

**Alberta Conservation Association
2007/08 Project Summary Report**

Project name: *Angler Surveys (Sturgeon, Pigeon and Wolf Lakes)*

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Partnerships:

Alberta Student Temporary Employment Program
Alberta Sustainable Resource Development
Canada Career Planning
Municipality of Bonnyville

Key findings

- Angler surveys were successful at quantifying angling pressure, as well as catch, population structure and abundance for walleye and northern pike at Sturgeon, Pigeon and Wolf lakes.
- These sport fisheries exhibited signs of over-exploitation, including size-selective structuring (depleted age- or length-classes), truncated distributions (larger, older fish absent) and reduced recruitment.
- ASRD will use these data to evaluate the status of these walleye and northern pike sport fisheries and modify the existing regulations.

Introduction

Prior to the mid 1990s, high angling pressure, combined with high fish harvest rates, resulted in the over-harvest of walleye (*Sander vitreus*) and northern pike (*Esox lucius*) populations in Alberta (Sullivan 2003). To aid the recovery of these fisheries, Alberta Sustainable Resource Development (ASRD) implemented two new management strategies, *Alberta's Walleye Management and Recovery Plan (AWMRP)* in 1996 and *Alberta's Northern Pike Management and Recovery Plan (ANPMRP)* in 1999 (Berry 1995, 1999). Through strategies identified in these two recovery plans, individual fisheries were assigned a management status (i.e., collapsed, vulnerable, stable) based upon a set of population criteria. Sport fishing regulations on individual lakes were then modified according to the status assigned (Sullivan 1998). In 2007-08, we conducted angler surveys (creel surveys) to assess the status of the walleye and northern pike sport fisheries on Sturgeon, Pigeon, and Wolf lakes.

Methods

We conducted access-site creel surveys (Pollock et al. 1994) during the summer fishing season at Sturgeon, Pigeon and Wolf lakes; busiest access points were surveyed. Surveys were conducted from 0800 – 2300h each day, from mid May to early September at Sturgeon and Pigeon lakes and from early June to early September at Wolf Lake. We calculated fish catch and release rates (fish/h) as total ratio estimators from the catch and number of angler-hours following Malvestuto (1983). We derived mean estimates and associated confidence intervals (95% CI) of angling effort, catch, and yield of walleye using the bootstrapping technique (Haddon 2001). We estimated incidental mortality rates from data collected from nine previous creel surveys following Reeve's (2004) multivariate analysis approach.

When permitted, creel clerks collected biological data from fish that were harvested by anglers. Data collected included total (TL) and fork (FL) length (± 1 mm), total weight (± 10 g), ageing structures, sex, and state of maturity. Age was determined following Mackay et al. (1990). Sex and state of maturity was determined following Duffy et al. (2000). Creel data was supplemented by “test angling” conducted throughout the survey period to collect data on size and age of fish that could not be legally harvested by anglers. Analysis of biological data followed characteristics used by ASRD to categorize walleye and pike sport fisheries under the AWMRP and ANPMRP.

Results

Sturgeon Lake

An estimated 11,400 angling trips and 36,000 angling-hours occurred on Sturgeon Lake during the 2007 angler survey. The angling pressure at Sturgeon Lake was high considering it is a 4,050 ha lake (Figure 1). Overall, the catch rates for released and harvested (kept by anglers) walleye were 0.31 and 0.07 fish/angling-h, respectively. The related yield was moderate and the related catch-and-release mortality was considerable.

Length of walleye captured during the test angling ranged from 270 to 570 mm TL and displayed a bimodal distribution with peaks around 370 and 470 mm TL (Figure 2). In contrast, the angler harvest consisted primarily of larger fish (≥ 450 mm) likely biased by current size limit regulations.

The pike sport fishery at Sturgeon Lake exhibited a broad length distribution with catchable pike ranging from 325 to 925 mm TL (Figure 3). Overall, the catch rates for released and harvested (kept by anglers) northern pike were 0.40 and 0.04 fish/angling-h, respectively.

