

Alberta Conservation Association 2011/12 Project Summary Report

Project Name: *Owl River Riparian Restoration and Enhancement Project*

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Partnerships

Syncrude Canada Ltd.

Key Findings

- Springtime congregation of walleye in the upper 10 km of the study area in the Owl River confirms this area as walleye spawning grounds.
- Aerial videography results indicated that 47% of riparian areas of the Owl River are in good condition, 39% in fair condition and 14% in poor condition.
- Dissolved oxygen levels were high (6.0 – 13.6 mg/L) throughout the system from May to August.
- Total phosphorus levels were high (summer average: 92 – 140 µg/L) throughout the system; levels were higher at downstream sites than at upstream sites.
- Total coliform counts exceeded established limits for agricultural use (>1,000 mpn/100 mL) at several sites.
- Negotiated a verbal agreement with a leaseholder to relinquish grazing rights on approximately 9 km of riparian area along the Owl River. This agreement is pending approval by Alberta Sustainable Resource Development Lands Division.

Introduction

Since 2006, the provincial government has stocked nearly 200 million 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 the next few years (2011 – 2013), presumably resulting in larger spawning runs and greater natural recruitment for the lake. Alberta Sustainable Resource Development (ASRD) considers the Owl River as a primary spawning river for Lac La Biche walleye. However, the identified walleye spawning habitat is located approximately 30 km upstream from Lac La Biche. Portions of this section of the river run through grazing leases and private land that support livestock grazing. Long-term grazing in this area has reduced riparian vegetation that could potentially increase nutrient and sediment loading of the watercourse. Restoring riparian vegetation will provide better habitat for spawning walleye (i.e., increased availability of large substrate and interstitial space, well-oxygenated sediments) and reduce algal

blooms within the watercourse (through reduced nutrient loading), thereby making out-migration of fry more successful. Prior to beginning riparian restoration activities, we conducted baseline studies to characterize riparian health and aquatic habitats and identify spawning habitat used by walleye, and worked with government agencies and landowners to protect and enhance these areas.

Methods

We conducted night-time visual observations during the walleye spawning season to determine habitat use and spawning activity within the Owl River, from Lac La Biche to 40 km upstream. We searched for walleye using hand-held spotlights from a boat and on shore and recorded locations with a global positioning system (GPS) unit.

We conducted monthly water quality analyses from May to August at five locations, as well as macroinvertebrate analyses at these sites in August. Also in August, we assessed aquatic habitat along cross-sectional transects at 1-km intervals in the upper section (upper 10 km) and at 5-km intervals in the lower section (lower 30 km) of the river. We calculated summer averages for each site for key water quality variables using June and August data only when data were available for all sites; delays in courier deliveries resulted in some water samples not being provided to the lab within specified time limits and therefore these samples were not analyzed. Where applicable, we interpreted water quality data following established protocols (Canadian Council of Ministers of the Environment [CCME] 2007, Alberta Environment [AEVN] 1999).

We used low-level aerial videography to assess the health and integrity of riparian areas along the Owl River and to characterize riparian areas as good, fair and poor using our lotic riparian health assessment scorecard.

We initiated communications with several landowners interested in working with Alberta Conservation Association to restore and enhance riparian vegetation along the river.

Results

We observed several fish (walleye and white suckers) in the upper 10 km of the study reach but very few in the lower 30 km. While white suckers dominated observed fish, springtime congregation of walleye in the upper 10 km confirms ASRD's previous identification of this section of the river as suitable walleye spawning area.

Water temperature ranged from 7.7 – 19.1°C and dissolved oxygen (DO) from 6.0 – 13.6 mg/L from May to August. Total phosphorus (TP) concentrations were high throughout the system. Summer average total TP ranged between 92 – 140 µg/L, with higher concentrations at downstream sites than at upstream sites (Table 1). Based on these TP values, the Owl River may be considered as eutrophic to hyper-eutrophic (see CCME 2007). Total nitrogen concentrations in summer ranged from 1.0 – 1.2 mg/L, slightly exceeding the AENV (1999) limit (1.0 mg/L) in most cases. Turbidity ranged from a high of 26 NTU in May to a low of 2.1 NTU in August, with summer averages ranging from 6.0 – 10.0 NTU. As expected, turbidity was higher in spring (May) than summer, and summer averages were higher at downstream sites than at upstream

sites. Total coliform counts were low in May but exceeded the CCME (2007) limit for agricultural use (>1,000 mpn/100 mL) at most sites in the summer (Table 1).

