



Lake Sturgeon Population Characteristics, Movements, and Habitat Use in the Namakan Reservoir

2008 Progress Report

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Project Objectives

This multiagency project has two primary objectives:

1. Determine population characteristics of lake sturgeon in Namakan Reservoir
2. Document seasonal habitat use and reproductive patterns of lake sturgeon in Namakan Reservoir

Preliminary Results

Fifty-eight (58) adult lake sturgeon (*Acipenser fulvescens*) were captured in the Namakan reservoir system in May 2008 by a multi-agency team that included biologists from the National Park Service, Ontario Ministry of Natural Resources, the U.S. Forest Service, Minnesota Department of Natural Resources, and South Dakota State University. Lake sturgeon were collected using gillnets and measured for total length, fork length, girth, and weight. Pectoral fin ray sections were collected from each fish for aging purposes. Blood samples were taken from 48 fish and sent to the U.S. Fish and Wildlife Service Bozeman Fish Technology Center for determination of sex and reproductive maturity. Age, sex, and reproductive results are pending completion of lab analyses. Data from the 2008 collections will be added to data collected previously from nearly 500 other sturgeon throughout the system (90 in the Namakan Reservoir and 397 in the Namakan River) for a more detailed analysis of sturgeon population characteristics in the Namakan system.

To determine seasonal movement patterns, 26 lake sturgeon were implanted with Vemco V16 acoustic transmitters (Figure 1a). Fish implanted with transmitters ranged in total length from 863 to 1662 mm ($\bar{x} = 1256$ mm), girth from 329 to 659 mm ($\bar{x} = 455$ mm) and weight from 4.25 to 31.1 kg ($\bar{x} = 13.5$ kg). Thirteen VEMCO VR2W submersible, data logging receivers (Figure 1b) were stationed throughout Namakan Reservoir to track sturgeon movements (Figure

2). HOBO temperature loggers were attached to stationary receivers to monitor lake temperatures throughout the year.



Figure 1. a) VEMCO V16 acoustic transmitter. b) VEMCO VR2W acoustic receiver.

The acoustic technology used in this study is identical to that used in a separate study conducted by the Ontario Ministry of Natural Resources (OMNR) of lake sturgeon in the Namakan River. Thirty-four (34) lake sturgeon were implanted with acoustic transmitters by the OMNR (30 in 2007 and 4 in 2008) and thirteen (13) receivers were deployed throughout the Namakan River. Results from this Namakan River work will be reported separately by the Ontario Ministry of Natural Resources.

Data from the stationary acoustic receivers were downloaded in August and October 2008. All 26 fish with acoustic transmitters were located on stationary receivers in the Namakan Reservoir during 2008. An additional 19 lake sturgeon that were tagged by OMNR biologists were also detected by receivers in the Namakan Reservoir (i.e., 45 of the 60 total fish implanted with acoustic tags in 2007/2008 were detected at least once in the Namakan Reservoir in 2008). Movement data from the receivers provides evidence that lake sturgeon within Namakan Reservoir move freely across the international border, providing further evidence of an internationally shared stock. Receivers differed in the total number of fish detected and total detections per fish. Receivers in Namakan Lake (Receiver 8, 9 and 10 in Figure 1) and northern Sand Point Lake (Receiver 6 and 7 in Figure 2) had the largest numbers of total fish detected, ranging from 12 to 16 fish per receiver. Receivers located in or near tributaries and southern Crane Lake (Receiver 1, 3, 4, 11 and 12 in Figure 2) had less total fish detected, ranging from 0 to 5 fish per receiver. Mean detections per fish were greatest in Redhorse Bay (Receiver 7; 3,629 mean detections/fish), southern Sand Point Lake (Receivers 2 and 5 ; 1,261 - 2,011 mean detections/fish), Vermillion Gorge (Receiver 4; 2,543 mean detections/fish) and the Loon River (Receiver 1; 1,072 mean detections/fish). Namakan Lake receivers (Receivers 8, 9, 10, 11, 12 and 13) ranged from 0 to 256 mean detections/fish. Lake sturgeon spent more time (mean detections/fish) near tributary mouths (Receivers 1, 4, and 7), particularly during May and June.

Sturgeon implanted with transmitters moved significantly throughout the Minnesota and Ontario portions of the Namakan Reservoir during the period May to October 2008. One sturgeon, #49682, traveled more than 70km between its capture on May 2008 in the Vermillion Gorge (Crane Lake) and its last detection in Little Eva Lake in the Namakan River (Figure 3). In fact, at least 11 of the 26 sturgeon implanted with transmitters in the Namakan Reservoir in May

2008 had moved upstream of Hay Rapids in the Namakan River by October 21, 2008. Similarly, at least 14 of the sturgeon implanted with acoustic transmitters in the Namakan River by the Ontario Ministry of Natural Resources in 2007 had moved into the Namakan Reservoir by October 21, 2008.