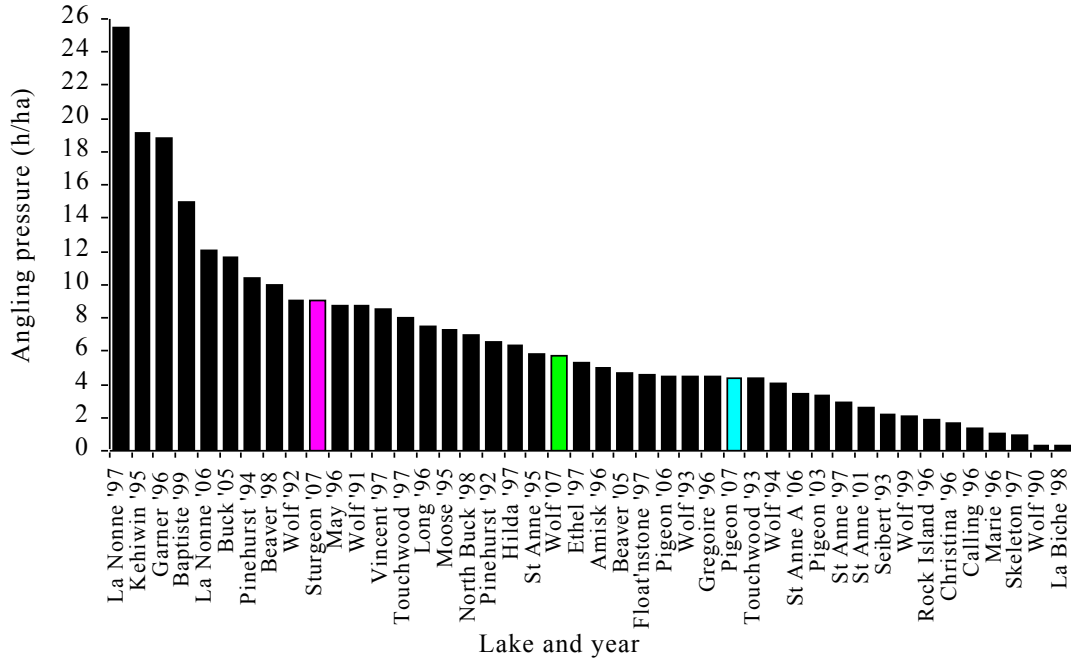


Figure 1. Angling pressure at Alberta lakes between 1990 and 2007. The angling pressure at Sturgeon, Wolf, and Pigeon lakes are indicated by the pink, green, and blue bars, respectively.

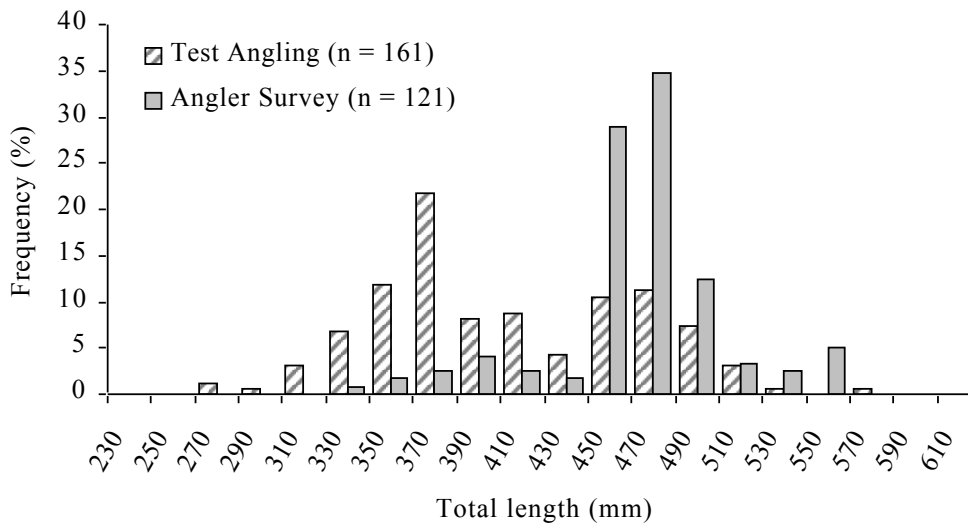


Figure 2. Length-class frequency distribution of walleye from Sturgeon Lake captured by anglers and test angling in 2007.

