



MUNICIPAL PLANNING SERVICES

Biophysical Assessment: Summer SV of Bondiss

Prepared for: Municipal Planning Services

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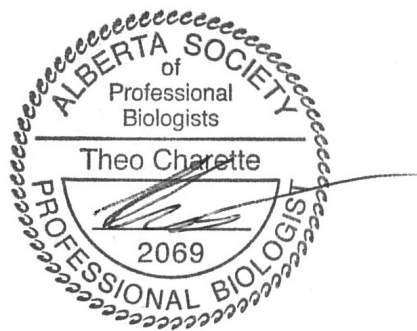


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To the best of my knowledge and the best of my professional ability, recognizing the standard of care expected of a reasonable professional doing this work, it is my professional opinion that all the information contained in this Professional Report is accurate and complete, and contains all the relevant information for the purposes of this project or application.

This Professional Report, including all attachments, data, and supplemental information, were prepared by me or under my direct supervision and has been reviewed and accepted by me.

All the information submitted is, to the best of my knowledge, true, accurate, and complete.

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1. Introduction

The Summer SV (SV) of Bondiss, is located on the southeast shore of Skeleton Lake; and 6.5 km northeast of the Town of Boyle, Alberta within Athabasca County. The SV borders less than 5% of the shoreline of Skeleton Lake. The lake served as a source of drinking water to the SV of Boyle until 2007, but now it is serviced by the Athabasca River. Since 2007, water levels have decreased and separated the northern and southern portions of the lake until 2022, when the north and south basins of the lake have reconnected. The watershed for Skeleton Lake is relatively small; it is only four times larger than the area of the lake itself with several defined inlets to the lake. The outlet from Skeleton Lake eventually connects to Amisk Lake, east of Skeleton Lake. Cricket Lake to the south of Skeleton Lake is also hydrologically connected.

The water level in Skeleton Lake has risen by 1 meter (m) by 2020, despite a large decline between the late 1990's and 2020. Skeleton Lake is experiencing a decreasing trend in total phosphorus levels whilst receiving an increase trend in total suspended solids. The average euphotic depth (maximum depth that light can penetrate the water for photosynthesis) during the summer months of 2020 was 3.03 meters (ALMS 2021), which is quite clear. Skeleton lake is prone to toxic blue-green algae blooms, which can cause the euphotic depth to decrease. Dissolved oxygen levels remained above the CCME guideline of 6.5 mg/L in August and September of 2020, however due to natural algal blooms these levels had dropped below the threshold. Most of the SV is developed with private residences, parks and a large golf course.

CPP Environmental (CPP) completed a terrestrial and aquatic survey in the SV of Bondiss and in adjacent aquatic areas on July 13, 2022 (**Appendices 2, 3**). The survey included documentation of fish and wildlife, wildlife habitat, wetland and ecosite classification, and riparian health. Where available, information provided by external sources was incorporated into the report. A summary of terrestrial, riparian, and aquatic characteristics is described below. Site photographs are presented in **Appendix 4**.

2. Background

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

- The Alberta Conservation Information Management System (ACIMS) was accessed to document rare plants within the project boundaries. No sensitive species or non-sensitive species were documented (**Appendix 5**).
- The Fish and Wildlife Internet Mapping Tool (FWIMT) was accessed to document previously recorded fish and wildlife observations (**Appendix 6**).
- A Landscape Analysis Tool (LAT) report was generated to document land features such as sensitive wildlife features, historical resources, and land management conditions (**Appendix 7**). The LAT report shows no potential of historic resources in the SV.

3. Aquatic Habitats

The aquatic survey was completed by kayak within 50 m of Skeleton Lake's 3.63 km shoreline within the SV of Bondiss boundaries on July 13, 2022. Field measurements included percent cover of different substrate and vegetation types along reaches defined in the field (**Table 1**). Sixteen individual reaches were defined while travelling parallel to the shoreline and further divided into low, medium and highly disturbed areas. Each reach began and ended based on the extent of disturbance within the reach. Highly disturbed reaches consisted of manicured vegetation that parallels the shoreline; docks or launches; shoreline armoring such as riprap or retaining walls; imported sand and lack of aquatic vegetation. Medium disturbed areas may have the

same features as mentioned in the high disturbance areas but contained more thriving terrestrial and aquatic vegetation. Low disturbance areas consisted of no to minimal human features and extensive vegetation in the water and on the shoreline. When a notable change in substrate, vegetation type or features 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, and pH.

Despite differences in the degree of disturbance and vegetative cover, water quality parameters were relatively similar at all reaches and were at levels suitable to support aquatic life. Submergent vegetation was visible in clear waters and consisted primarily of Arum-leaved arrowhead (*Sagittaria cuneata*); Richardson's pondweed (*Potamogeton perfoliatus* var. *richardsonii*), pondweed species (*Stuckenia* spp.), coontail (*Ceratophyllum demersum*) and northern milfoil (*Myriophyllum sibiricum*). The substrate was dominated by sandy materials (in areas with minimal submergent vegetation cover), with some large and small gravel, and occasional cobble observed along the boat launch and in area with more wave action. **Table 1** summarizes the data collected from the field.

Table 1: Aquatic habitat characteristics in each reach.

