Unit 154 Heritage Court
150 Chippewa Road
Sherwood Park, AB T8A 6A2

Summer Village of Itaska Beach Biophysical Survey

Prepared for: Municipal Planning Services (MPS)
By: CPP Environmental – Théo Charette, Michelle Desaulniers, and Angie Bouzetos

Date of Report: April 30, 2019

Introduction

CPP Environmental completed a terrestrial and aquatic survey in the Summer Village of Itaska Beach on Pigeon Lake and in adjacent aquatic areas on October 2, 2018 (**Figure 1**). The survey included a terrestrial assessment to classify land features such as ecosite, streams and wetlands and the aquatic survey documented shoreline and aquatic conditions. Other biophysical features included a riparian health assessment and fish and wildlife observations and habitat types. In some cases, where information was previously collected by other parties, it was included in our report. A summary of terrestrial, wetlands, watercourses, riparian, aquatic and fish and wildlife habitat conditions are described below.

Background

Prior to the field survey, a desktop review of Alberta Environment and Parks (AEP) resources was completed, including:

- The Alberta Conservation Information Management System (ACIMS) was accessed to document rare plants within the project boundaries. One sensitive aquatic plant, widgeon-grass (*Ruppia cirrhosa)* was documented in Pigeon Lake along the shoreline of Sundance SV (**Appendix A**). It was not documented during the aquatic survey but may have only been absent due to the timing of the survey (October).
- The Fish and Wildlife Internet Mapping Tool (FWIMT) was accessed to document previously recorded fish and wildlife observations (**Appendix C**).
- A Historical Resources report was generated to identify potential historical resources (**Appendix C**). The report documented no potential for historical resources values (HRV) within the project area.

Terrestrial

The SV of Itaska Beach is located within the Boreal Forest Natural Region and the Dry Mixedwood sub-region. A total of 25.15 hectares is designated as a bird sanctuary and nature reserve and the area is protected by the Itaska Audubon Society. The purpose of the protected area is to keep the land in as much of a natural state as possible by only allowing foot traffic. For the purpose of this assessment, the area was accessed to classify wetlands, streams, and ecosites. Ecosite classification occurred within the nature reserve as the majority of the SV is developed along the lake shoreline.

Ecosites were identified in accordance with the *Field Guide to Ecosites of Northern Alberta*. [1] Plants and soils were identified throughout the area and conditions were classified to an ecological unit identification

[1] Beckingham, J. D. 1996. Field Guide to ecosites of northern Alberta. University of British Columbia. Vancouver, B.C.

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code of BM-d1.1/SM3. The vegetation characteristics comprise the first letters of the ecological unit identification code (BM-d1.1). The SV is located within the Boreal Mixedwood (BM) ecological area and due to plant community characteristics, the area was classified to a low-bush cranberry / trembling aspen (Aw) (d1) ecosite (**Table 1**).

Table 1: Itaska SV plant community documented as BM-d1.4.

Stratum	Dominant Species	Sub-dominant Species
Tree	trembling aspen (*Populus tremuloides*	balsam poplar *(Populus balsamifera)* and white spruce (*Picea glauca)*
Shrub	red osier dogwood (*Cornus stolenifera)*	prickly wild rose (*Rosa acisularis*), wild red raspberry (*Rubus idaeus)* and trembling aspen (*Populus tremuloides*)
Ground	bunchberry (*Cornus canadensis*)	twin-flower (*Linnaea borealis)* and bishops cap (*Mitella nuda*)

Soil characteristics comprise the last letters in the ecological code. Soil type classification (SM3) was completed using a mix of soil type, soil moisture, and texture. The first letter of the code (S) is the soil identifier and the second letter (M) indicates that the area is moist. The low-bush cranberry ecosites are characteristic of mesic moisture regime and a medium nutrient regime, meaning the area contains a medium amount of moisture and nutrients. The number 3 represents the texture class, which was assessed at the surface (top 30 cm) and was documented as a silt loam (SiL). Within the nature reserve, the majority of the landscape is classified as wetland and the upland ecosite is concentrated in the southern portion and throughout upland areas of the SV.

Wetlands

One wetland was identified within the SV, which was classified into two forms including a coniferous wooded swamp and a deciduous wooded swamp (**Figure 2**). The wetland was classified in accordance with the *Alberta Wetland Classification System (AWCS)* and included a desktop delineation of wetland boundaries and field verification of plants and soils (**Table 2**).[2]

Table 2: Itaska SV wetland classification results.

Wetland Classification	Soils	Plants
Coniferous Wooded Swamp (S-WC-III)	Humic (oh) organic soil for top 30 cm (VP = > 7)	**Tree stratum** - Black spruce (*Picea mariana*) **Shrub stratum** black spruce, Labrador tea (*Ledum groenlandicum) &* willow *(Salix)* **Ground stratum –** feathermosses dominated with some intermixed bog

[2] Government of Alberta. 2015. Alberta Wetland Classification System. Water Policy Branch, Alberta Environment and Parks. Edmonton. Alberta.