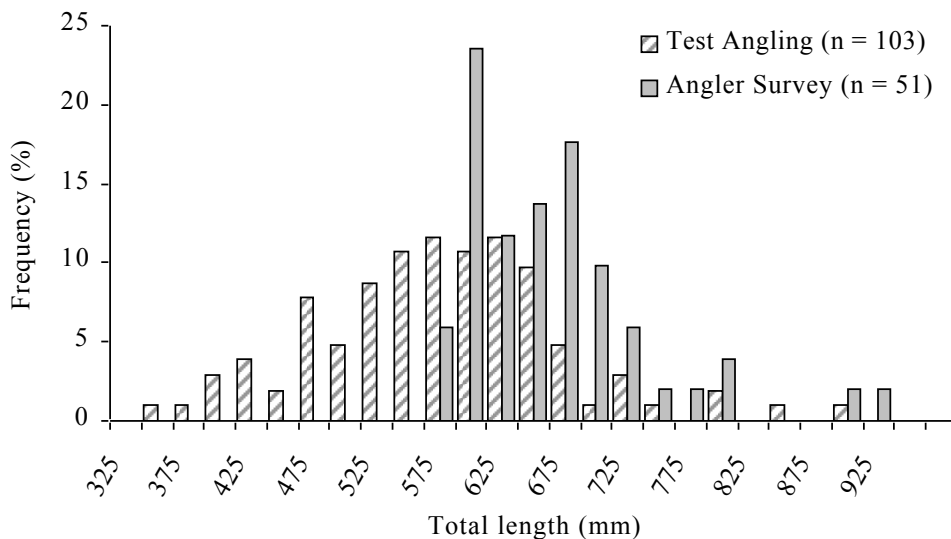


Figure 3. Length-class frequency distribution of northern pike from Sturgeon Lake captured by anglers and test angling in 2007.

Pigeon Lake

The walleye fishery at Pigeon Lake is maintained by stocked fish and is currently managed by a special harvest license (SHL), similar to big game hunting draws, and a catch-and-release regulation. During the survey period (mid-May to late August), 3,706 angling-trips and 10,959 angling-hours were recorded for the lake, resulting in estimated totals of 14,760 angling-trips and 42,870 h. In total, anglers caught and released 158,000 walleye. The angling effort at Pigeon is high even though the angling pressure is low by comparison (Figure 1). Overall catch rate (both released and SHL) in 2007 was 3.4 fish/h; SHL rate was 0.24 fish/h that translated into a harvest of 2,700 walleye.

Of the 3,745 anglers interviewed during the survey, 20% held SHLs; 37% of SHL anglers had not fished the lake the previous year. SHL holders averaged 1.28 trips to Pigeon Lake. The SHL was administered in three length categories i.e., < 43 cm, 43 - 50 cm and > 50 cm TL, and the proportion of each category in the harvest was 1%, 47% and 52%, respectively.

The age-class distribution of walleye vulnerable to angling was narrow and represented by ages-7 to 11 walleye (Figure 4); however, gill netting studies indicate strong recruitment of younger walleye not vulnerable to angling.

During the survey period, 73 northern pike were harvested by anglers with a total catch rate of 0.05 fish/h. The northern pike sport fishery at Pigeon Lake has a truncated distribution with fish > 660 mm TL being scarce (Figure 5).

