-056-0075(1)(a)(A)(ix)(II) – Map of the waterbody including vegetation present in the water body, all inlets, and outlets, and screen locations.

A map of Devils Lake and its watershed (See Attachments 6, 7 and 8) shows the major features of the lake including the only outlet through the D River at the southwest portion of the lake. The primary perennial tributaries are Rock Creek and Thompson Creek. Devils Lake is a large, shallow, and eutrophic lake. A detailed digital map of Devils Lake was prepared by a professional hydrologist in 2005 and again in 2019 (See Attachments 1 and 9).[9]

In August 2022, the lake was 48.6 percent occupied by volume with elodea. Surface coverage of the weeds is 40.1 percent, with 100 percent of the bottom of the lake covered with elodea. Engineering estimates of the volume of material indicate as much as 116 million cubic feet of SAV present at the time of the survey (See Attachment 2).

OAR 635-056-0075(1)(a)(A)(ix)(IV) - Description of emergency procedures for responding to fish escapes from approved sites.

As previously described, there has been no documentation or other indication of grass carp escaping from Devils Lake into other water bodies since the initial stocking in 1986. That said, the District, in the signage it proposes to post at public lake access points, will provide a method for the public to report any inadvertent removal of grass carp from the Lake, along with reporting any deceased grass carp observed by the public.

OAR 635-056-0075(1)(a)(A)(ix)(V) - Description of how fish will be removed and disposed of at the end of the proposed project.

As history has shown, due to the shallowness of Devils Lake, it is easily impacted by SAV invasive and nuisance species. Therefore, instead of proposing a method for removal of the carp, it is assumed that additional stocking of grass carp will be necessary as the carp population ages. A mortality rate of 10 percent per year is to be assumed.[10] Although a study conducted in 2014 showed that Devils Lake contained some of the oldest recorded grass carp,[11] fish eat significantly

[9] Further research and management projects conducted in Devils Lake are detailed in the District's Letter to the ODF&W Commission, dated August 9, 2013. These reports are available upon request from the District.

[10] Annual mortality rates in South Carolina have been estimated at 22 to 39 percent where water temperatures are significantly higher; in Iowa where waters are significantly colder that estimate is 2.0 to 7.7 percent. A 2015 study of Devils Lake set its annual mortality rate at 10 percent. See Attachment 10.

[11] https://doi.org/10.3996/042015-JFWM-044

less as they age. While a five-pound fish can eat about five pounds of aquatic plants a day, a 20-pound fish eats only four pounds of plants a day.[12]

Prior to conducting restocking, the District will submit a request for the additional number of grass carp needed to maintain the optimal maintenance level of 15 to 20 percent coverage, along with a SAV survey. Regardless of if additional stocking is requested, the District will conduct a SAV survey within 5 years of permit issuance and provide that survey to ODF&W. If the survey shows that SAV have reached 20% or less of coverage (by volume) of the lake, the District will stop using other eradication measures (such as harvesting). Additionally, the District will provide ODF&W a report of any known fish removal or mortality incidences on an annual basis.

OAR 635-056-0075(1)(a)(A)(xi) - An Oregon Department of Fish and Wildlife fish transport permit shall accompany grass carp imported into and transported within Oregon.

Once ODF&W approves this application, the District will contract with a KEO Fish Farms for the purchase and transport of the carp, at which time a transport permit application will be submitted to ODF&W.[13]

OAR 635-056-0075(1)(a)(A)(x) - No person may remove grass carp from one site (as identified in a management plan) and transport them to any other site without prior written approval from the Department.

The carp will be shipped to the District via trucks which hold eighteen 120-gallon tanks, each will be filled with water and carp to approximately 100 gallons. A gate in each tank connects to a PVC pipe that dispenses the carp directly into the lake. Since the carp will be released directly from the transportation equipment into Devils Lake, no transportation to other sites will occur. The District will release the grass carp from the former marina located at 4006 NE West Devils Lake Road in Lincoln City. No further transportation or release of the carp will occur as required by Oregon law. [14]

[12] https://dwr.virginia.gov/fishing/private-pond-management/triploid-grass-carp-stocking-for-aquatic-vegetation-control/