Wetland Classification	Soils	Plants
		cranberry (*Vaccinium vitis-idaea*) and creeping snowberry (*Gaultheria hispidula).*
Deciduous Wooded Swamp (S-Wd-III)	Humic (oh) organic soil for top 30 cm (VP = > 7)	**Tree stratum** - balsam poplar **Shrub stratum** - willow *(Salix)* & birches *(Betula spp.)* **Ground stratum –** not assessed as many plants were dead given the season

Both wetlands were classified as seasonal (III) due to the documentation of organic soils in the upper soil surface and the absence of surface water in the top 30 cm. Seasonal wetlands contain water throughout the majority of the growing season but are typically dry by the end of the summer. The coniferous wooded swamp extends north into the next quarter section out of the project area and is bordered by agricultural lands to the east.

Streams

One small-permanent stream with 2 watercourse crossings were identified within Itaska SV (**Figure 2**). The small permanent stream is an unnamed and mapped tributary to Pigeon Lake.

Crossing 1 is over Range Road 13 and is blocking fish passage due to a large culvert outlet gap preventing fish passage. The outlet gap is causing erosion issues within the stream bed and a scour pool is starting to develop. Upstream of Crossing 1, fish habitat is null due to ditch drainage throughout dense cattails (*Typha latifolia*) that originate from a shrubby wetland located within an agricultural field. The remainder of the upstream area is considered ephemeral due to the vegetated drainage pathway with the absence of stream channel development (bed and banks). Downstream of Crossing 1 is the wooded deciduous swamp and the channel is well defined and fluvial. CPPENV recommends a culvert replacement to prevent streambed erosion.

Crossing 2 is located on Beach Ave within Itaska SV and is in good functioning condition with no issues to report. Downstream habitat meanders throughout the wooded deciduous swamp and is defined and fluvial throughout the area.

Riparian Health

Riparian areas are the transitional ecological zones bordering rivers and lakes. They encompass areas of emergent aquatic vegetation, the shoreline, the bank and upwards to areas where plants remain tolerant of water-logged soils. These areas provide important ecological services, including stabilizing lake sediments and terrestrial soils to reduce shoreline erosion, filtering sediment and nutrients from runoff entering the lake, storing water during wet periods and releasing it during dry periods and providing essential habitat for fish and wildlife. Lakeside modification, including construction of buildings along the shoreline, clearing of aquatic and shoreline vegetation, installation and maintenance of lawns and artificial beaches, and placement of docks, boat lifts, concrete and riprap, can degrade riparian health. This can impact water quality and biodiversity by increasing shoreline erosion, degrading fish habitat and increasing nutrient input which may lead to algal blooms.

In 2002 and 2008, Alberta Sustainable Resource Development conducted riparian health assessments on Pigeon Lake.[3] In both assessment years, results classified the majority of Pigeon Lake's shoreline (65%) as highly impaired. In 2002, 24% of the shoreline was classified as healthy and the remaining 11% was considered moderately impaired. In 2008, riparian health improved slightly, with 29% of the shoreline considered healthy and 6% moderately impaired (**Appendix D**). This improvement in shoreline quality was likely the result of land purchases by the Government of Alberta along the northwest shore of the lake, although some improvement in riparian health was offset by poorer health scores elsewhere along the lake.

Shoreline and Aquatic Biophysical Survey

The shoreline and aquatic biophysical survey was completed by kayak within 50 m of the lakeside boundary of the SV on October 17, 2018. Field measurements included percent cover of different substrate and vegetation types along reaches defined in the field. An individual reach was defined while travelling parallel to the shoreline, as follows. The first reach began at one end of the summer village. When a notable change in substrate, vegetation type or shoreline disturbance occurred, a waypoint was created to mark the end of the reach and the start of the next reach. At each waypoint, water quality was measured using an Aqua TROLL 600 multi-parameter probe at a depth of 0.5 m. Measured parameters included temperature, conductivity, turbidity, dissolved oxygen (D.O.) and pH. The survey was limited to a maximum depth of approximately 2 m due to water clarity restrictions.

The aquatic assessment resulted in a total of six reaches representing the entire near-shore area of the SV (**Figure 3**). Reaches were classified as either natural, moderately disturbed or highly disturbed. Natural reaches included 1, 3 and 6 and accounted for 18.7% of the project area. These reaches were characterized by relatively undisturbed shorelines with abundant natural riparian vegetation. Reaches 2, 4 and 5 were documented as highly disturbed and accounted for approximately 81.3% of the project area. These reaches were characterized by abundant shoreline disturbance in the form of residential and recreational development, including buildings, docks, manicured lawns, rock placement and shoreline vegetation removal.

Despite differences in the degree of disturbance, water quality parameters were relatively similar in all reaches and were at levels suitable to support aquatic life.[4] Submergent vegetation cover was most abundant within reach 1 (55%) and gradually decreased moving west across the length of the study area. Submergent vegetation consisted primarily of sago pondweed (*Stuckenia pectinata*), large-sheath pondweed (*Potamogeton vaginatus*) and northern watermilfoil (*Myriophyllum sibiricum*). Cyanobacteria blooms were observed throughout the study area. Emergent vegetation was not present within any of the study reaches at the time of assessment. Substrates in all reaches were generally sand-dominated, however some coarser substrates, including cobble and gravel, were present closer to shore (**Table 3**).

[3] Alberta Sustainable Resource Development. 2008. User Guide to the Pigeon Lake Shoreline Video. Fish and Wildlife, Alberta Sustainable Resource Development. 8 pp.
[4] Alberta Environment and Parks. 2018. Environmental Quality Guidelines for Alberta Surface Waters. Water Policy Branch, Edmonton, Alberta.

