INTERIM REPORT

5 April 2013

Owl River Walleye Spawning-run Assessment

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EXECUTIVE SUMMARY

Since 2006, the Alberta government has stocked over 200 million walleye fry and fingerlings as part of a management strategy to restore walleye populations to Lac La Biche. Many of these stocked fish are expected to reach sexual maturity in 2012-2013, presumably resulting in larger spawning runs and greater natural recruitment for the lake. The Owl River is considered a primary spawning system for Lac La Biche walleye. In the spring of 2012 we conducted a mark-recapture survey using two pound trap nets to determine the magnitude of the walleye spawning run from the lake into the Owl River.

We captured a total of 3,183 walleye during the study, nearly 99% of which were in a spawning stage (i.e., ripe or spent), confirming use of the Owl River as a walleye spawning system. Overall, walleye ranged in size from 355 to 760 mm total length (TL), with a mean (± SE) of 544 ± 1 mm (n = 3,129). Size of males ranged 355 - 673 mm TL, with a mean of 530 ± 0.68 mm (n = 2,155); while females ranged 361 - 760 mm TL, with a mean of 575 ± 0.90 mm (n = 956). Males (69%) were more abundant in the catch than females (31%). In general, females were larger than males. Dominant size ranges were 520 - 580 mm for males and 560 - 600 mm for females, constituting 83% and 85% of male and female catch, respectively. Water temperature during the survey ranged from 0.2 – 13.7°C, with a mean of 7.5°C. Number of walleye captured peaked on 6 May 2012 when water temperature was 7.5°C. We were unable to derive reliable abundance estimates of the walleye spawning run due to low recapture rates, but we will make a second attempt in 2014/15 using modified procedures.

ACKNOWLEDGEMENTS

This work was funded by Syncrude Canada Ltd. We thank ACA employees Troy Furukawa, Brendan Ganton, Dave Jackson, Clayton James, Chad Judd, Bill Patterson, and Mike Rodtka for their assistance in data collection. We also thank Aaron Foss (Alberta Environment and Sustainable Resource Development) for his help with data collection.

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1.0 INTRODUCTION

The walleye (*Sander vitreus*) population of Lac La Biche has been impacted by human exploitation since the early 1900s. Heavy harvest in the lake (legally and illegally), including spawning tributaries, led to a collapse of the walleye fishery in the 1960s. Between 1985 and 1987 the Alberta government stocked more than one million fingerlings into the lake (Mitchell and Prepas 1990). However the success of this stocking was limited, and by 1995 the lake was still considered as recovering and managed with a zero bag limit regulation (Berry 1995). Since 2006, the government has stocked the lake with nearly 200 million walleye fry and fingerlings in order to restore populations. Many of these stocked fish are expected to reach sexual maturity in 2012-2013, presumably resulting in larger spawning runs and greater natural recruitment for the lake. However, potential reductions in water quality and spawning habitat in the Owl River from riparian habitat degradation could limit success of the walleye restoration program.

The Owl River is considered the primary spawning habitat for Lac La Biche walleye (Chris Davis, AESRD, pers. com.). However, portions of this section of the river run through grazing leases and private land that support livestock. Long-term grazing and other agricultural activities have reduced riparian vegetation and this could potentially increase nutrient and sediment loading to the watercourse. The resulting reduction in water quality can have negative impacts on the quality and quantity of walleye spawning habitat. In 2011/12 we launched a long-term initiative to protect and restore riparian habitat along the Owl River. We collected baseline data on riparian health, water quality, aquatic habitat, and the distribution of walleye spawning habitat (Johns and Cantin 2012). In general, this assessment confirmed the presence of walleye in the river, particularly on the historical spawning grounds, in the upstream section where the river is fast, shallow and characterized by a rocky substrate. To date, we successfully re-negotiated lease boundaries on eight quarter sections with a lease holder, and installed over 7 km of wildlife friendly-livestock fencing, effectively protecting over 8 km of important riparian habitat. The objective of the current project was to estimate abundance of the walleye spawning run from Lac La Biche into the Owl River during the spring of 2012.

2.0 STUDY AREA

The Owl River is located 220 km northeast of the city Edmonton, in the Lac La Biche sub-basin. It is the major inflow river to Lac La Biche and it drains an area of 3,364 km^2 (Figure 1). Historically identified walleye spawning grounds are located approximately 30 km upstream from the mouth with Lac La Biche (Chris Davis, AESRD, pers. com.).