Characteristics	Reach Number															
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16
Total Reach Length (m)	342.3	227.5	86.7	190.3	26.3	11.8	64.4	19.7	213.7	611.6	542.7	184.3	63.3	176.3	164.7	713.1
Shoreline Disturbance	High	Moderate	High	Moderate	High	Low	High	Low	High	Moderate	Low	High	Moderate	High	Low	Moderate
Water Quality (30 cm below surface)																
Temperature (°C)	21.56	22.19	20.49	20.46	18.91	19.00	18.88	18.85	18.63	18.76	18.35	19.94	19.06	19.17	18.53	18.10
Conductivity (µS/cm)	380.21	353.76	379.14	379.83	369.38	346.23	366.89	355.20	331.52	346.91	342.06	363.40	341.54	355.98	337.93	331.49
Dissolved Oxygen (mg/L)	10.06	8.61	10.71	10.72	8.19	8.78	8.30	8.52	8.62	8.73	9.18	10.26	9.17	8.95	9.13	9.11
pH	-*	-*	-*	-*	8.99	8.99	8.99	8.99	8.98	9.02	7.57	8.32	9.14	8.17	8.15	-*
Riparian Zone (Average)																
Sedges/Grasses (%)	10	40	5	10	10	5	10	30	5	15	80	5	10	5	100	20
Shrubs (%)	5	5	0	10	20	0	0	0	0	5	10	5	5	0	5	5
Trees (%)	5	0	0	5	20	0	0	0	0	5	10	0	0	0	0	0
Disturbed (%)	50	25	50	25	50	5	100	5	50	25	5	50	25	50	5	25
Manicured Lawns (#)	3	0	3	1	0	0	4	0	11	2	0	6	2	5	0	~6
Boat Launches/Docks (#)	many	many	4	4	2	0	4	0	11	many	2	6	1	10	0	Many
Riparian Zone Length (m)	20	2-30	0	0-30	0	1	0-4	0-10	0	2-15	15-40	2-4	1-10	0	30	0-15
Emergent Plant Zone (Average)																
Dominant Veg. Type	bulrushes	bulrushes	N/A	bulrushes	N/A	bulrushes	bulrushes	bulrushes	bulrushes	N/A	N/A	bulrushes	bulrushes	bulrushes	N/A	N/A
Emergent Veg. Zone Width (m)	-	10-20	-	5-10	0	10	0.5-3	15	0.5-1	2-15	15-40	2-5	10	1	30	10-20
Emergent Veg Cover (%)	10	30	0	10	0	5	10	40	<5	15	50	10	10	5	75	50
Submergent Plant Zone (Average)																
Water depth (m)	>2	>2	>2	>2	>2	1.9	>2	>2	>2	>2	0-15	0.1-5	>2	0-1.5	0-1.5	>2
Aquatic Veg. Cover (%)	20	UN	UN	20	20	50	10	10	20	60	100	95	90	90	75	40
Distance from shore (m)	20	UN	UN	5-UN	2	2	7	4	10	5	In bay	1	1	2	2	2-20
Overhead Cover																
Woody Debris (%)	Floating, 10	0	0	25	1	<5	0	0	0	10	5	0	0	0	0	0
Overhanging Vegetation (%)	5	5	0	5	0	<5	0	10	0	15	20	5	5	1	20	5
Substrate Characteristics																
Fines (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0
Sand (%)	50	50	50	90	75	90	90	9	90	90	90	90	90	90	60	90
Sm. Gravel (%)	10	10	10	0	15	5	5	5	5	5	5	5	5	5	10	5
Lg. Gravel (%)	20	20	20	10	10	5	5	5	5	5	5	5	5	5	10	5
Cobble (%)	20	20	20	0	0	0	0	0	0	0	0	0	0	0	15	0
Boulder (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

*Reading not taken due to technical issues. No value available.

N/A Not Applicable, UN Unknown

3.1. Reaches 1, 3, 5, 7, 9, 12, and 14

Reaches 1, 3, 5, 7, 9, 12, and 14 accounted for 30.0% of the lakeshore. They were **highly disturbed** with extensive shoreline disturbance in the form of recreational development, including boat launch, man-made beaches, boat storage along the shoreline, and shoreline vegetation removal/disturbance. Emergent vegetation was minimally to not present. The submergent vegetation was found within 1 m to approximately 5 m from the shoreline. Beyond 5 m, the submergent vegetation was not visible. The land adjacent to these reaches consisted of private residences with docks, boat lifts, and direct access to water with cleared upland and shoreline riparian vegetation, some residences with shoreline protection (rock and retaining walls), one public boat launch and dock, and two small parks with grassy open areas towards the shoreline. Aquatic vegetation is plentiful within Skeleton Lake, however lack of abundant submergent vegetation was documented at and around private docks and boat lifts. This is likely due to boat traffic coming in and out from the private docks. The public boat launch was active and multiple boats were within the SV of Bondiss Bay area at the time of assessment. Water depth along this reach was shallow but got progressively deeper. Aquatic species, such as invertebrates, and small forage fish could utilize the shallow depths and submergent vegetation for cover. A school of yellow perch young-of-the-year (YOY) (*Perca flavescens*) was seen within the area of no submergent vegetation in less than 60 cm of water at the boat launch.

3.2. Reaches 6, 8, 11, and 15

Reaches 6, 8, 11, and 15 had natural to **low disturbance** and accounted for 20.3% of the lakeshore. The natural littoral zones were characterized by relatively undisturbed shorelines with abundant emergent and submergent vegetative cover. Low disturbance was characterized by the number of disruptions in the natural connectivity of the shoreline through lake access points from private residences or trails. The emergent vegetation was apparent and abundant on either side of the limited number of docks. Natural areas provide nesting and foraging opportunities for waterfowl and provide accessible areas for larger mammals. While conducting the aquatic survey within Reach 11, a female common loon (*Gavia immer*) and her fledgling, as well as two Red-necked grebe (*Podiceps grisegena*) adults and two fledglings were encountered. The emergent and submergent vegetation was likely utilized as habitat for cover and feeding for both species of waterfowl. The abundance of aquatic vegetation has potential to support habitat for a variety of life stages for species of fish.

Reach 11 is the most east section of the lake and where the Skeleton Lake outflow is. The water level drops to about 1.5 m with heavy abundance of submerged vegetation. The submergent vegetation dominated while emergent vegetation was present along the shoreline and within the outflow area. Reach 8 was a singular property that had been under development and has had limited to no access to the shoreline, thus allowing for emergent vegetation to remain undisturbed as a dock and boat lift was not present. Reach 6 is a very small section of riparian area immediately adjacent to the public dock and the next private residence. This area is likely left undisturbed as there is access to water available. Reach 15 is along a bend that protrudes out into the lake with one private residence facing north and the other facing south, of which leaves the west section undisturbed. There is a large, intact section of emergent vegetation with intersperse submergent vegetation. This habitat could be utilized by small forage fish for feeding and cover and for large-bodied fish for feeding, spawning, and rearing.

3.3. Reaches 2, 4, 10, 13, and 16

Reaches 2, 4, 10, 13, and 16 accounted for 49.6% of the shoreline. They were categorized as **moderately disturbed**, meaning that aquatic vegetation is not continuous, emergent vegetation is degraded or less in abundance, submergent vegetation cover is minimal along shoreline, and direct access to lake shore is apparent and used frequently resulting in low recovery for aquatic vegetation. Aquatic vegetation was separated by numerous docks and boat lifts. The area around each dock and boat lift had minimal to no

aquatic vegetation, but between properties and in-water structures, aquatic vegetation was intact. Boat docks extended approximately 15-30 meters from the shoreline for majority of properties.