Table 3: Survey data collected at each reach in near-shore areas along the SV.

Characteristics	Reach Number					
	1	**2**	**3**	**4**	**5**	**6**
Total Reach Length (m)	110.98	225.29	29.92	395.20	629.31	100.38
Water Quality						
Temperature (°C)	7.45	7.43	7.44	7.45	7.46	7.46
Conductivity (µS/cm)	327.19	329.09	326.84	327.85	329.82	328.82
Turbidity (NTU)	2.78	3.91	2.08	1.97	1.90	5.87
Oxygen, dissolved (mg/L)	7.98	8.00	7.97	7.96	7.98	7.95
pH	8.72	8.69	8.67	8.70	8.73	8.72
Shoreline (Average)						
Sedges/Grasses (%)	25	40[a]	20	40[a]	20[a]	25
Shrubs (%)	20	20	35	20	20	35
Trees (%)	55	25	45	20	30	40
Disturbed (%)	0	80	0	80	70	0
Emergent Vegetation Zone (Average)						
Dominant Veg. Type	None	None	None	None	None	BR
Emergent Veg. Zone Width (m)	0	0	0	0	0	8
Emergent Veg Cover (%)	0	0	0	0	0	20
Submergent Vegetation Zone (Average)						
Aquatic Veg. Cover (%)	55	35	30	30	20	15
Fines (%)	15	15	15	10	10	10
Sand (%)	55	55	60	55	50	50
Sm. Gravel (%)	5	5	5	10	10	10
Lg. Gravel (%)	5	5	5	10	15	15
Cobble (%)	15	15	10	10	10	10
Boulder (%)	5	5	5	5	5	5

[a] Grasses are lawns, thus representing a shoreline disturbance.
BR- Bulrush bed

Fish and Wildlife Habitat

Five species of sport fish inhabit Pigeon Lake, including burbot (*Lota lota*), lake whitefish (*Coregonus clupeaformis*), northern pike (*Esox lucius*), yellow perch (*Perca flavescens*), and walleye (*Sander vitreus*). Sucker and forage fish species, including white sucker (*Catostomus commersonii*), spottail shiner (*Notropis hudsonius*), emerald shiner (*Notropis atherinoides*), trout perch (*Percopsis omiscomaycus*), and Iowa darter (*Etheostoma exile*), have also been documented within the lake.

Fishes in Pigeon Lake are subject to environmental and anthropogenic pressures such as habitat modification, overfishing and hypoxia due to eutrophic conditions. Northern pike and walleye populations are often used as indicators of the fisheries status within lakes due to these species' value to the recreational fishery, position atop the aquatic food web and sensitivity to stressors such as angling. The population of walleye in Pigeon Lake is currently sustainable, although this is due to intensive stocking efforts in the 1990s which brought the population back from extirpation. Populations of northern pike in

the lake are considered collapsed, likely a result of a combination of factors, including the extirpation of the species in the 1950s, loss of littoral spawning and feeding habitat, direct competition with reintroduced walleye, and overfishing. According to AEP, as of 2015, walleye populations within Pigeon Lake are at Very Low Risk while northern pike populations are considered Very High Risk due to weak recruitment and low survival.[5]

Results of the aquatic survey indicate that the majority of the Itaska Beach shoreline (81.3%) has been considerably impaired by human disturbance. Submergent vegetation cover was most abundant in reach 1 and gradually declined moving westward toward reach 6, where submergent vegetation was relatively scarce. No emergent vegetation cover was present within the study area at the time of the assessment. Results of the aquatic survey suggest that the Itaska Beach littoral zone is unlikely to provide adequate spawning, rearing or foraging habitat for Northern Pike (*Esox lucius*), which rely heavily on vegetative cover for these activities. Submergent vegetative cover may be sufficient to provide foraging habitat for smaller-bodied fishes, especially towards the eastern end of the SV. The cobble and gravel dominated nearshore substrates could potentially provide spawning habitat for walleye, which require wave-washed gravelly shoals, however the high level of human disturbance, including docks and boat-use may make these areas inadequate for walleye spawning. Areas with sand-dominated substrate are unlikely to provide adequate spawning habitat for walleye however these areas may be utilized as travel corridors between areas of more cover, as well as by certain forage fishes, such as trout-perch which feed nocturnally in open, sandy-bottomed shallows.

A cyanobacteria bloom was observed throughout the study area during the assessment. Although the precise impacts of cyanobacteria blooms on Pigeon Lake fish communities are unknown, these blooms may impact fish and fish habitat in a variety of ways. These include producing toxins, degrading water quality, suppressing the growth of aquatic vegetation, affecting the amount and quality of food available for fish by disrupting the aquatic food web structure, and depleting dissolved oxygen levels during decomposition, resulting in anoxic conditions and fish kills.

Wildlife habitat is available throughout the eastern SV natural areas but is limited along the lake edge as forest habitat is scattered amongst built-up areas. The larger intact natural riparian areas have the potential to provide foraging and nesting sites for waterfowl. Some limited sightings of waterfowl occurred along Pigeon Lake shoreline at Itaska SV including the following observations: groups of Canada geese (*Branta Canadensis*) and mallards (*Anas platyrhynchos*).

