Alberta Conservation Association
2010/11 Project Summary Report

Project Name: *Wabasca Lakes Walleye Movement Study 2010/11*

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Partnerships

Alberta Sustainable Resource Development

Key Findings

- The closure period of April 1 to June 1 was useful in protecting the majority of spawning walleye from harvest in both North and South Wabasca lakes.
- Only 4% of tagged walleye moved between North and South Wabasca lakes.
- Walleye in North and South Wabasca lakes were genetically identical.
- During telemetry surveys, we observed approximately eight boats per survey on North Wabasca Lake, while we observed no boats on South Wabasca Lake.

Introduction

Previous studies of North and South Wabasca lakes suggested walleye (*Sander vitreus*) spawn in Willow River and Drowned-horse Creek, which are tributaries to North and South Wabasca lakes, respectively. Domestic and recreational harvest of walleye from these spawning sites is a potential threat to the sustainability of walleye populations in these lakes. In response to a petition by the Bigstone Cree Nation and the public to protect walleye during their spawning season, Alberta Sustainable Resource Development (ASRD) implemented fishing closure zones on both lakes from April 1 to June 1 (Figure 1). The primary objective of this study was to determine if the closure zones effectively protect spawning walleye from over-harvest by determining the location of walleye before, during and after the spring closure period. Secondly, we compared the genetic relatedness of walleye sampled at each spawning site and walleye caught in North Wabasca Lake. Lastly, we compared basic angler use between North and South Wabasca lakes by performing simple boat counts during tracking efforts. Information from this study will aid ASRD in managing walleye populations in these lakes.

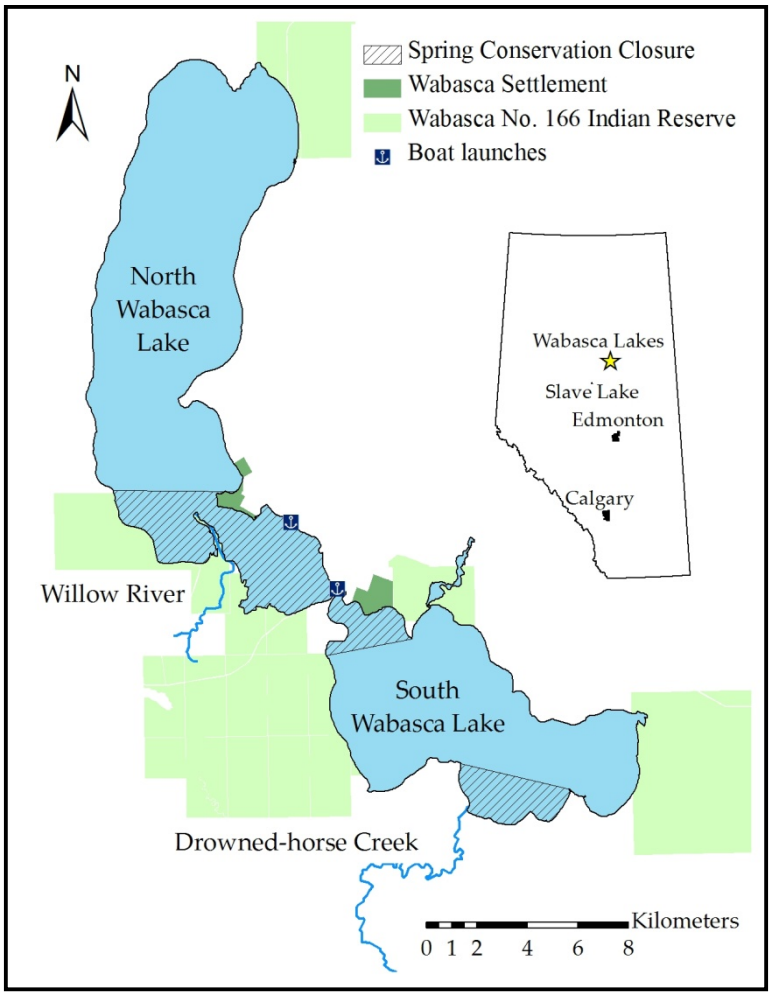

Figure 1. Map showing locations of spring closure zones on North and South Wabasca lakes. Inset map shows the location of these lakes in Alberta.