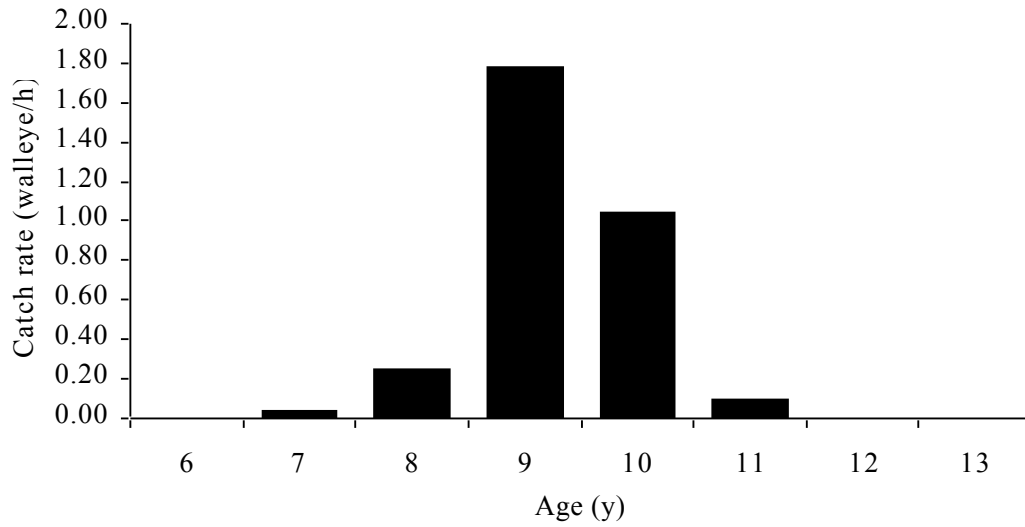


Figure 4. Age-class distribution of walleye sampled by test angling in Pigeon Lake in 2007.

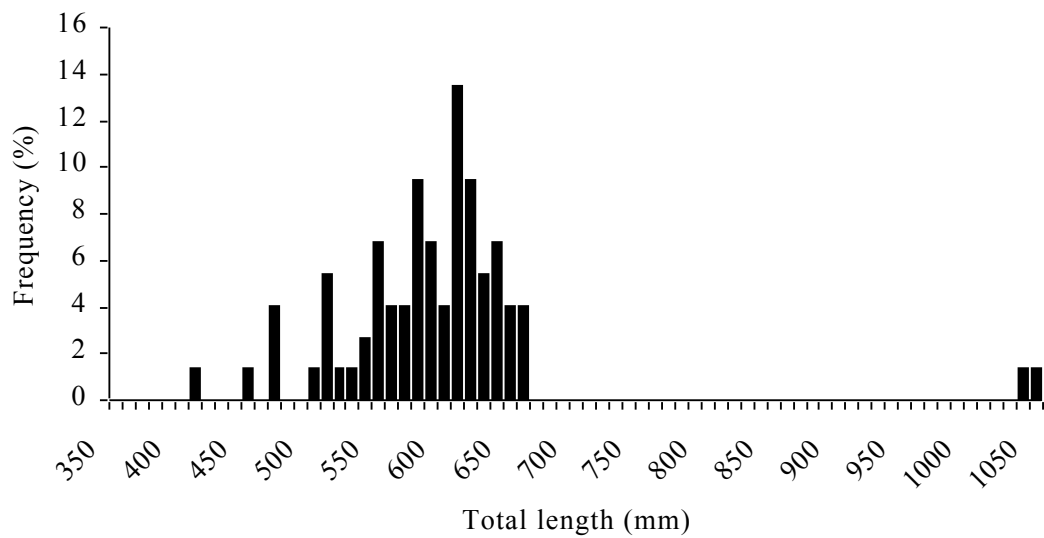


Figure 5.

Length-class distribution of northern pike sampled by test angling in Pigeon Lake in 2007.

Wolf Lake

Wolf Lake contains a natural population of walleye and is currently managed under SHL and a catch-and-release regulation. In 2007, 4,080 anglers fished the lake over 11,600 angling-hours and captured a total of 31,100 walleye. In total, 6,288 angling-trips and 17,885 h of angling were estimated. Overall catch rate (both released and SHL) in 2007 was 2.6 fish/h; SHL harvest rate was 0.19 fish/h that translated into a harvest of 835 walleye.