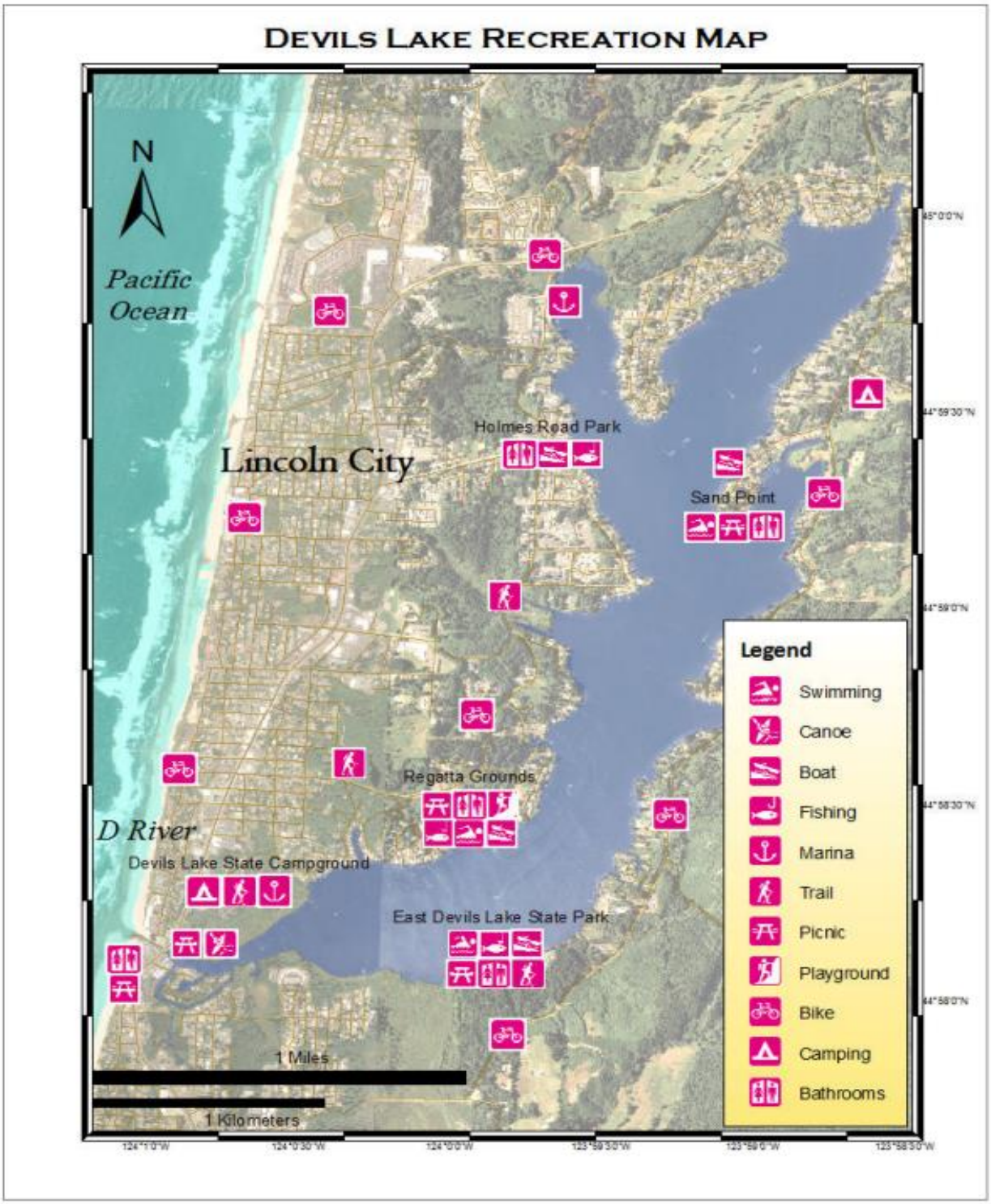
[13] The information regarding obtaining a transport permit is available at https://nrimp.dfw.state.or.us/FishTransportPermit/default.aspx?ReturnUrl=%2fFishTransportPermit%2f

[14] ORS 498.222 prohibits the transportation and release of fish without a permit and classifies a violation of these provisions as a crime. Additionally, ODF&W's regulations prohibit bringing live fish into the state, transporting them overland, or from one water body to another without a permit. See pages 18 and 28 of the 2023 Oregon Sport Fishing Regulations. https://www.eregulations.com/assets/docs/guides/23ORFW.pdf