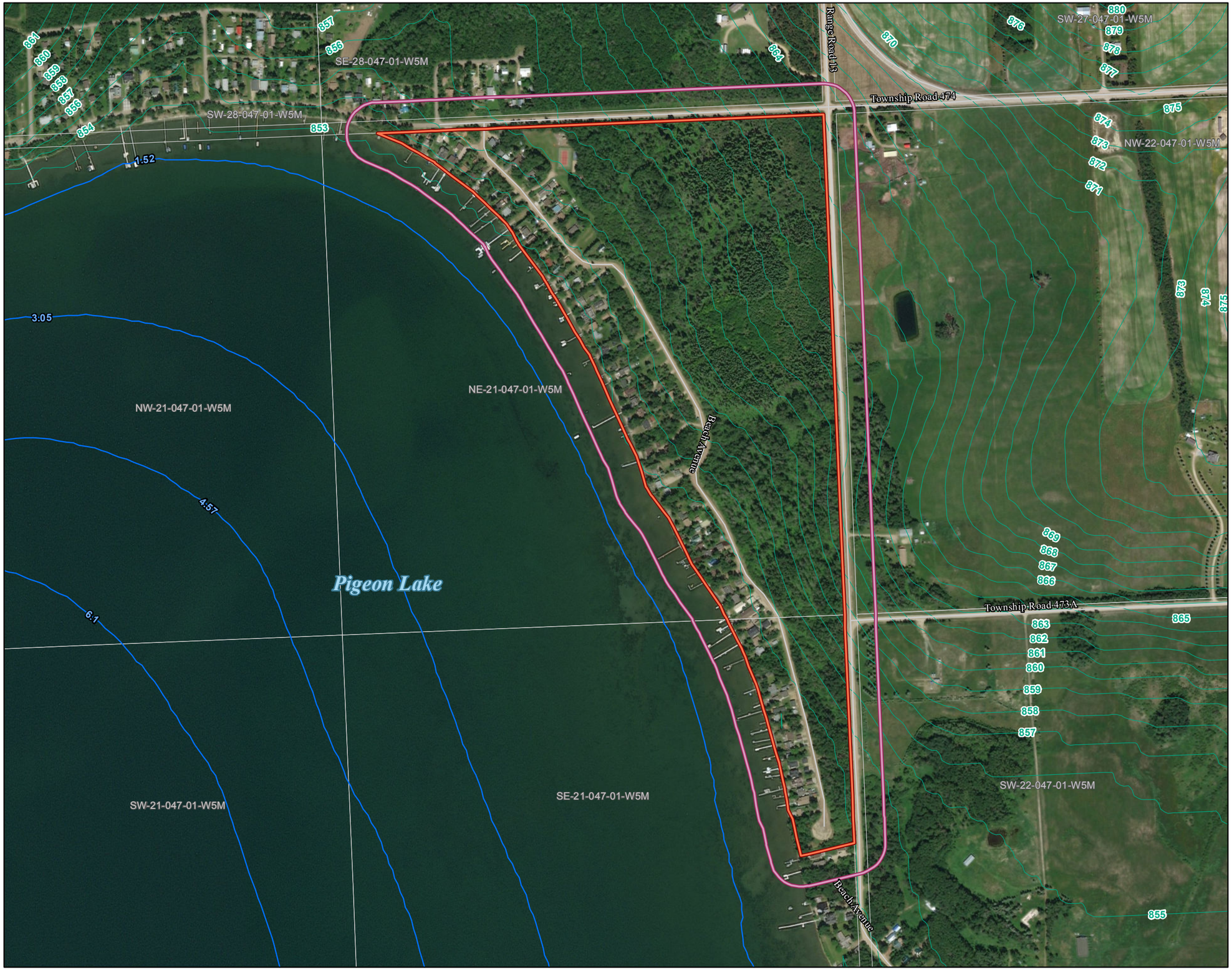
Bird observations included common local species such as the downy woodpecker (*Picoides pubescens*), blue jay (*Cyanocitta cristata*), American robin (*Turdus migratorius*), bohemian waxwings (*Bombycilla garrulous*), and black capped chickadees (*Poecile atricapillus*). All of these species, except the robin, are known to overwinter in Canada and will rest in tree cavities and large white spruce trees throughout the winter. Many bird feeders and houses were documented throughout the SV and the forested areas provide habitat for songbirds and woodpeckers. Natural areas along the northern boundary may also provide foraging opportunities for whitetail and mule deer, moose and coyotes and also smaller mammals such as porcupines, skunks, weasels and squirrels.

[5] Pigeon Lake Fisheries Management Update. Available from http://aep.alberta.ca/fish-wildlife/fisheries-management/fall-index-netting/fall-index-netting-summaries/default.aspx.

The Government of Alberta database (FWIMT) documented the bay breasted warbler (*Dendroica castanea)* in the wildlife inventory listing. The bay breasted warbler is provincially listed as Sensitive under the Alberta *Wildlife Act* and is not federally listed under the *Species at Risk Act* (SARA). None were observed during the 2018 biophysical survey but habitat is available. The bay breasted warbler prefers extensive stands of spruce trees and secondarily prefers mixed-wood stands. Potential habitat exists within the coniferous wooded swamp, which is already protected within the bird sanctuary.