Table 1. Summer averages (June and August) for key water quality variables for the Owl River.

Site	Temperature (°C)	Dissolved oxygen (mg/L)	Total phosphorus (µg/L)	Total nitrogen (mg/L)	Turbidity (NTU)	Total coliform (mpn/100 mL)
1-W	15.7	7.6	92.0	1.0	6.0	605
9-W	16.2	8.6	92.5	1.1	6.0	1,070
12-W	17.1	7.3	140.0	1.2	10.0	2,420
16-W	16.9	7.1	125.0	1.1	10.0	1,635
2-W ¹	16.2	8.3	65.5	1.2	7.5	1,300

¹Site located on Piche River, approximately 200 m upstream of confluence with the Owl River.

We collected a total of 11,705 macroinvertebrates belonging to 54 families. Diversity ranged from 1.2 – 2.2 and richness from 30 – 36; there were no clear spatial distribution patterns. The most common family was Baetidae (order Ephemeroptera).

Dominant substrate in the upper sites consisted of boulders, cobble and gravel suitable for walleye spawning, while sites in the lower section consisted mainly of fine sediments and sands unsuitable for walleye spawning (Table 2). Overall, bank disturbance (erosion, exposed soil and human disturbance) along the river was low, with grasses/sedges and woody shrubs dominating the vegetation (Table 2).

Table 2. Summary of Owl River habitat characteristics. Values for bank erosion, human disturbance, exposed soil and vegetation cover are averaged for left and right banks. Site 1-W is the furthest upstream site and Site 17 is the furthest downstream site on the Owl River. Site 2-W is located on the Piche River, approximately 200 m upstream of confluence with the Owl River.

Site	Average depth (m)	Wetted width (m)	Dominant Substrate ¹	Bank erosion (0 -10)	Human disturbance on bank (0 – 10)	Exposed soil (%)	Deciduous/ coniferous tree (%)	Woody shrubs (%)	Grass/ sedge (%)
1-W	0.98	40.4	B/C	0	0	0	13	15	60
3	0.92	29.7	B	0	0	0	0	15	85
4	0.50	47.6	B/S	0	0	0	13	40	35
5	0.78	52.5	B/G	0	0	0	0	40	60
6	0.96	54.0	C/G	0	0	0	11	30	50
7	0.74	35.2	C/G	0	3	0	0	40	60
8	0.44	54.0	C/G	0	2	0	0	65	35
9-W	1.06	29.4	F	0	2	0	0	35	65
10	1.47	18.9	F	1	4	0	0	80	20
11	1.03	18.7	F	1	2	1	0	13	88
12-W	1.39	17.2	F	1	2	0	0	10	90
13	1.39	19.7	F	2	2	3	0	25	73
14	1.40	16.3	F	1	3	3	0	48	50
15	1.21	27.2	F	1	4	5	1	18	75
16-W	1.66	24.7	F	0	2	0	0	0	100
17	1.77	23.0	S/F	0	0	0	0	0	100
2-W	0.80	12.9	C	0	0	0	0	45	55

¹B = boulder, C = cobble, G = gravel, S = sand, F = fines.

Aerial videography results indicated that 47% of riparian areas along the Owl River are in good condition, 39% in fair condition and 14% in poor condition (Figure 1). We reached a verbal agreement with a leaseholder to protect approximately 9 km of riparian area along the river; this agreement is pending approval by Alberta Sustainable Resource Development Lands Division.