4. Wetlands

Wetlands are highly diverse, productive ecosystems that provide a variety of ecological services, such as protecting water quality, providing water storage and infiltration, habitat for wildlife, fish and plants and sustaining biodiversity. Wetlands play an important role in sustaining healthy watersheds and are defined as: "Land saturated with water long enough to promote wetland or aquatic processes as indicated by poorly drained soils, hydrophytic (water loving) vegetation, and various kinds of biological activity that are adapted to a wet environment." in the *Alberta Wetland Classification System (AWCS; ESRD 2015)*.

Wetlands were classified in accordance with the AWCS and included a desktop delineation of wetland boundaries and field verification within project boundaries. One wetland, a wooded deciduous swamp (S-Wd) was identified within the SV (**Appendix 3**). Wooded deciduous swamps contain >25% tree cover, of which 75% or more is comprised of deciduous species. According to satellite imagery, this wetland is natural in origin, having been impacted by the development of roads (Bondiss Drive) and surrounding residential lots. Natural wetlands are protected under the *Water Act*. A description of the vegetation community at the wetland area within the SV is presented in **Table 2**.

Table 2: Vegetation communities of wetlands within the Summer SV of Bondiss.

Wetland Classification	Description	Dominant Species
Wooded Deciduous Swamp (S-Wd)	Canopies with at least 25% tree cover, of which 75% or more is comprised of deciduous species.	<ul style="list-style-type: none"> • Willows (<i>Salix</i> spp.) • Trembling aspen (<i>Populus tremuloides</i>) • Sedges (<i>Carex</i> spp.) • Reed canary grass (<i>Phalaris arundinacea</i>)

5. Riparian Areas

Riparian areas are the transitional ecological zones bordering rivers, lakes, and wetlands. 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, reducing 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. Thus, a healthy riparian area corresponds with a healthy lake or river.

Generally, the riparian area around the summer SV of Bondiss is in moderate to poor condition. The riparian vegetation included emergent vegetation (e.g., bulrushes) closest to the water's edge and deciduous tree/shrub swamp species (e.g., spruce, aspen, and willows) further inland in areas of low disturbance. **Table 3** lists the typical species comprising the riparian area within the summer SV.

Table 3: Vegetation species observed in the riparian areas within the summer SV of Bondiss.

Tree Stratum	Shrub Stratum	Ground Stratum
<ul style="list-style-type: none"> Paper birch (<i>Betula papyrifera</i>) Balsam poplar (<i>Populus balsamifera</i>) Trembling aspen (<i>Populus tremuloides</i>) 	<ul style="list-style-type: none"> Willows (<i>Salix</i> spp.) Bracted honeysuckle (<i>Lonicera involucrata</i>) Red osier dogwood (<i>Cornus stolonifera</i>) River alder (<i>Alnus tenuifolia</i>) Prickly rose (<i>Rosa acicularis</i>) 	<ul style="list-style-type: none"> Marsh reed grass (<i>Calamagrostis canadensis</i>) Reed canary grass (<i>Phalaris arundinacea</i>) Asters (<i>Aster</i> spp.) Common horsetail (<i>Equisetum arvense</i>)

6. Fish and Wildlife Habitat

6.1. Fish

AEP's FWIMT database provides an inventory of the fish species within Skeleton Lake, based on professional fish surveys. At least ten fish species are known to have inhabited Skeleton Lake, with the last professional survey having been conducted in 2020. Small forage fish species include lake chub (*Couesius plumbeus*), iowa darter (*Etheostoma exile*), spottail shiner (*Notropis hudsonius*), white sucker (*Catostomus commersonii*), tullibee (Cisco) (*Coregonus artedii*), yellow perch (*Perca flavescens*), lake whitefish (*Coregonus clupeaformis*), burbot (*Lota lota*), northern pike (*Esox lucius*) and walleye (*Sander vitreus*). Skeleton Lake is managed as a sport and domestic fishery. Commercial fisheries are not supported. The lake used to be stocked with walleye in the late 1980's to early 1990's. Lake chub, iowa darter, spottail shiner, white sucker, tullibee, yellow perch, lake whitefish, burbot and northern pike are the sole indigenous species.

A Fall Index Netting (FIN) monitoring conducted by Alberta environment and Parks (AEP) concluded the walleye population in Skeleton Lake has declined below sustainable levels due to the low numbers of the species making it through the recruitment phase during their lifecycle (Government of Alberta [GoA], 2020). The lack of harvesting restrictions on walleye at Skeleton Lake inhibits population growth which contributes to low sustainability of this species within the lake. Yellow perch populations within Skeleton Lake are below sustainable levels due to overfishing and winterkill (GoA, 2020). Small forage species are increasing as a result of predator populations declining.

When populations decline in the lake, there is opportunity for natural replenishment. An outlet from Skeleton Lake may provide passage to Amisk Lake, which contain similar species of fish as Skeleton Lake. The hydrological connectivity for fish species allows them to access suitable spawning habitat, and to escape undesirable conditions (e.g., low oxygen in winter). Abundant emergent and submergent vegetation, with deep pools, minimal turbidity, and oxygenated waters provide suitable in-lake habitat for a variety of fish species. From a fish population and fish habitat perspective, Skeleton Lake is a productive system. However, regulating recreational and domestic fishery activities at the lake will be crucial to long-term sustainability

Results of the aquatic survey indicate that 30% of the SV's shoreline has high human disturbance, 50% of the shoreline has medium human disturbance, and 20% has low human disturbance. Submergent and emergent vegetation is an important factor in healthy fish habitat. It provides important spawning, nursery, rearing and foraging habitat for species like yellow perch as well as a variety of forage fish. Submergent vegetation was high across Reaches 10, 11, 12 and 13, accounting for at least 60% coverage of each reach. Reach 15 has 75% submergent coverage while reach 6 has 50% coverage. Reach 14 contains a minimal of 90% submergent aquatic vegetation. Emergent Vegetation was abundant in reaches 8, 11 and 14 made up of mostly bulrush species. The abundant vegetation present in Reaches 11 and 15 provide highly valuable fish habitat. Emergent vegetation was absent from Reaches 3 and 5 which demonstrated higher levels of human disturbance and minimal aquatic vegetation and are less likely to provide adequate fish habitat especially for yellow perch which relies heavily on vegetative cover for spawning, rearing, and foraging.