Summary and Recommendations

The SV of Itaska is nestled within a surrounding forested area, offering wildlife use and viewing opportunities within the SV. Maintaining natural areas within the SV and increasing the percent cover of natural vegetation overall will attract birds and limit further nutrient loading to the lake. Hence CPPENV recommends maintaining the land cover in the bird sanctuary and limiting further land clearing within the SV as possible to protect habitat features. Protecting the natural vegetation along diversity-rich areas, such as natural forested areas, watercourses, riparian zones and natural aquatic vegetation offers an excellent opportunity to maintain and improve fish and wildlife habitat, as well as water quality in the greater Pigeon Lake. If possible, a 30 m buffer on the small permanent watercourse would be ideal to protect the significant ecological values that it offers. CPPENV also recommends replacing crossing 2 to improve fish habitat. Pigeon Lake's riparian impairment is largely a result of extensive riparian vegetation removal and shoreline modification. If the SV would like to improve riparian health adjacent to its boundary, highly impaired areas should be targeted for restoration and healthy areas should be targeted for some form of protection and conservation. Residents should be encouraged to maintain healthy shorelines with native vegetation and avoid the removal of aquatic and shoreline vegetation. Also, given the relatively high density of shoreline development in the SV, naturalization efforts to restore and maintain the integrity of the natural ecosystem, while supporting suitable recreational use, is strongly encouraged.



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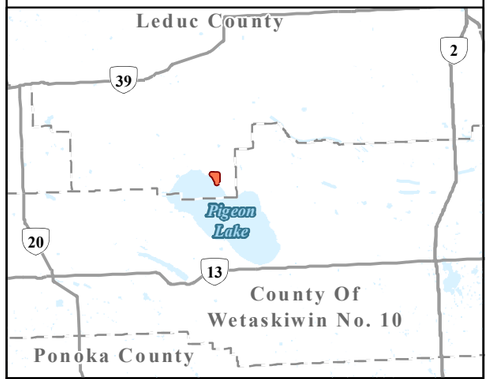
Itaska Beach (Pigeon Lake)

Figure 1: Overview

- Bathymetry
- Contour Line (1 m)
- Project Boundary
- Buffer (50 m)



Source: Contains information licensed under the Open Government Licences – Canada, Alberta, TerraColor and DigitalGlobe
Imagery acquisition date: June 20, 2016
Coordinates system: NAD 1983 UTM Zone 11N

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0 100 200 300 400 m

Date: January 31, 2019

Prepared by: R. Ok

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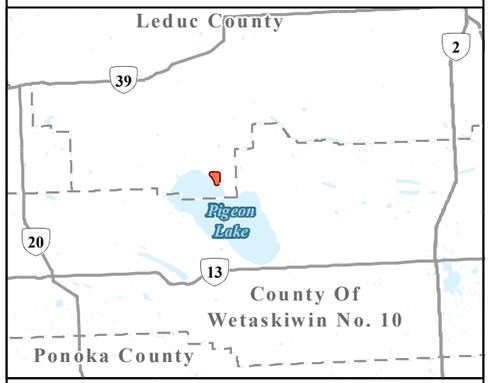
Itaska Beach (Pigeon Lake)

Figure 2: Terrestrial Assessment

- Watercourse Crossing
- Audubon Society Bird Sanctuary and Nature Reserve
- Wooded Coniferous Swamp (S-Wc-III)
- Wooded Deciduous Swamp (S-Wd-III)
- Project Boundary
- Buffer (50 m)



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Imagery acquisition date: June 20, 2016
Coordinates system: NAD 1983 UTM Zone 11N

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Date: February 27, 2019

Prepared by: R. Ok

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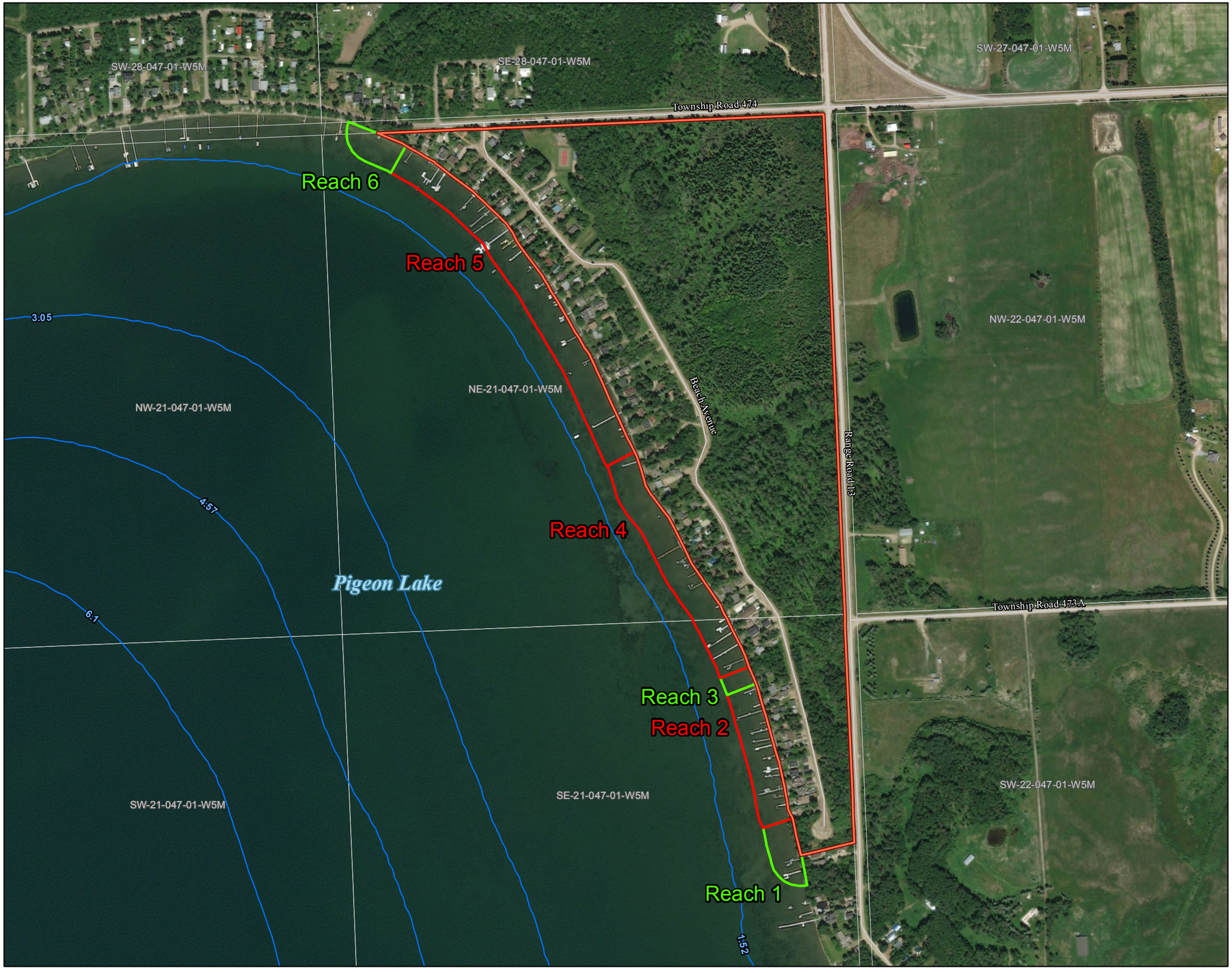