Of the 4,560 anglers interviewed during the survey, 25% held SHLs; 22% of SHL anglers had not fished the lake the previous year. SHL holders averaged 1.25 trips to Wolf Lake. The SHL was administered in three length categories i.e., < 43 cm, 43 - 50 cm and > 50 cm TL, and the proportion of each category in the harvest was 28%, 26% and 46%, respectively. The age-class of walleye vulnerable to angling was wide and represented by fish 370 - 620 mm TL (Figure 6).

During the survey period, 469 pike were harvested by anglers with a total catch rate of 0.80 fish/h. The pike sport fishery at Wolf Lake has a severely truncated distribution with fish > 630 mm TL being relatively scarce (Figure 7).

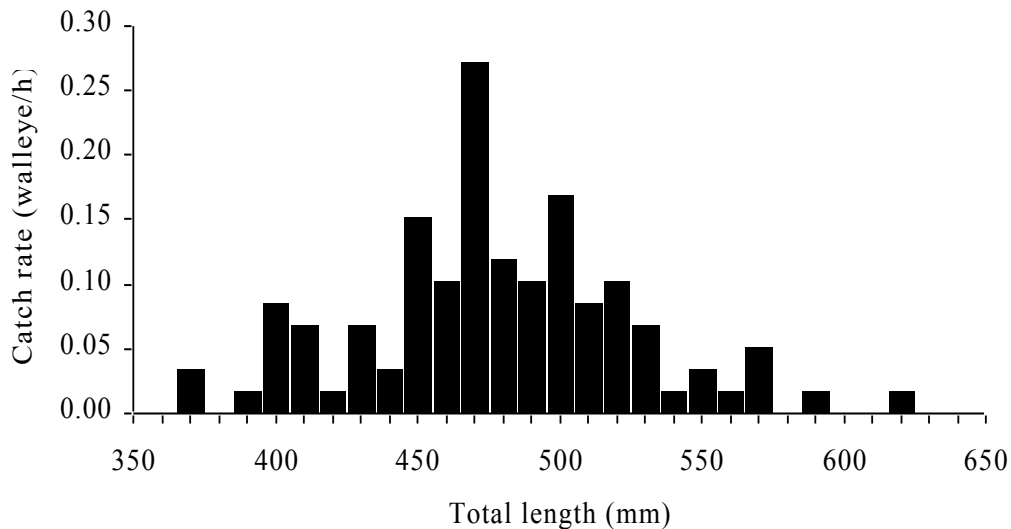


Figure 6. Length-class distribution of walleye sampled by test angling in Wolf Lake in 2007.

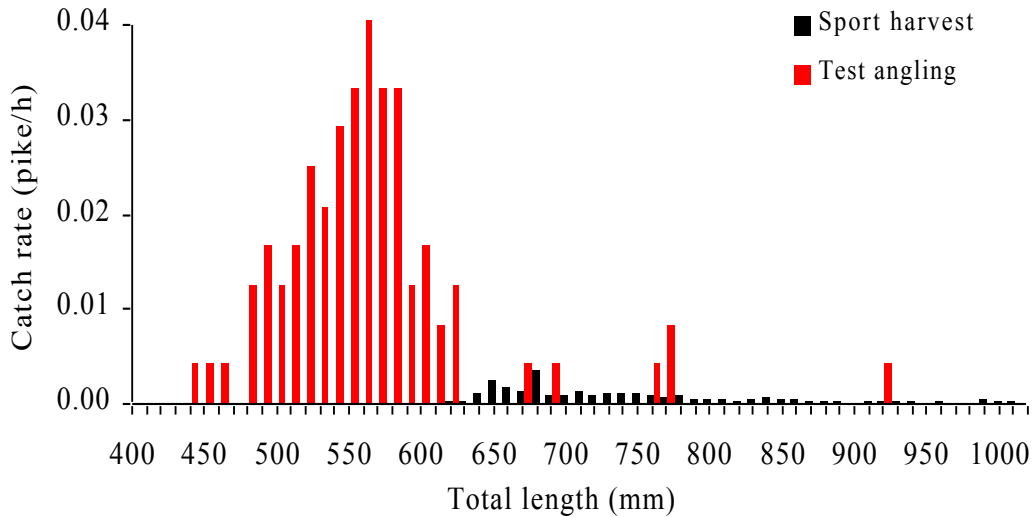


Figure 7. Length-class frequency distribution of northern pike from Wolf Lake captured by anglers and test angling in 2007.