6.2. Wildlife

Wildlife habitat is available throughout the SV, within the riparian area surrounding the lake, several wetlands, and the forested areas north, west, and south of the lake. The mature forest provided a variety of habitats, including standing snags, which provide cover, nesting opportunities, and foraging for insects. The riparian areas have the potential to provide foraging and nesting sites for waterfowl, while the forested areas could provide shelter and corridors for mammals and birds. During CPP's site visit, deer tracks were seen in various areas throughout the SV. Numerous bird species were also observed during CPP's site visit, as presented in **Table 4**. Birds were active in all visited areas of the SV, though conditions were not favorable for photography.

Table 4: Bird species observed within the SV of Bondiss and Skeleton Lake, July 13, 2022.

Common Name	Latin Name	Observation Type
American Crow	<i>Corvus brachyrhynchos</i>	Flying overhead near playground by Birch Crescent
American white pelican	<i>Pelecanus erythrorhynchos</i>	Congregating on Skeleton Lake
Blue jay	<i>Cyanocitta cristata</i>	Heard in forested area north of Oldtimers Drive
Boreal chickadee	<i>Poecile hudsonicus</i>	Seen in trees and shrubs in several areas around SV
Common loon	<i>Gavia immer</i>	Adult and two young on Skeleton Lake
Downy woodpecker	<i>Picoides pubescens</i>	Feeding on snag in forested area south of Oldtimers Drive
House wren	<i>Troglodytes aedon</i>	Heard by playground near Birch Crescent
Philadelphia vireo	<i>Vireo philadelphicus</i>	Heard in forested area north of Oldtimers Drive
Red-necked grebe	<i>Podiceps grisegena</i>	Two adults congregating on water, with two young
Red-winged blackbird	<i>Agelaius phoeniceus</i>	Heard by playground near Birch Crescent
Red-eye vireo	<i>Vireo olivaceus</i>	Heard in forested area north of Oldtimers Drive
White throated sparrow	<i>Zonotrichia albicollis</i>	Heard in forested area north of Oldtimers Drive

One of the observed species are listed as Sensitive under the Alberta *Wildlife Act*, the American white pelican. Many bird feeders and houses were documented throughout the SV and the forested areas provide habitat for songbirds and woodpeckers. Natural areas throughout the SV may also provide foraging opportunities for whitetail and mule deer, moose and coyotes and smaller mammals such as porcupines, skunks, weasels, hares, and squirrels.

7. Terrestrial Habitats

Terrestrial habitats include forested areas, shrublands and natural grasslands. The SV of Bondiss is located within the Boreal Forest Natural Region and the Dry Mixedwood sub-region of Alberta. Ecosite classification occurred within the SV boundary for terrestrial areas noted as being of interest during the desktop assessment. Ecosites were identified in accordance with the *Field Guide to Ecosites of Northern Alberta*, based on vegetation and site characteristics (Beckingham and Archibald 1996). **Table 5** presents a list of the vegetation species within the tree, shrub, and ground strata of the terrestrial ecosites visited within the SV.

Table 5: Select terrestrial plant communities within the SV of Bondiss

Ecosite	Tree Stratum	Shrub Stratum	Ground Stratum
BM-d1.3	<ul style="list-style-type: none"> Trembling Aspen (<i>Populus tremuloides</i>) 	<ul style="list-style-type: none"> Prickly rose (<i>Rosa acicularis</i>) Canada buffaloberry (<i>Shepherdia canadensis</i>) 	<ul style="list-style-type: none"> Grasses (<i>Poaceae</i>)
BM-d2.2	<ul style="list-style-type: none"> White Spruce (<i>Picea glauca</i>) 	<ul style="list-style-type: none"> Prickly rose (<i>Rosa acicularis</i>) Low-bush Cranberry (<i>Viburnum edule</i>) 	<ul style="list-style-type: none"> Grasses (<i>Poaceae</i>) Twin-flower (<i>Linnaea borealis</i>) Wild sasparilla (<i>Aralia nudicaulis</i>)
BM-f3.1	<ul style="list-style-type: none"> White Spruce (<i>Picea glauca</i>) 	<ul style="list-style-type: none"> Prickly rose (<i>Rosa acicularis</i>) Low-bush Cranberry (<i>Viburnum edule</i>) 	<ul style="list-style-type: none"> Bishops cap (<i>Mitella Nuda</i>) Common horsetail (<i>Equisetum arvense</i>) Stair-step moss (<i>Hylocomium splendens</i>)

Within the SV, there are some terrestrial areas that are well-established but separated and not continuous (**Appendix 3**), with three areas standing out as having particularly valuable habitat. All three listed ecosites (**Table 5**) provide different habitats for ungulates, small and large mammals, and bird at a variety of life stages. The largest section of intact forest is in the southeast corner of the SV.

Land development in the SV is extensive and ongoing, and natural habitats are becoming increasingly lost and degraded. Consequently, terrestrial habitats should be protected from development, if possible, to retain their ecological value and to maintain ecological connections among the patches of relatively intact areas, which as a whole provide the habitat requirements for many of the species found near the lake.

During the biophysical assessment, two species noxious weeds were identified within the boundary of the SV: white cockle and ox-eye daisy. Noxious weeds are too widespread to be eradicated; thus, ongoing management is key.

CPP did not assess the golf course located on the north end of the SV.

8. Summary and Recommendations

Skeleton Lake can be considered a fragile ecosystem. It has a very long residence time (over 100 years), meaning that the water in the lake is replaced or replenished at a crawl's pace. Thus, any pollutants that enter the lake (e.g., herbicides, fertilizers, sediment, sewage) are not readily flushed out of the system and remain in the lake for a long time. Due to the hydrological isolation of the lake, water-bound animals are "stuck" within the lake when conditions turn bad (e.g., winterkill events). This highlights the tremendous importance of protecting the lake and its watershed. Watershed protection can best be accomplished through the conservation of wetlands, riparian areas, and in-lake vegetated areas, and by reducing hard surfaces (roads and sidewalks), maintaining natural areas in uplands, minimizing mowed areas (especially near riparian and wetland areas), and nutrient-reducing strategies like inspecting septic systems and minimizing fertilizer usage. Continuing to educate the community and public on the importance of watershed protection will be essential to maintaining a healthy ecosystem for generations to come.