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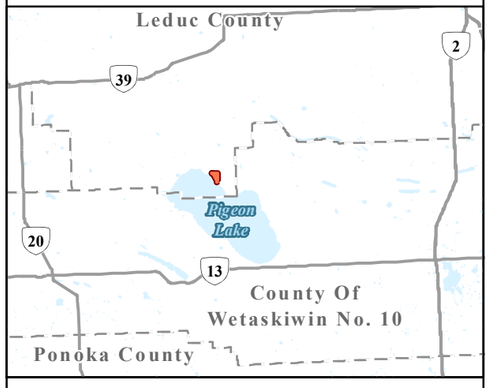
Itaska Beach (Pigeon Lake)

Figure 3: Aquatic Assessment

Bathymetry

Aquatic Assessment

- High Disturbance
- Natural / Low Disturbance
- Project Boundary



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Imagery acquisition date: June 20, 2016
Coordinates system: NAD 1983 UTM Zone 11N

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Date: February 27, 2019

Prepared by: R. Ok

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150 Chippewa Road
Sherwood Park, AB T8A 6A2

Appendix A: Alberta Conservation Information Management System (ACIMS) Rare Plant Results

Search ACIMS Data

Date: 18/7/2018
Requestor: Consultant
Reason for Request: Land Use Planning
SEC: 28 **TWP:** 047 **RGE:** 01 **MER:** 5

Alberta Parks

Non-sensitive EOs: 2 (*Data Updated:October 2017*)

M-RR-TTT-SS	EO_ID	ECODE	S_RANK	SNAME	SCOMNAME	LAST_OBS_D
5-01-047-28	17395	IILEPG9010	S2S3	Plebejus optilete	Cranberry Blue	2002-07-14
5-01-047-28	17988	PMRUP01020	S3	Ruppia cirrhosa	widgeon-grass	1982-XX-XX

Next Steps: See FAQ

Sensitive EOs: 0 (*Data Updated:October 2017*)

M-RR-TTT	EO_ID	ECODE	S_RANK	SNAME	SCOMNAME	LAST_OBS_D

No Sensitive EOs Found: Next Steps - See FAQ

Protected Areas: 0 (*Data Updated:October 2017*)

M-RR-TTT-SS	PROTECTED AREA NAME	TYPE	IUCN

No Protected Areas Found

Crown Reservations/Notations: 0 (*Data Updated:October 2017*)

M-RR-TTT-SS	NAME	TYPE

M-RR-TTT-SS	NAME	TYPE
No Crown Reservations/Notations Found		

.

Appendix B: Fish and Wildlife Internet Mapping Tool (FWIMT) Results

Alberta Environment and Parks

Fish and Wildlife Internet Mapping Tool (FWIMT)

(source database: Fish and Wildlife Management Information System (FWMIS))

Species Summary Report

Report Created: 10-Aug-2018 11:33

Species present within the current extent :

Fish Inventory	Wildlife Inventory	Stocked Inventory
BURBOT	BAY-BREASTED WARBLER	No Species Found in Search Extent
EMERALD SHINER		
IOWA DARTER		
LAKE WHITEFISH		
NORTHERN PIKE		
SPOTTAIL SHINER		
WALLEYE		
WHITE SUCKER		
YELLOW PERCH		

Buffer Extent

Centroid (X,Y):	Projection	Centroid: (Qtr Sec Twp Rng Mer)	Radius or Dimensions
561737, 5878300	10-TM AEP Forest	NE 21 47 1 5	3 kilometers