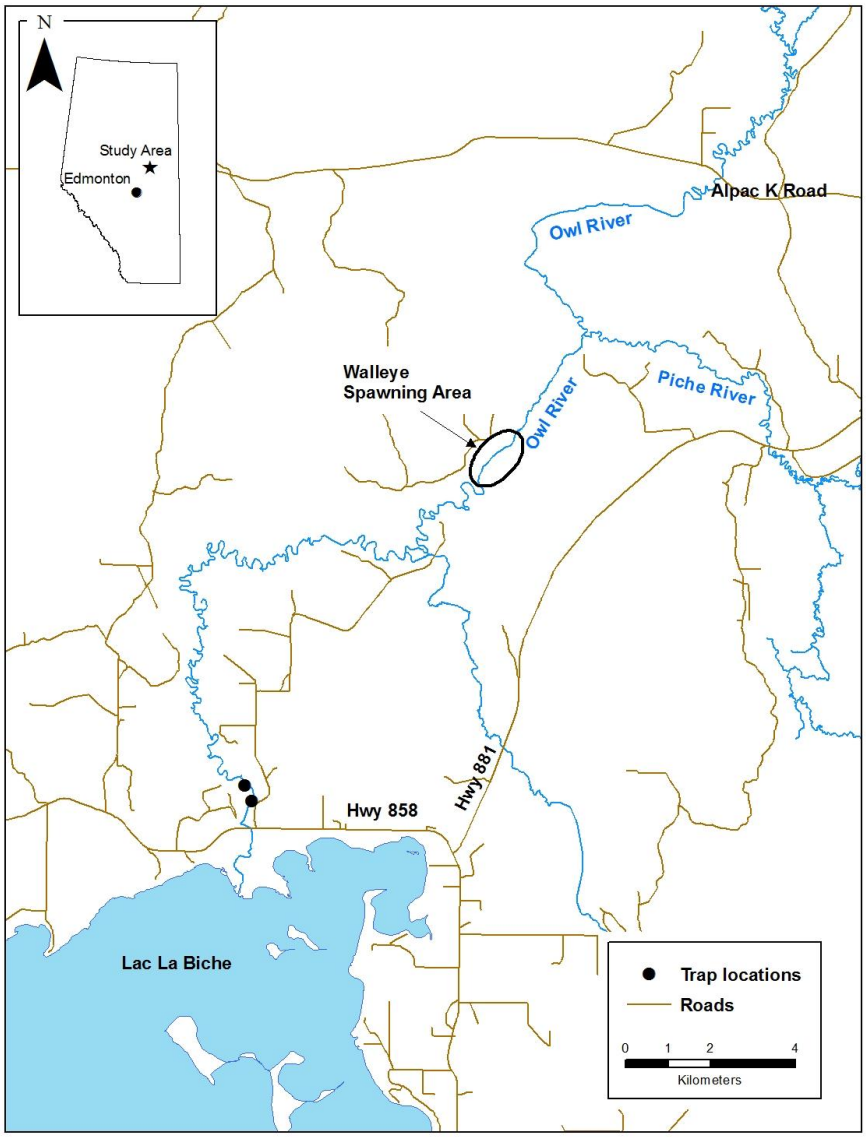

Figure 1. Map of Owl River showing trap net locations in 2012. Inset map shows the location of the river within Alberta.

3.0 MATERIALS AND METHODS

We conducted a mark-recapture survey during the spring of 2012 to estimate abundance of the walleye spawning run from the lake into the Owl River. We deployed two pound trap nets in the Owl River to capture spawning walleye migrating upstream from Lac La Biche. Traps were set immediately after ice out on 29 April 2012 and checked daily until 15 May 2012. Traps were 1 km apart with the downstream trap (DT) located 2.5 km upstream of the mouth with the lake (Figure 1).

Traps were made from 9.5 mm knotless nylon mesh netting and consisted of an open-top box and two lead nets. Trap boxes measured 3.68 x 3.68 m by 1.83 m deep, and lead nets measured 1.83 x 18.29 m. Each lead net included a leadcore line and a float line. A 1.22 x 1.22 m square funnel at the face of the trap tapered back 1.83 m into the centre of the trap to a 0.30 x 0.30 m opening (Appendix 1). The four corners of the trap were held in place with T-bar anchor posts driven into the stream substrate. Two lead nets were attached to the downstream corners of each trap to channel fish travelling upstream into the box. The right lead ran from the trap box to the river bank and the left lead ran out into the thalweg (Appendix 1). In compliance with Transport Canada's regulations (Navigable Waters Protection Act 1985) the leads and trap blocked no more than 2/3 of the river width. Traps were set on the inside bend of the river, at depths between 0.6 – 1.5 m, where water velocity were reduced to ensure the safe installation and operation of the traps. Fish caught in the DT constituted the initial capture event while catch in the upstream trap (UT) constituted the recapture event.