The SV of Bondiss is surrounded by forested area, offering a variety of wildlife viewing opportunities. Environmental management has been a topic in lakeshore development and watershed management over the years. There has been an interest in preserving shorelines through educational outreach to property owners. Maintaining and increasing the overall cover of natural vegetation in private lots will maintain and attract birds and wildlife within the SV. The following recommendations are offered for discussion:

- Minimize mowing to water's edge along Skeleton Lake outflow and wetland along Bondiss Drive. This will promote vegetation re-establishment.
- Educational outreach to landowners regarding the importance of riparian health.
- Consider bylaw/law education/enforcement programs.
- Where possible, keep a non-disturbance buffer (ideally 20 m but could be less depending on circumstance) around all riparian areas, wetlands, and mature tree stands to protect the ecological values that these areas offer. Since riparian areas, wetlands, and mature forested areas often offer excellent wildlife viewing opportunities, it is possible to provide low-impact access to these areas (e.g., off-ground boardwalks and platforms, and narrow trails) as a way to increase the social value of these areas and increase the overall quality of life in the SV.
- Reducing the extent of nearshore disturbances could increase potential for spawning and foraging habitat for small-bodied fish, which prefer vegetated areas. Generally, if the SV would like to improve fish and wildlife habitat, riparian, aquatic, and forested habitats that are impaired should be targeted for restoration and healthy areas should be targeted for protection and conservation. Additionally, strategies to reduce nutrient, sediment and contaminant inputs into the lake should be implemented, and the SV should promote low-impact development as the community continues to grow. Perhaps engage with an outreach organization, such as the Alberta Conservation Association to assist with education, outreach, and potential shoreline restoration opportunities. This has been a successful approach in the Lac La Biche watershed.

9. References

- Alberta Environment and Sustainable Resource Development (ESRD). 2015. Alberta Wetland Classification System. Water Policy Branch, Alberta Environment and Parks. Edmonton, AB.
- Alberta Lake Management Society (ALMS). 2021. LakeWatch: Skeleton Lake Report 2021. Updated May 6, 2022.
- Beckingham, J. D., and Archibald, J. H. 1996. Field Guide to Ecosites of Northern Alberta. UBC Press, Vancouver, BC.
- Government of Alberta (GoA). 2020. Skeleton Lake FIN Summary 2020. Available from: <https://open.alberta.ca/dataset/9387a09f-ded2-44e1-9123-2a4e2e72a10e/resource/a1c5af4e-6b3f-4b0d-ad14-6aa03ccdb4ee/download/aep-skeleton-lake-fin-summary-2020.pdf>

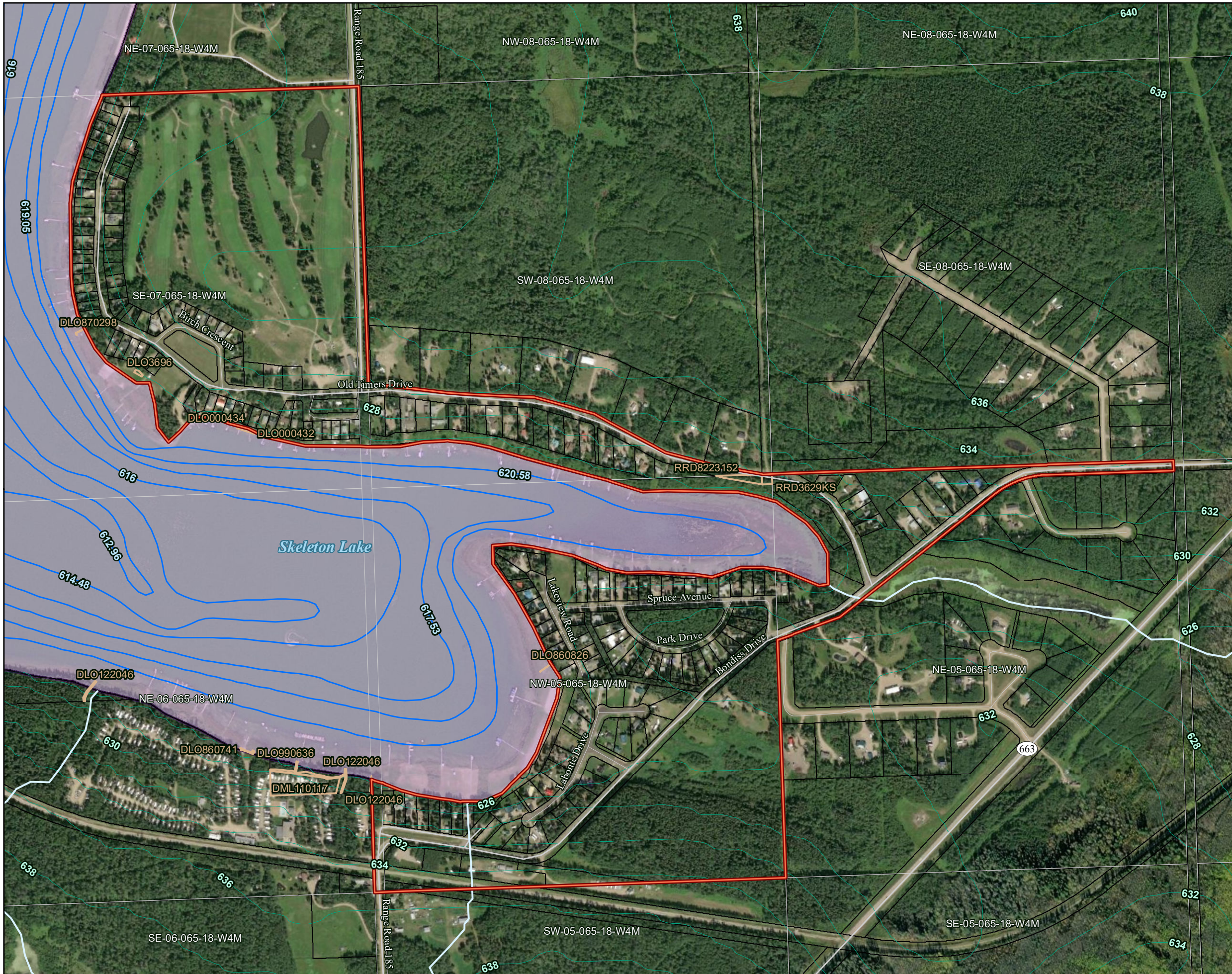
10. Appendices

Appendix 1: Overview Map



Summer Village of Bondiss

Figure 1: Overview



- Summer Village of Bondiss
- Bathymetry
- Watercourse
- Contours (2 m)
- Disposition
- Cadastral
- Crown Land
- Legal Land Description