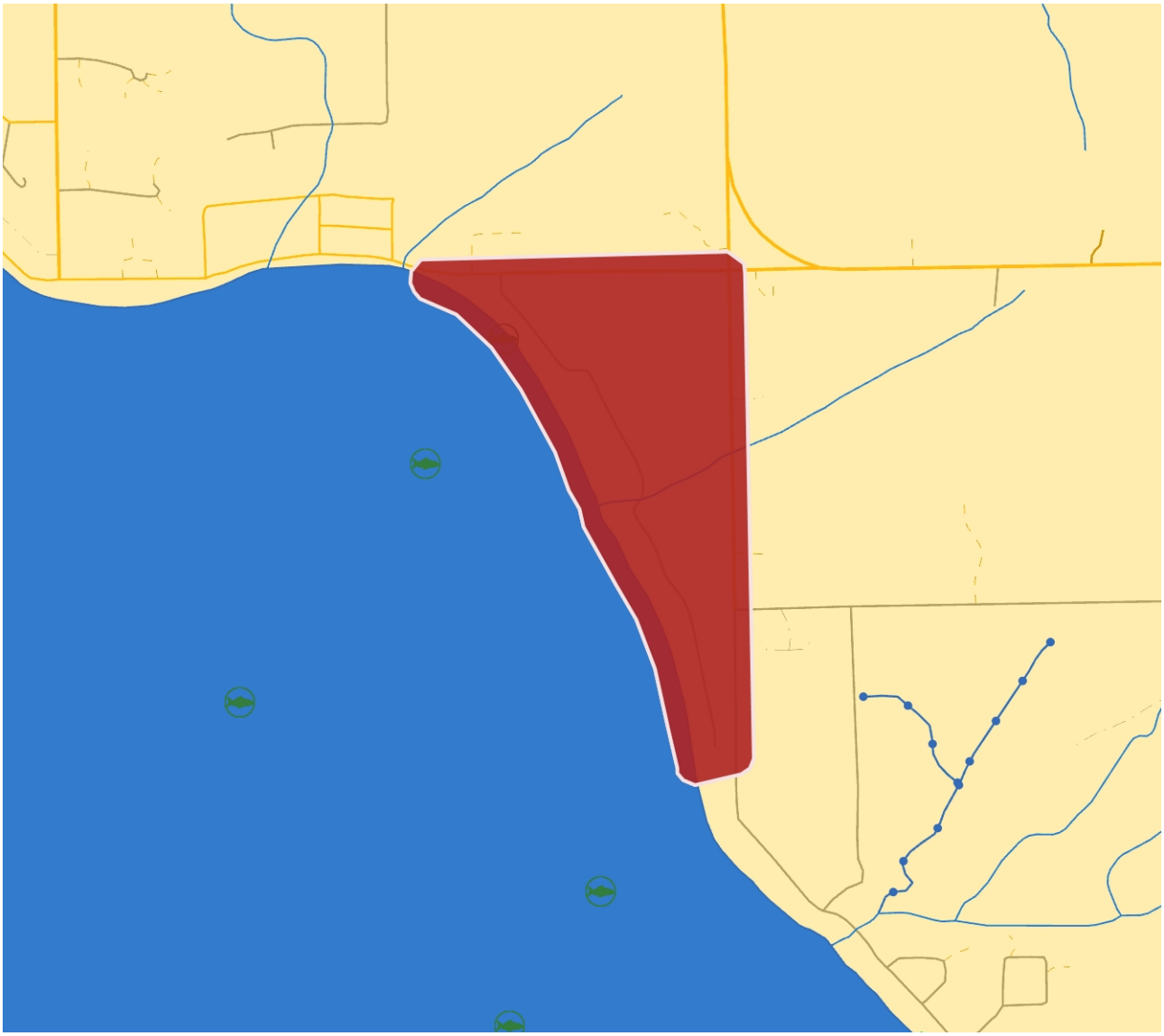
Contact Information

For contact information, please visit:

http://aep.alberta.ca/about-us/contact-us/fisheries-wildlife-management-area-contacts.aspx

10-Aug-2018 11:33

Map Results



Appendix C: Historical Resources Report

Online Permitting and Clearance
Welcome Mrs. Leslie A McCormack

Contact Us/Instructions

Main Menu My Profile Log Off

Search the Listing of Historic Resources

Define Search Area(s)

Enter the legal description(s) you wish to search. Multiple Sections or LSDs must be separated by hyphens or commas.

MER	RGE	TWP	Section(s)	LSD List
5	1	47	21	1,2,9,10,15,16
5	1	47	22	3-6, 11-14
5	1	47	27	3-6
5	1	47	28	1,2,7,8

Rows 1

Records found in search area

No records found.