For all walleye captured, we recorded total length (mm), gender, and state of maturity. We clipped the third dorsal spine of each walleye captured in the downstream trap and the sixth dorsal spine in the upstream trap to differentiate between fish marked in the downstream and upstream traps. All other fish captured were identified to species and enumerated.

We installed a temperature data logger at the downstream trap and recorded water temperature at one hour intervals during the spawning run.

4.0 RESULTS

We captured a total of 3,183 walleye during the study; 2,112 from the downstream trap and 1,071 from the upstream trap, of which only 15 were previously marked in the downstream trap (recaptures). Of the walleye where sex could be determined, 69% were males (n = 2,155) and 31% were females (n = 956). Nearly 99% of the 3,183 walleye captured were in a spawning stage (i.e., ripe or spent) confirming use of the Owl River as a walleye spawning system. Of the mature males 98% were ripe and 2% were spent. Similarly, 78% of mature females were ripe and 22% were spent (Table 1).

We were unable to derive reliable abundance estimates for walleye due the low recapture rate; a capture probability (capture-recapture) of 0.01 is recommended for deriving abundance estimates (Otis et al. 1978), but the probability from our survey was 0.007 (i.e., 15/2,122). Variations in trap location and water velocities, or dilution due to purely large numbers of fish, likely contributed to the lower number of walleye captured in the UT relative to the DT, hence the lower recapture rates. In compliance with Transport Canada's protocol of blocking no more than 2/3 of the river width, the lead net extended further into the thalweg for the DT than for the UT that could result in the DT intercepting and capturing more fish than the UT. Higher water velocities at the UT than DT may have raised the bottom of lead nets off the substrate allowing fish to escape under the net (Aaron Foss, AESRD, pers. com.).

Table 1. State of maturity of walleye captured in the Owl River during the 2012 spawning-run assessment.

Gender	Maturity		n
	Ripe	Spent	
Male	2,111	35	2,146
Female	747	207	954

Water temperature ranged from 0.2 – 13.7°C, with a mean of 7.5°C. Number of walleye captured peaked on 6 May 2012 when water temperature was 7.5°C (Figure 2). Overall more walleye were captured in the downstream trap compared to the upstream trap (Figure 3; Appendix 2). Other fish caught include 5,093 northern pike (*Esox lucius*), 17 white suckers (*Catostomus commersoni*), and one cisco (*Coregonis artedi*).

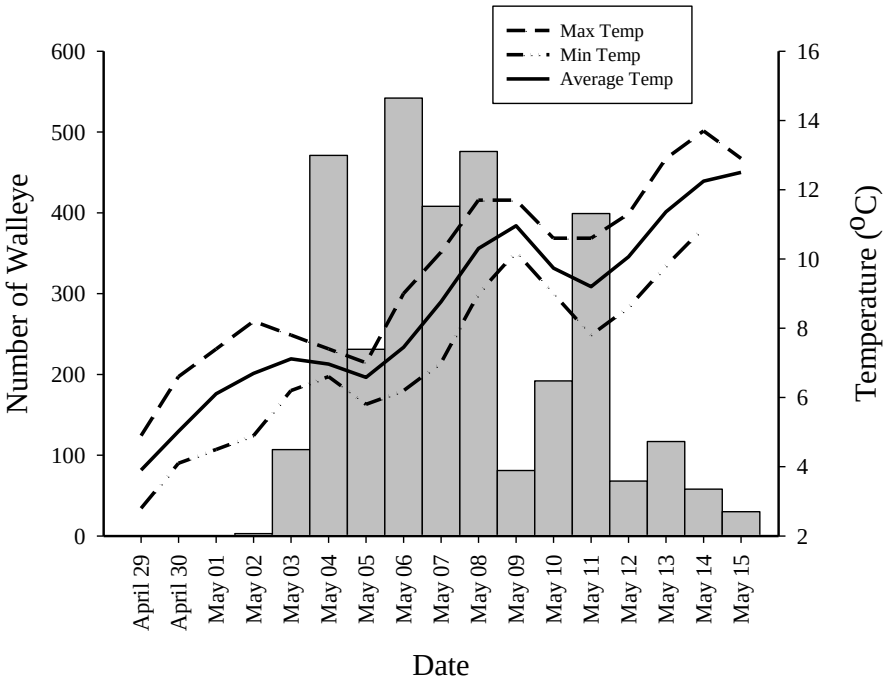

Figure 2. Number of walleye caught and water temperature during the 2012 Owl River spawning-run assessment.