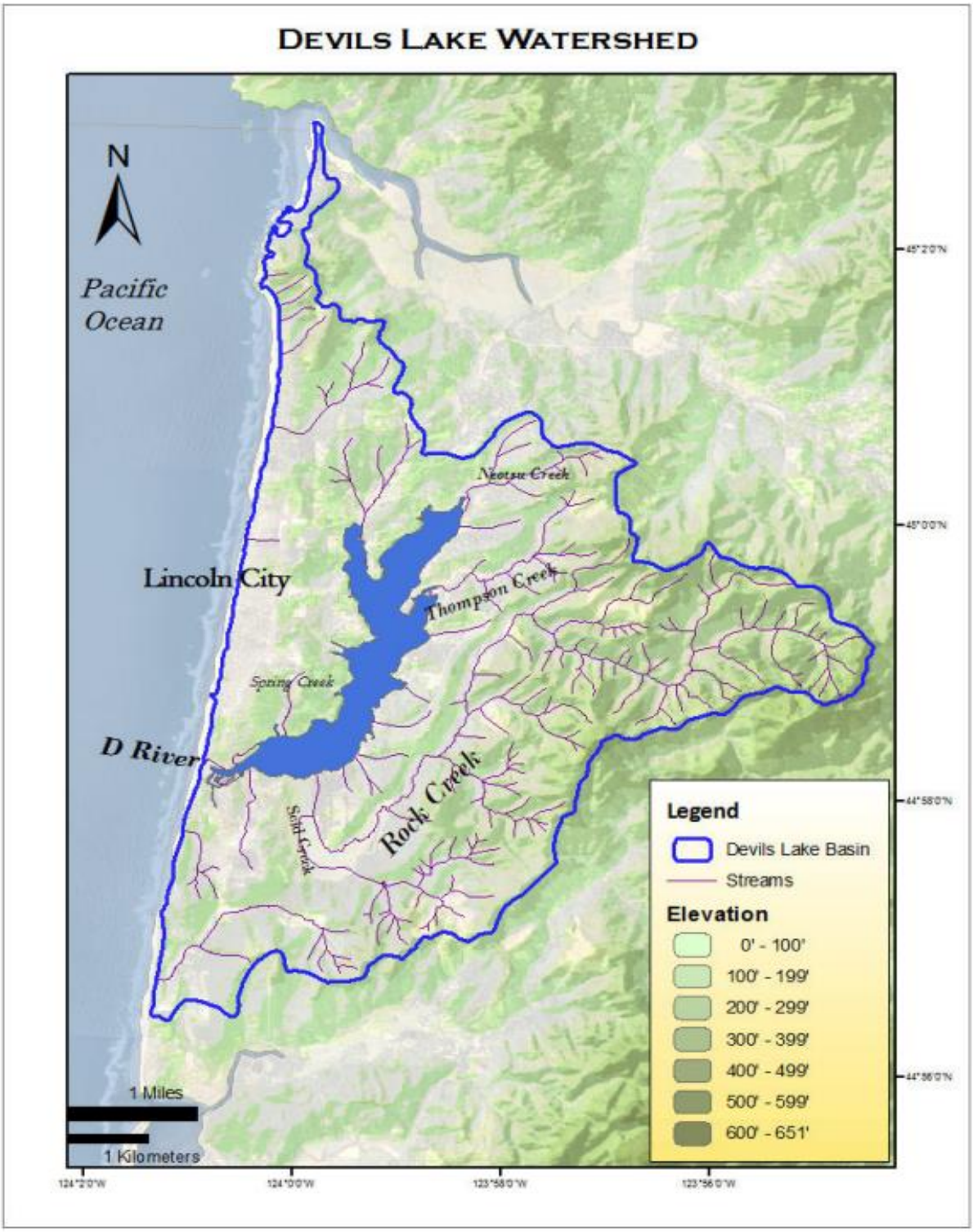
ATTACHMENTS

1. Devils Lake 2019 Aquatic Plants Survey Report
2. Report and Documentation of Physical Survey of Weed Impact, August 2022
3. Effects of Introduced Fishes on Wild Juvenile Coho Salmon Using Three Shallow Western Washington Lakes, November 2005
4. Email from ODF&W, dated October 19, 2022
5. Sterile Grass Carp Stocking Recommendation for Devils Lake
6. Devils Lake Recreation Map
7. Devils Lake Watershed Map
8. Devils Lake Wetland & Riparian Zone Map
9. Updated Bathymetry and Paleolimnology of Devils Lake, May 2005
10. Estimating Abundance of Grass Carp in Devils Lake and A Plan for Continued Stocking of Fish, September 2015

ATTACHMENT 6



ATTACHMENT 7



ATTACHMENT 8