Source: Contains information licensed under the Open Government Licences – Canada, Alberta
 Imagery Acquisition Date: August 6, 2014
 Coordinate System: NAD 1983 10TM AEP Resource



1:7,500



Date: August 3, 2022
 Prepared by: T. Kjorlien



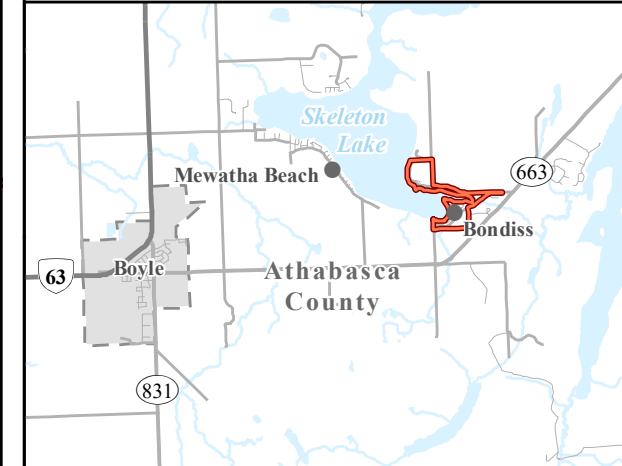
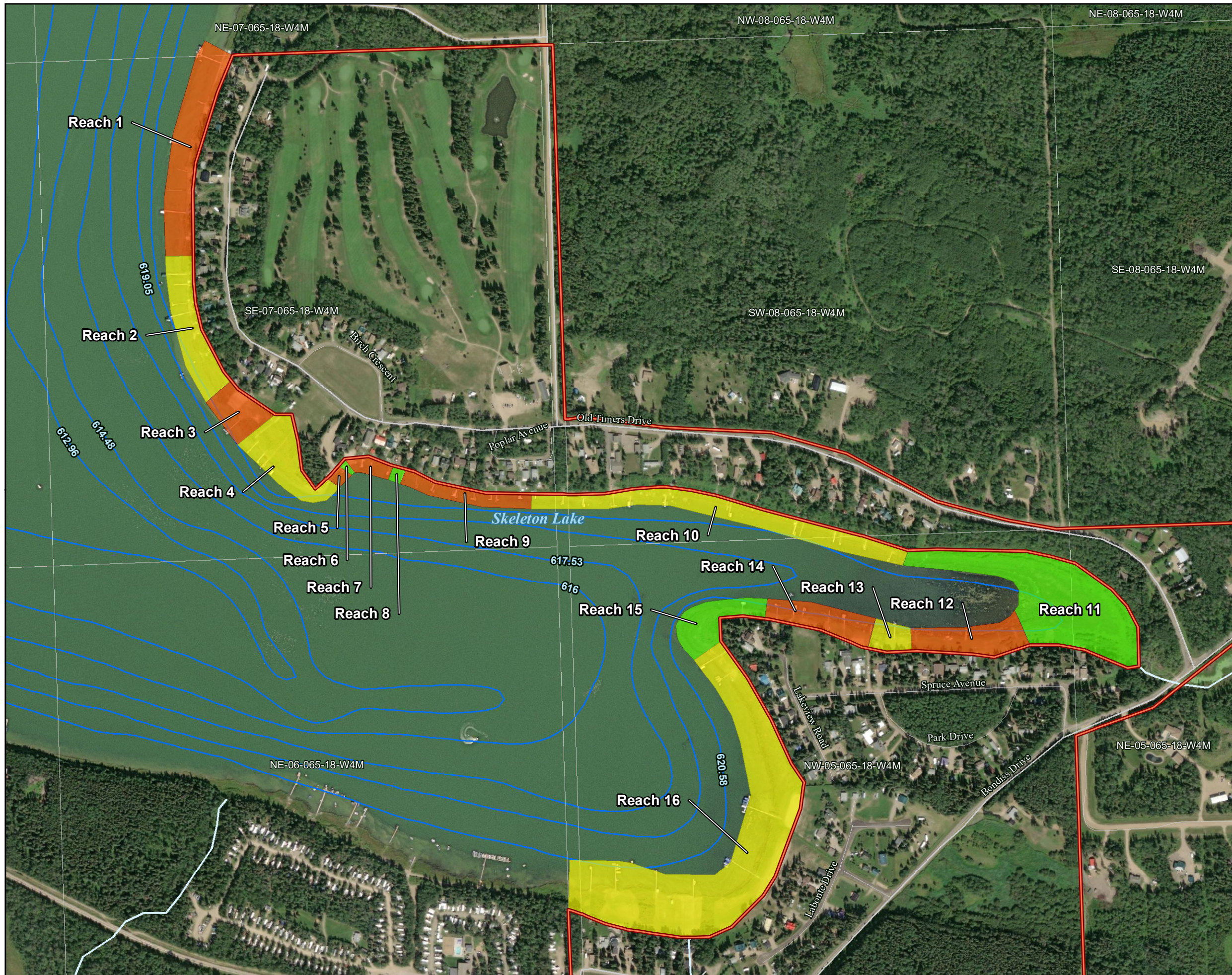
Appendix 2: Aquatic Environmental Assessment Map



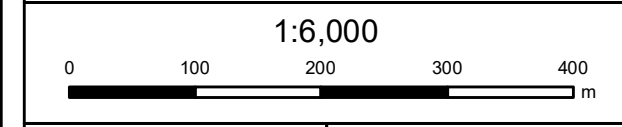
Summer Village of Bondiss

Figure 2: Aquatic Environmental Assessment

- High Disturbance
- Moderate Disturbance
- Low Disturbance
- Summer Village of Bondiss
- Bathymetry
- Watercourse
- Legal Land Description



Source: Contains information licensed under the Open Government Licences – Canada, Alberta
 Imagery Acquisition Date: August 6, 2014
 Coordinate System: NAD 1983 10TM AEP Resource