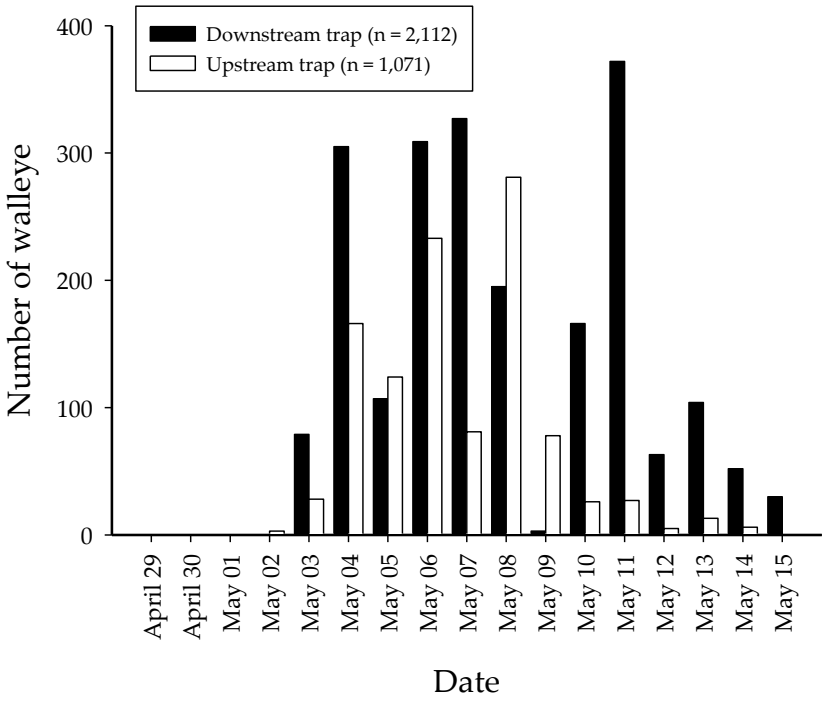

Figure 3. Number of walleye captured in the downstream trap vs. the upstream trap during the 2012 Owl River spawning-run assessment.

Overall, walleye ranged in size from 355 to 760 mm total length (TL), with a mean (± S.E.) of 544 ± 1 mm (n = 3,129). Size of males ranged 355 - 673 mm TL, with a mean of 530 ± 0.68 mm (n = 2,155); while females ranged 361 - 760 mm TL, with a mean of 575 ± 0.90 mm (n = 956) (Figure 4). In general, females were larger than males. Dominant size ranges were 520 - 580 mm for males and 560 - 600 mm for females, constituting 83% and 85% of male and female catch, respectively.

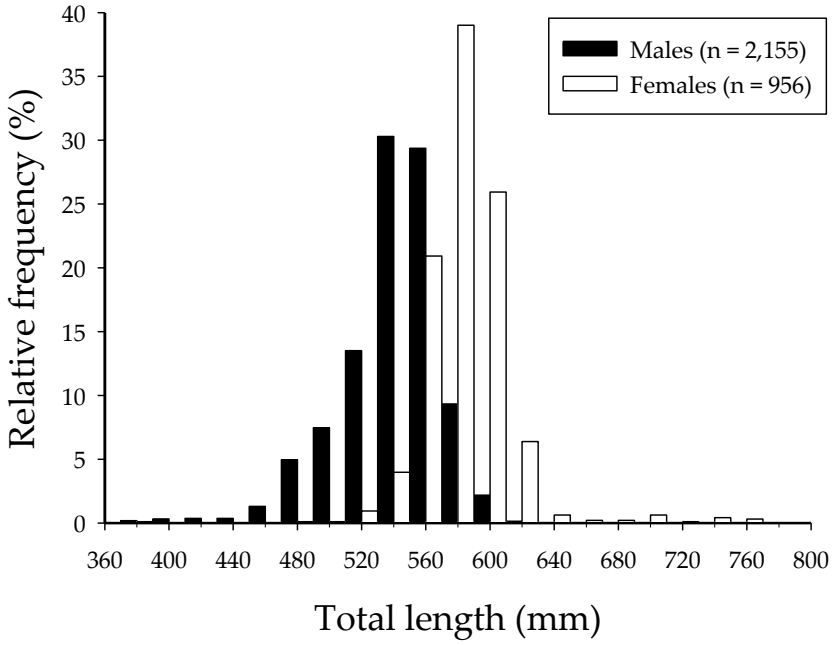

Figure 4. Length-frequency distribution of walleye captured during the 2012 Owl River walleye spawning-run assessment.