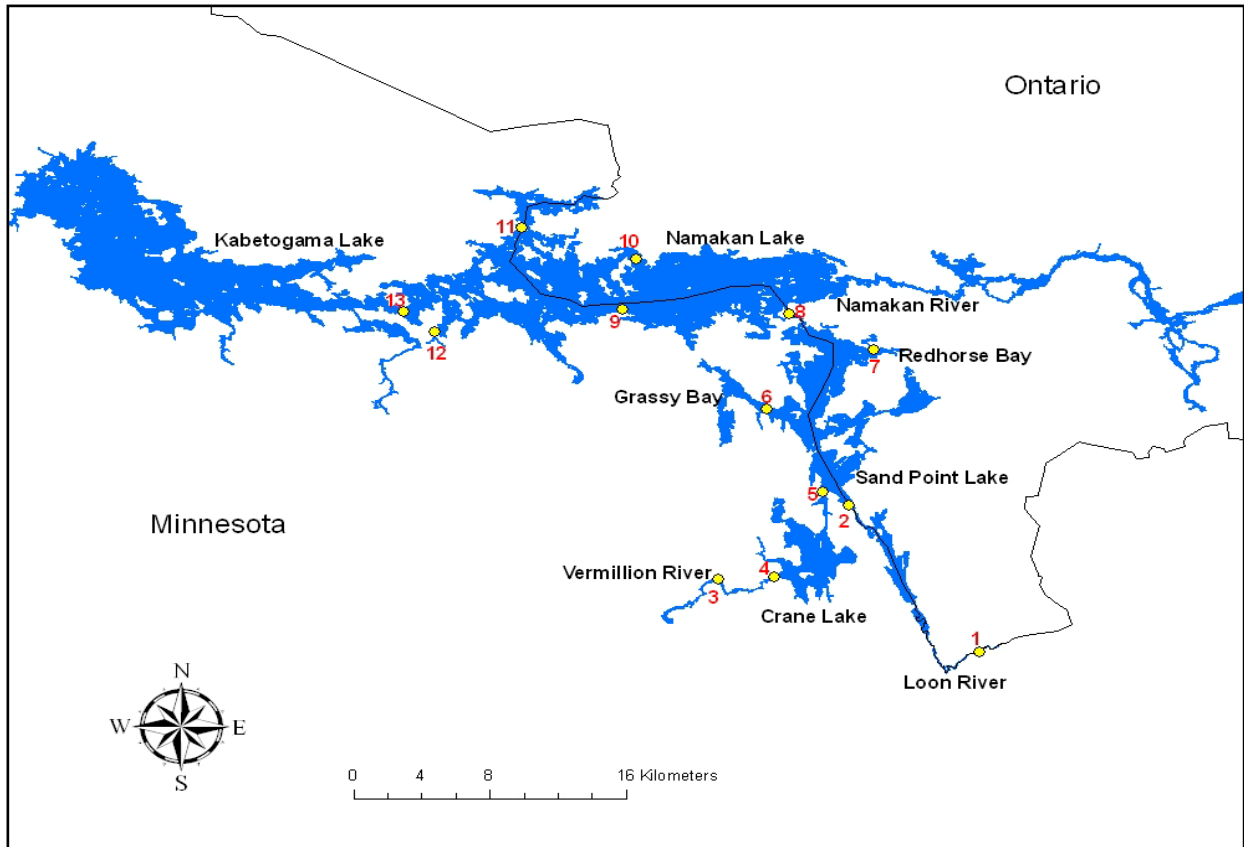


Figure 2. Locations of thirteen (13) VEMCO VR2W receivers stationed within Namakan Reservoir to track movements of acoustically tagged lake sturgeon. Thirteen additional receivers were deployed in the Namakan River by the Ontario Ministry of Natural Resources in 2007/2008 (not shown).



Figure 3. Movements of lake sturgeon #49642 in the Namakan Reservoir from May 7-October 21, 2008.

During the summer of 2008, SDSU biologists recorded velocity profiles throughout selected locations in the Namakan Reservoir using a Sontek Acoustic Doppler Profiler (ADP; Figure 4a). Transects were completed in Crane, Sand Point, and Namakan lakes as well as the main tributaries (Vermillion Gorge, Little Vermillion Lake, the Loon, Namakan, Redhorse, Moose, and Ash Rivers). Depth/velocity profiles will be used to create spatially explicit depth and bottom velocity maps of the reservoir in ArcGIS. Substrate grabs were also taken along ADP transects in order to characterize habitat suitability (Figure 4b).



Figure 4. a) Acoustic Doppler Profiler (ADP) equipment used to map velocity profiles in areas of interest. b) SDSU graduate student Stephanie Shaw taking a substrate grab.

Future Work

Work planned for 2009 includes:

- Targeted sampling of lake sturgeon in spawning areas for reproductive assays and additional population data
- Additional habitat sampling in areas of interest using ADP and substrate mapping
- Continued monitoring of sturgeon movements and space use via acoustic telemetry

2008 Project Outreach

- Shaw, S.L., S.R. Chipps, D.W. Willis, S.K. Windels, and D. McLeod. 2008. Seasonal distribution of adult lake sturgeon in Namakan Reservoir, Voyageurs National Park, MN. Midwest Fisheries and Wildlife Conference, Columbus, OH, December 2008 (poster presentation).
- McLeod, D.T. 2008. Movement of lake sturgeon in the Namakan River, Ontario. American Fisheries Society Conference, Ottawa, ONT, August 2008 (poster presentation)

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