Date: July 29, 2022
 Prepared by: T. Kjorlien



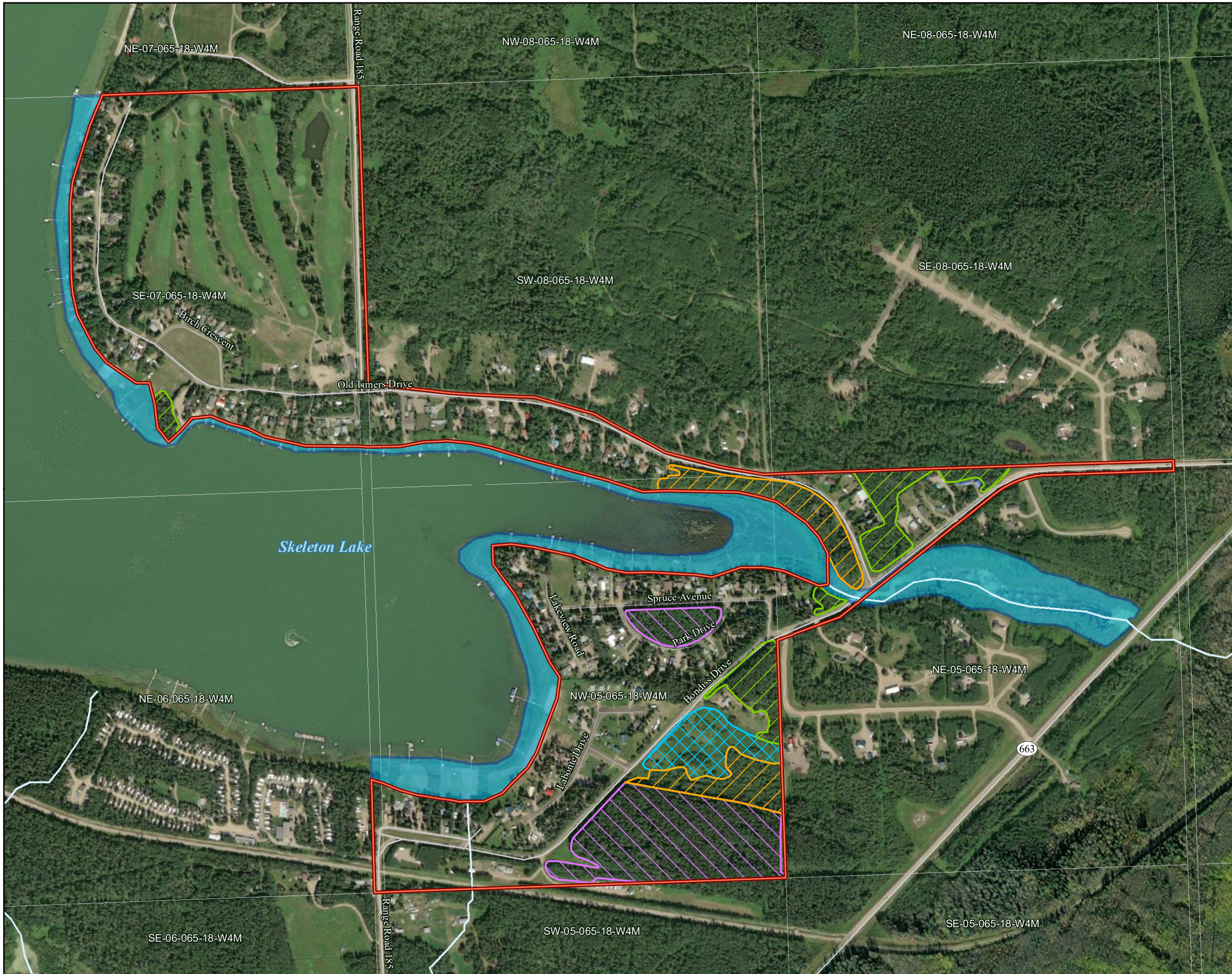
Appendix 3: Sensitive Environmental Features Map



Summer Village of Bondiss

Figure 3: Sensitive Environmental Features

- Summer Village of Bondiss
- Watercourse
- Riparian Area
- Wetland**
- Wooded Deciduous Swamp (S-Wd)
- Terrestrial Habitat (Ecosite)**
- BM-d1.3
- BM-d2.2
- BM-f3.1



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 Imagery Acquisition Date: August 6, 2014
 Coordinate System: NAD 1983 10TM AEP Resource



1:7,500



Date: August 4, 2022
 Prepared by: T. Kjolien



Appendix 4: Site Photographs

1 Select Requester: *

2 Select Reason for Request: *

3

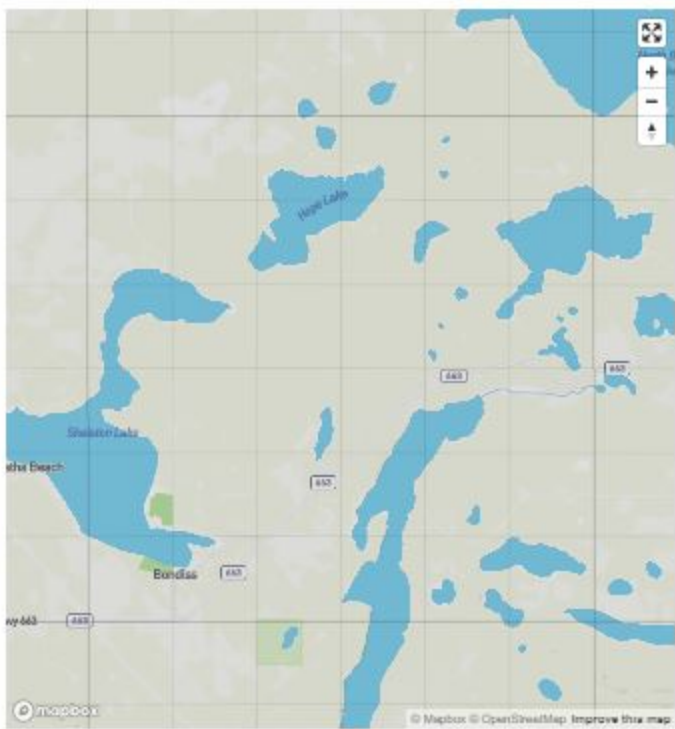
BEC	TWP	RGE	MER
<input type="text" value="05"/>	<input type="text" value="065"/>	<input type="text" value="18"/>	<input type="text" value="W4M"/>

(option) Convert Lat/Long to Township

- Legend**
- Element Occurrences (part one, non-sensitive)
 - Element Occurrences (part two, sensitive)

For information on where to obtain GIS data for boundaries of parks and protected areas in Alberta, please refer to Alberta's Open Data catalog.

Park and Protected area boundaries can be previewed using the GeoDiscover Alberta geospatial viewer.