5.0 CONCULSIONS

Nearly all (99%) the walleye captured were in a spawning stage (i.e., ripe or spent) confirming use of the Owl River as a walleye spawning system. We were unable to derive reliable abundance estimates of the walleye spawning run due to low recapture rates, but we will make a second attempt in 2014/15 using modified procedures.

6.0 LITERATURE CITED

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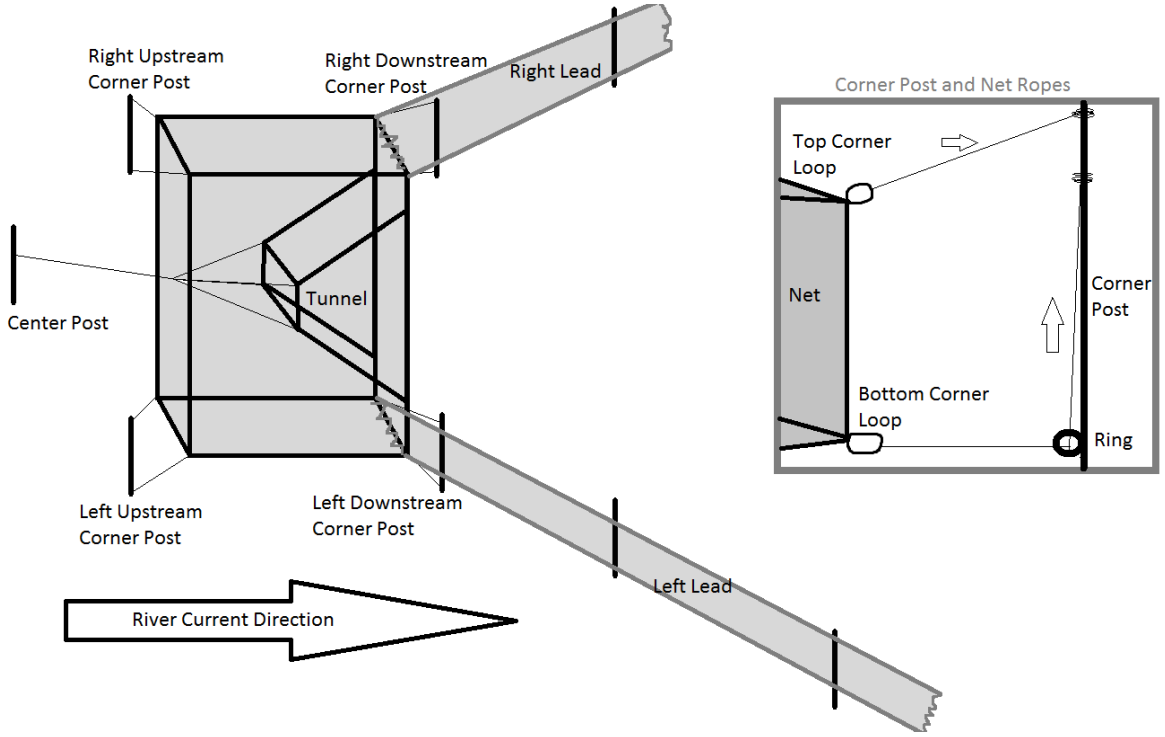
7.0 APPENDICES

Appendix 1. Diagram of trap net setup used to capture walleye during the 2012 Owl River spawning-run assessment.



Appendix 2. Summary of daily catch of walleye in the during the 2012 Owl River survey. Codes: DT = downstream trap, UT = upstream trap.

Date	Male		Female	
	DT	UT	DT	UT
29/04/2012	0	0	0	0
30/04/2012	0	0	0	0
01/05/2012	0	0	0	0
02/05/2012	0	1	0	2
03/05/2012	62	18	15	10
04/05/2012	222	106	77	52
05/05/2012	69	80	32	37
06/05/2012	224	178	87	53
07/05/2012	185	53	141	28
08/05/2012	87	205	71	73
09/05/2012	0	60	3	18
10/05/2012	124	16	40	10
11/05/2012	263	20	108	7
12/05/2012	39	4	24	1
13/05/2012	71	11	33	2
14/05/2012	37	3	15	3
15/05/2012	16	0	14	0
Total	1399	756	660	296