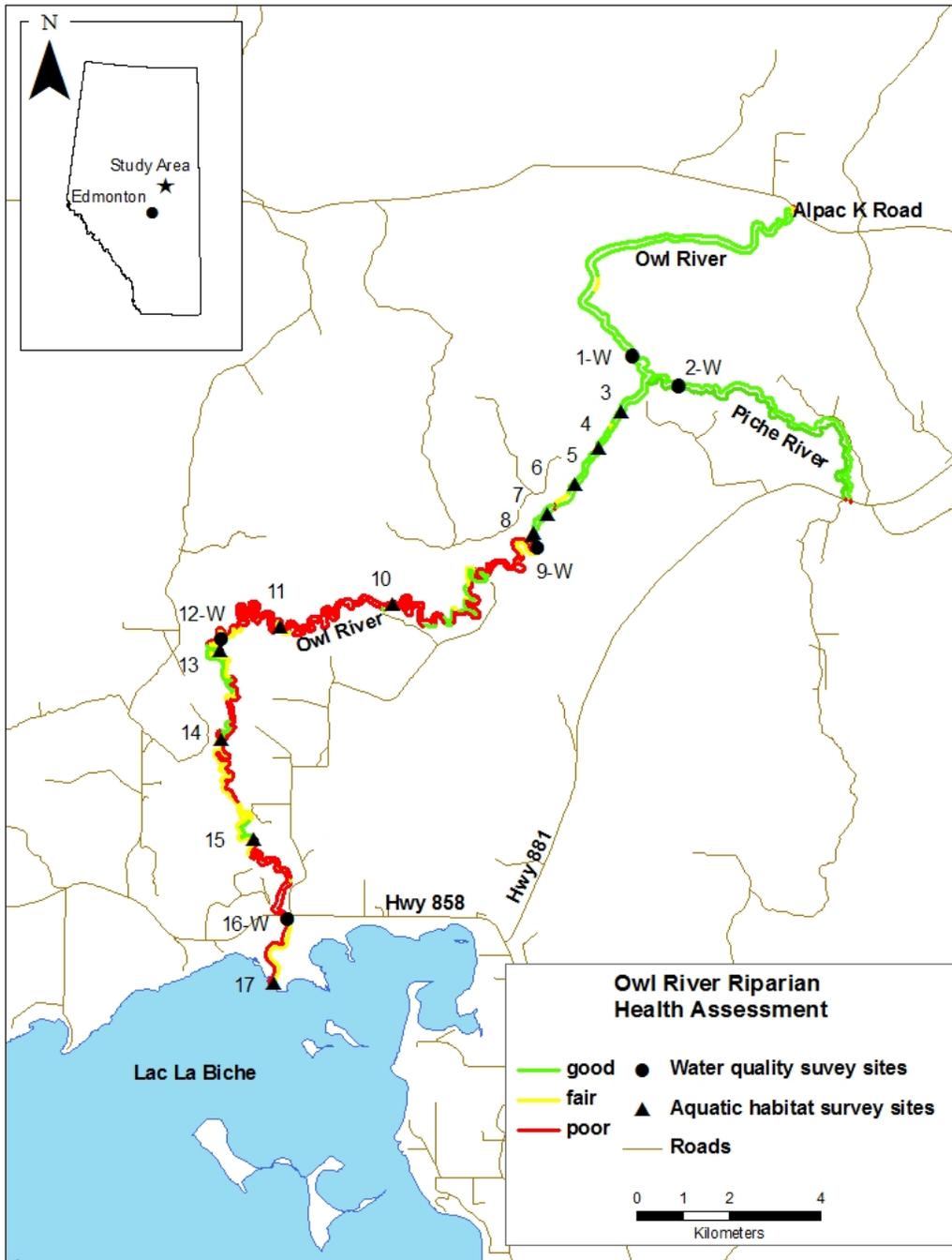


Figure 1. Owl River riparian health assessment map. Note that Site 2-W is located on the Piche River, approximately 200 m upstream of confluence with the Owl River.

Conclusions

We collected baseline information that will be useful in assessing the long-term initiative to protect and restore the riparian vegetation along the Owl River. Congregation of walleye in the upper 10 km of the study area confirms previous identification of this section of the river as suitable walleye spawning grounds. Over the next two years, we will continue to assess the walleye spawning run and work with landowners and leaseholders to enhance and protect riparian areas along the river.

Communications

- Project featured on *Let's Go Outdoors* television broadcast.
- Data report submitted to Syncrude Canada Ltd., Department of Fisheries and Oceans Canada and Alberta Sustainable Resource Development.

Literature Cited

AENV. 1999. Surface water quality guidelines for use in Alberta. Environmental Assurance Division Science and Standards Branch, Alberta Environment, Edmonton, Alberta. 20 pp.

CCME. 2007. Canadian environmental quality guidelines, v.10. Canadian Council of Ministers of the Environment (CCME), Winnipeg, Manitoba, Canada.



Alberta Conservation Association staff member, Ariane Cantin, collecting aquatic macroinvertebrates in the Owl River. (Photo: Tyler Johns)



Example of aerial videography of the riparian area along the Owl River. In the foreground the riparian vegetation has been cleared for a hay field and in the background the vegetation is intact and healthy. Arrows indicate riparian health on each bank; green = good, red = poor. (Photo: Walker Environmental)



Walleye spawning ground in the upper 10 km of the study area on the Owl River. (Photo: Tyler Johns)



Eroded bank along the Owl River. (Photo: Ken Foster)