Conclusion

These angler surveys were successful at quantifying angling pressure, as well as catch, and population characteristics for walleye and northern pike at Sturgeon, Pigeon and Wolf lakes and will be used by ASRD to manage these sport fisheries. In addition to providing a current state of these sport fish populations, the creel surveys also indicated potential areas of concern, for example, unobservable yield related to hooking mortality.

These angler surveys were conducted in a scientifically credible manner and collected information from the majority of the recreational anglers utilizing these lakes during the summer angling period. The use of bootstrapping techniques provided a measure of uncertainty around parameter estimates that can be used to identify areas that may require more or less sampling effort in the future in addition to their applications to fisheries management. This provides a level of flexibility in survey design that can be modified to suit the survey.

Communications

- Collaborated with ASRD in regard to survey design, data uploading and reviews of reports
- Prepared Alberta Conservation Alberta data reports on these surveys.

Literature cited.

- Berry, D.K. 1995. Alberta's walleye management and recovery plan. Alberta Environment Protection, Natural Resources Service, Number T/310, Edmonton, Alberta, Canada. 32 pp.
- Berry, D.K. 1999. Alberta's northern pike management and recovery plan. Alberta Environment Protection, Natural Resources Service, Number T/459, Edmonton, Alberta, Canada. 22 pp.
- Duffy, M., J. McNulty, and T. Mosindy. 2000. Identification of sex, maturity and gonad condition of walleye *Stizostedion vitreum vitreum*. Ontario Ministry of Natural Resources, Kenora, Ontario, Canada. 33 pp.
- Haddon, M. 2001. Modeling and quantitative methods in fisheries. Chapman and Hall/CRC, Boca Raton, Florida. 406 pp.
- Mackay, W.C., G.R. Ash, and H.J. Norris (eds.). 1990. Fish ageing methods for Alberta. R.L. & L. Environmental Services Ltd. in association with Alberta Fish and Wildlife Division and University of Alberta, Edmonton, Alberta. 113 pp.
- Malvestuto, S.P. 1983. Sampling the recreational fishery. Pages 397-419. *In*: L.A. Nielsen and D.L. Johnson, editors. Fisheries techniques. American Fisheries Society, Bethesda, Maryland, USA. 468 pp.
- Muoneke, M.I., and W.M. Childress. 1994. Incidental mortality: a review for recreational fisheries. *Reviews in Fisheries Science* 2(2): 123-156.
- Paul, A.J., J.R. Post, and J.D. Stelfox. 2003. Can anglers influence the abundance of native and nonnative salmonids in a stream from the Canadian Rocky Mountains? *North American Journal of Fisheries Management* 23:109-119.
- Pollock, K.H., C.M. Jones, and T.L. Brown. 1994. Angler survey methods and their applications in fisheries management. *American Fisheries Society Special Publication* 25. 371 pp.
- Reeves, K.A. 2004. Hooking mortality of walleye caught by anglers on Mille Lacs Lake, Minnesota in 2003. Minnesota Department of Natural Resources Section of Fisheries, Aitkin, Minnesota, USA. 16 pp.
- Sullivan, M.G. 1998. Northern management classification criteria for Alberta. Unpublished. Alberta Fish and Wildlife Division Memorandum, Edmonton, Alberta, Canada. 11 pp.

Sullivan, M.G. 2003. Exaggeration of walleye catches by Alberta anglers. North American Journal of Fisheries Management 23: 573-580.



ACA staff conducting an angler interview. (Photo: Bill Patterson)



ACA staff sampling an angler's harvest. (Photo: Bill Patterson)



Access point at a popular lake. (Photo: Owen Watkins)