Release 2.1.22, Screen ID: 65868

Appendix D: Riparian Health Assessment from the 2008 Watershed Assessment

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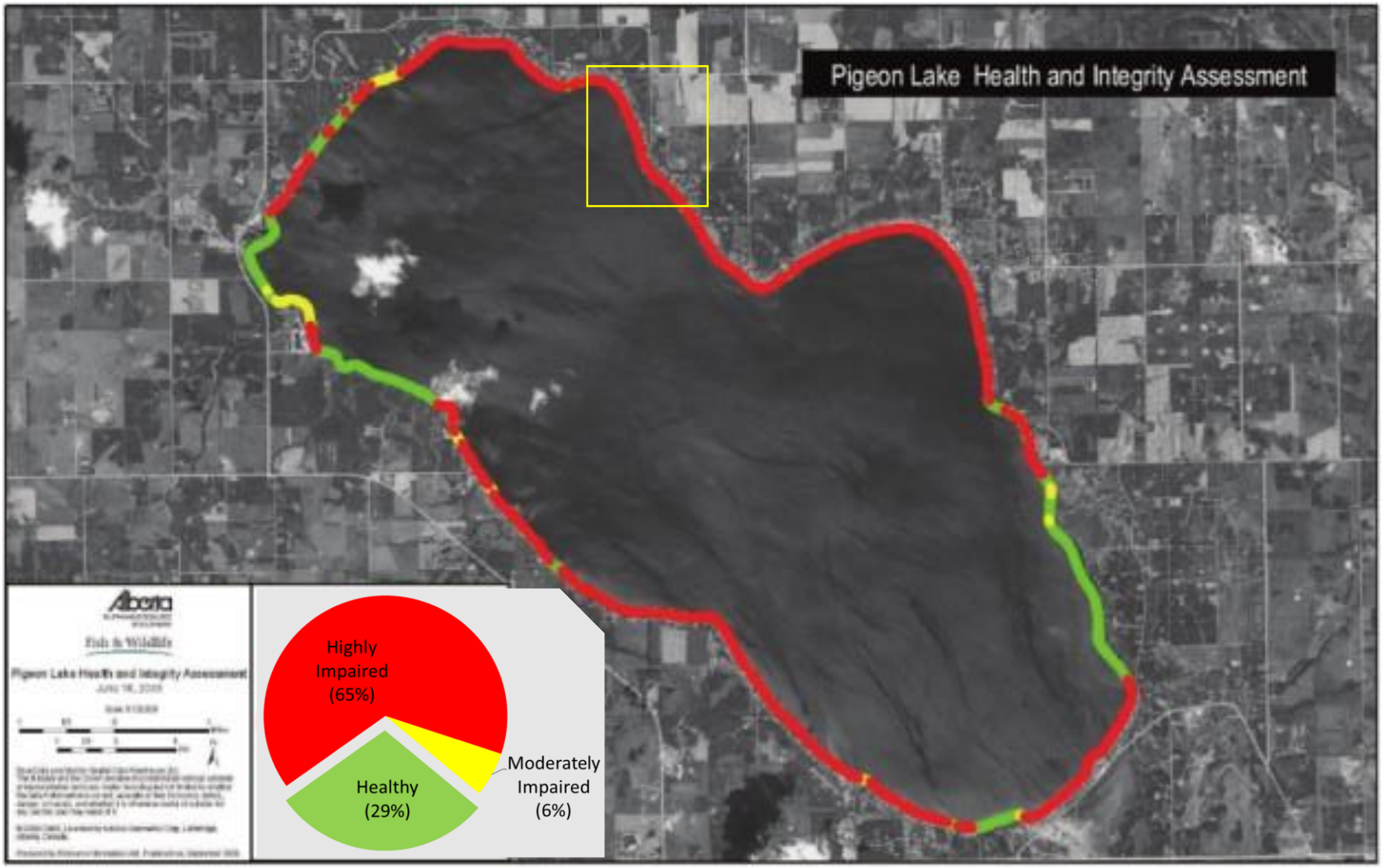

Itaska SV (yellow box) shoreline integrity assessment results from the June 2008 survey, indicating the extent of lakeshore degradation (SRD 2008).

Appendix E: Photographs

Terrestrial Assessment

Photo 1: Deciduous wooded swamp and bird sanctuary.

Photo 2: Tree canopy of deciduous wooded swamp.

Photo 3: Numerous nesting cavities are available throughout the deciduous wooded swamp.

Photo 4: View of the coniferous wooded swamp from RR 13 facing N, showing the transition zone from the deciduous wooded swamp.

Photo 5: Ground stratum of the coniferous deciduous swamp.

Photo 6: Tree stratum of the coniferous wooded swamp.

Photo 7: Crossing 1 overview; taken on March 20, 2019.

Photo 8: Crossing 1 upstream conditions.

Photo 9: Crossing 2 downstream view.

Photo 10: Crossing 2 upstream conditions.

Photo 11: Crossing 2 culvert outlets showing gap that blocks fish passage.

Photo 12: Crossing 2 downstream view.

Photo 13: Beach Drive view facing east.

Photo 14: View of the entrance trail to the bird sanctuary trail.

Aquatic Assessment

Photo 1: Intact riparian vegetation within Reach 1.

Photo 2: Submergent vegetation and substrate within Reach 1.

Photo 3: Shoreline disturbance including buildings, lawns, rock placement and vegetation clearing within Reach 2.

Photo 4: Intact riparian vegetation within Reach 3.

Photo 5: Shoreline disturbance including buildings, rock placement, lawns, and vegetation clearing within Reach 4.

Photo 6: Shoreline disturbance including buildings, rock placement, lawns, and vegetation clearing within Reach 5.

Photo 7: Cobble and gravel dominated near-shore substrate within Reach 5.

Photo 8: Sand dominated sediment away from shore within Reach 5.

Photo 9: Cyanobacteria bloom observed within Reach 5.

Photo 10: Intact riparian vegetation within Reach 6.