Methods

We used radio telemetry to monitor fish movements. Between 2008 and 2009, we surgically implanted 64 walleye with high-frequency radio transmitters (Lotek OTEK MCFT-3L). In total, we implanted 25 fish from Willow River, 23 from Drowned-horse Creek and 16 from North Wabasca Lake. During 2010, we relocated walleye weekly from April 30 to June 17 using either helicopter and/or boat surveys. We conducted additional surveys on July 6 – 7, July 27 – 28, August 9 – 10, and September 27 – 28. Helicopter surveys covered the entirety of both North and South Wabasca lakes, including Drowned-horse Creek and Willow River, and extended roughly 5 km upstream. Boat surveys covered the shoreline of each lake, except the creek and rivers due to shallow water. Surveys conducted after June also monitored fish movement between lakes. We used boat counts during telemetry surveys on each lake to assess angler use.

We marked fish geographic locations during surveys and compared the proportion of walleye that were in and out of the closure zones. To determine the accuracy of our relocations, we conducted a calibration study in which five transmitters were distributed across the lakes at

known geographic locations and we tracked these transmitters using the same methods used to locate fish. Differences (i.e., distance) between actual transmitter locations and those recorded during relocating surveys were used to calculate 95% confidence intervals (White and Garrott 1990). Suspected mortalities or malfunctioning transmitters were removed from analysis.

To compare the genetic relatedness between both spawning sites during 2010, we took tissue samples from 62 and 71 electrofished walleye in Drowned-horse Creek and Willow River, respectively. We measured walleye (total length and weight), determined gender and maturity and then released fish. Lindsey Burke (Alberta Fish and Wildlife Division Forensic Unit) processed tissue samples and analyzed samples by comparing DNA profiles using microsatellite loci. These samples were further compared to 43 North Wabasca fish DNA samples already present in the forensic database collected in June 2008 via test-angling.

Results

Between April 30 and June 17, we relocated an average (± SE) of 64.0 ± 5.0% (range: 46.5 – 81.4; n = 8) of fish weekly. In South Wabasca Lake, the majority (>50%) of tagged walleye occupied the closure zones from April 30 until June 2. Likewise, the majority of walleye occupied the North Wabasca Lake closure zones between April 30 and May 27 (Table 1). The mean (± SE) crossover rate (proportion of tagged fish that moved from one basin to another) was 3.8 ± 0.6%. Peak walleye spawning activities occurred between May 5 – 13 on both lakes. The mean number of boats observed on North Wabasca Lake per telemetry survey between May 27 and August 10 was 8 ± 2. We did not observe boats on South Wabasca Lake. Pairwise comparisons indicated no genetic differentiation between walleye from North and South Wabasca lakes.

Table 1. Weekly distribution of tagged fish between closure and non-closure zones in South and North Wabasca lakes. Brackets represent proportions (%) of located tagged fish within the closure zones for each survey period.

	Total number of tagged fish	Tagged fish located in South Wabasca Lake		Tagged fish located in North Wabasca Lake	
Dates surveyed		Closure zone	Non-closure zone	Closure zone	Non-closure zone
April 30	24	17 (100)	0	8 (67)	4
May 5 – 6	24	17 (100)	0	17 (94)	1
May 12 – 13	43	15 (100)	0	14 (82)	3
May 17	42	9 (75)	3	9 (82)	2
May 27	42	6 (60)	4	3 (27)	8
June 1 – 2	42	1 (6)	16	4 (31)	9
June 8 – 9	42	3 (30)	7	4 (40)	6
June 16 – 17	42	4 (40)	6	2 (20)	8

Conclusions

Our results indicated that the conservation closures were effective in protecting spawning walleye until the end of the closure period (June 1). We also observed inter-basin movement of tagged fish and genetic analyses indicated the walleye populations are homogenous. Compared to North Wabasca Lake, South Wabasca Lake is not a popular recreational angling destination during the summer. This information will be helpful in managing the walleye populations in North and South Wabasca lakes.

Communications

James, C., and P. Hvenegaard. 2011. Verification of effectiveness of spring conservation closure zones on North and South Wabasca lakes, Alberta, 2008 - 2010. Data Report, D-2011-003, produced by the Alberta Conservation Association, Peace River, Alberta, Canada. 12 pp + App.

Literature Cited

White, G., and R. Garrott. 1990. Analysis of radio-tracking data. Academic Press. San Diego, California, USA. 383 pp.

A helicopter fitted with uni-directional Yagi antennae for aerial telemetry surveys. (Photo: Clayton James)

Alberta Conservation Association and Alberta Sustainable Resource Development technicians collecting data and tissue samples for DNA analysis on a walleye from Drowned-horse Creek. Left to right: Martin Brilling (ASRD) and Nathan Carruthers (ACA). (Photo: Clayton James)