

Protecting Minnesota's Shallow Lake and Wild Rice Heritage

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Shallow Lakes Program

- Program within the DNR Section of Wildlife
- Focus on improving wildlife habitat on lakes, primarily waterfowl habitat
- Shallow lake management provides benefits beyond just wildlife



Program Responsibilities

- Provide technical assistance to area wildlife managers and the public
 - Prepare lake management plans
 - Maintain a database of shallow lakes, wild rice lakes, and lake survey data
 - Assist with management of shallow and wild rice lakes
- Conduct habitat surveys of shallow & wild rice lakes



What is a shallow lake?

- Generic definition: lake with a maximum depth of 15 feet or less
- MN Shallow Lake Program definition: maximum depth of 15 feet or less & 50 acres or larger in size



Shallow Lakes in Minnesota



Minnesota has over 4,000 shallow lakes

(15 ft / 50 ac definition)

- Distributed across the state
- Over 1,000 lakes less than 100 acres in size
- Over 40 lakes greater than 2,000 acres in size

Characteristics of a Deep Lake



- Separates into layers based on temperature (stratifies)
- Nutrients do not mix throughout the basin
- Supports fish populations long term; winter-kill rarely, if ever
- Wind & waves do not have a major effect on the entire lake
- Plants grow only in the shallow zone along the shoreline

Characteristics of a Shallow Lake



- Water does not separate into layers, but mixes constantly
- Constant exchange of nutrients between sediments and water column
- More sensitive to nutrient inputs
- Fish can winter-kill often
- Wind & wave effects can be substantial on the sediment
- Potential for plants to grow throughout the basin
- Complex interactions between plants, fish, nutrients and invertebrates
- May switch between clear-water and turbid-water states

Clear State

clear water

•abundant aquatic vegetation; low algae

- high zooplankton & invert populations
- •low wind & wave action
- less sediment re-suspension
- provides excellent wildlife habitat, especially waterfowl habitat

Turbid State

- •cloudy, turbid water
- •few aquatic plants; high algae
- •low invert & zooplankton numbers
- •greater wind & wave action
- •higher sediment re-suspension
- •provides little, if any, wildlife habitat













Turbid-water State



Piscivores

Planktivores

Zooplankton grazing

Phytoplankton biomass

Macrophyte biomass

Sediment resuspension

Bioturbation

M.G. Butler and N. Hansel-Welch 1997

Clear-water State







Threats to Shallow Lakes

Altered hydrology
Ditching & tiling
Loss of wetlands
Higher lake levels

Fish populations

- Basins don't winter-kill as often
- Presence of exotics carp

Threats to Shallow Lakes

Nutrient loading

- Internal within the lake
- External from the watershed

Shoreline development

Shallow Lake Management – in the watershed

Maintaining shoreline vegetation Restoring and maintaining wetlands and grasslands Planting buffer strips Up-grading septic systems Reducing impervious surfaces Encouraging Best Management Practices

Shallow Lake Management – in the lake

Water level management

- Drawdowns
- Outlet modifications (beaver dam removal, new or improved water control structures)



Shallow Lake Management – in the lake

Fish management

drawdowns

chemical treatments

fish barriers

 stocking predator fish



Towner Lake

western MN -**Grant County** 162 acres maximum depth of 5 feet average depth of 3.5 feet bordered by a WMA & a WPA



Towner Lake – 1965



Towner Lake - 2002



Towner Lake Management Objectives:

Encourage the growth of emergent and submerged vegetation.

Control carp and black bullheads.

Towner Lake Management Plan:

Drawdown the lake for 2 growing seasons to allow emergents to re-establish to reduce carp and bullhead populations A drawdown by gravity alone was not possible Installed an electric pump water control structure to lower water in the lake



draw-down started in 2004; photo from 2005









Wild Rice in Minnesota



Wild Rice in Minnesota

- Minnesota has more natural wild rice than any other state in the nation
- Has declined from its historic range in MN, but still wide-spread
- Most abundant in northeast MN
 - top five counties: Aitkin, Cass, Crow Wing, Itasca, St. Louis
- About 2,100 lakes and rivers across the state



Wild Rice in North America

- The range of wild rice used to extend from the Midwest to the East Coast and south
- Has completely disappeared from most of the U.S. states
- Wisconsin still has harvestable stands, but less than it used to
- Almost completely gone from Michigan; some projects are underway to restore it



Figure 1. Distribution of wild rice in North America.

Wild Rice = Waterfowl Habitat

- Provides important waterfowl habitat in north-central and northeast MN
- Especially important habitat for ring-necked ducks
- Plant leaves and seeds provide food for ducks and other birds
- Plants provide nesting material and brood cover



Important for Humans

- Grain is edible and very nutritious
- Long tradition of hand-harvesting in Minnesota
- Harvestable stands from the Twin Cities to the Canada border



Sacred to the Ojibwe and Sioux Tribes

- Significant food source for generations
- Culturally important
 - Part of the Ojibwe creation story
- Tribes manage wild rice waters within their reservation boundaries

DEPARTMENT OF HEALTH

Tribal nations sharing geography with Minnesota



Ecology and Habitat

- Annual aquatic grass
- Plants grow from seed each year
- Grows best in slow flowing waters
 - lakes with inlets & outlets
 - rivers



Ecology and Habitat

- ► Water depth is critical
 - ideal range = 0.5 4 ft
 - optimum depth = 1.5 ft
 - can grow in deeper water, but doesn't do well



Ecology and Habitat

- Also requires gradual water level changes
- Water levels that rise too rapidly uproot the plants
- High water or rapid water level "bounces", especially during the floating-leaf stage, can destroy the entire crop



- New plants grow from seed each year
- Seeds must be exposed to freezing temperatures to germinate in the spring
- Germination occurs soon after ice-out
- Seeds sprout on the lake bottom in late April / early May



- Floating leaves appear in late May / mid June
- During this stage, the plant is very sensitive to drastic water level changes
- Can easily be uprooted or drowned



- Leaves start emerging late June
- By July all the plants are emergent
- Plants are less sensitive to water level changes at this stage, but not immune





- Plants flower in late July
- Seeds mature late Aug. / early Sept. RICING SEASON!
- Seeds on an individual plant do not ripen at the same time; this means that a single lake can have ripe rice for 2-3 weeks
- Seed production can be highly variable over time
 - in a 4-5 year period, 1-2 good crops, 1 poor crop, 2-3 fair crops





Threats to Wild Rice

- Rapid change in water level / water level "bounces"
- Wind and waves from storms
- Disease
- Sulfate and water pollution
- Low water clarity
- Shoreline development
- Motorboats
- Climate change



Ways to Protect Wild Rice

- Reduce water level "bounces"
- Maintain free-flowing outlet channels
- Easements to limit shoreline development
- Reduce pollution and runoff
- Good land use practices in the watershed
- Boat motor restrictions if needed



Management or Not?





Wild Rice Management

- Water level management
 - removing beaver dams and beavers
 - installing / improving control structures
 - bog removal
- Seeding









Washburn Lake





 Want to establish a selfsustaining stand of rice

36 acres

 50 pounds of rice seed per acre x 36 acres = 1,800 pounds









https://www.dnr.state.mn.us/wildlife/shallowlakes/index.html