Date: 8/7/2022
Requestor: Consultant
Reason for Request: Environmental Assessment
BEC: 05 **TWP:** 065 **RGE:** 18 **MER:** 4



■ Non-sensitive EOs (updated: October 2017)

M_RR_TTT_38	EO_ID	ECODE	S_RANK	S_NAME	S_COMNAME	LAST_OB_S_D
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No Non-sensitive EOs Found: [Next Steps](#) - [See FAQ](#)

■ Sensitive EOs (updated: October 2017)

M-RR-TTT	EO_ID	ECODE	S_RANK	S_NAME	S_COMNAME	LAST_OB_S_D
----------	-------	-------	--------	--------	-----------	-------------

No Sensitive EOs Found: [Next Steps](#) - [See FAQ](#)

Appendix 5: ACIMS Search Results

Fish and Wildlife Internet Mapping Tool (FWIMT)

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

Species Summary Report

Report Date: 08-Jul-2022 15:44

Species present within the current extent

Fish Inventory

BURBOT
 IOWA DARTER
 LAKE CHUB
 LAKE WHITEFISH
 NORTHERN PIKE
 SPOTTAIL SHINER
 TULLIBEE (CISCO)
 WALLEYE
 WHITE SUCKER
 YELLOW PERCH

Wildlife Inventory

AMERICAN WHITE PELICAN

Stocked Inventory

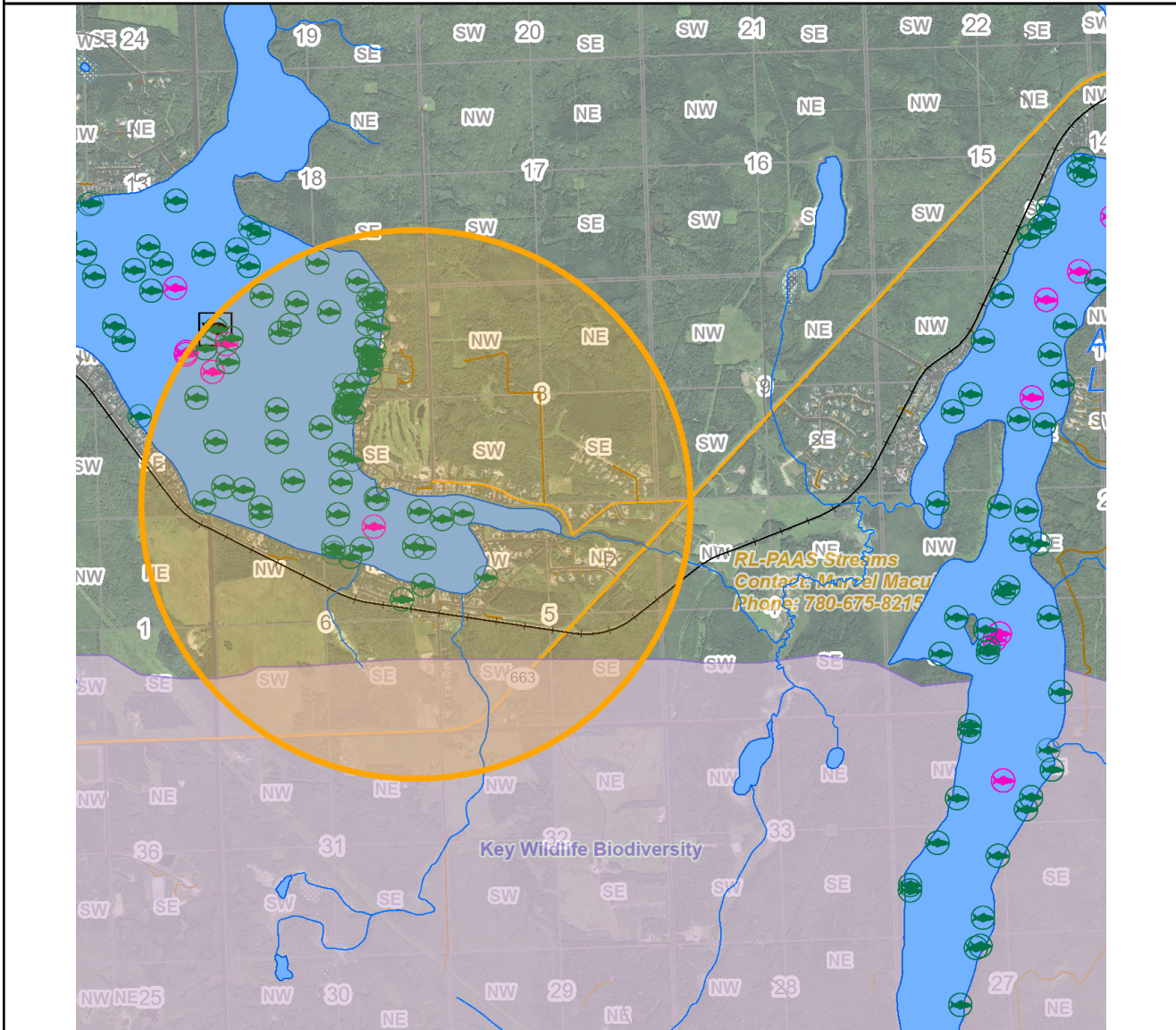
WALLEYE

Buffer Extent

Centroid (X,Y)	Projection	Centroid (Qtr Sec Twp Rng Mer)	Radius or Dimensions
648212, 6050519	10-TM AEP Forest	SE 7 65 18 4	2 kilometers

Contact Information

For contact information, please visit:
<https://www.alberta.ca/fisheries-and-wildlife-management-contacts.aspx>



Display may contain: Base Map Data provided by the Government of Alberta under the Alberta Open Government Licence. Cadastral and Dispositions Data provided by Alberta Data Partnerships. (c)GeoEye, all rights reserved. Information as depicted is subject to change, therefore the Government of Alberta assumes no responsibility for discrepancies at time of use

Appendix 6: FWIMT Search Results

Landscape Analysis Tool (LAT) Report

Licence of Occupation

000005E181

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LAT Number:	000005E181	LAT Date:	2022-07-11	08:54:26
Project Name:	SV Bondiss			
Project Description:	Biophysical			
Disposition Type:	DLO	Licence of Occupation		
Purpose Type:	RCTR	Research, Monitoring and Education		
Activity Type:	RCTR01DLOP	Education / Research Activity		

Responsibility of Applicants:

It is the applicant's responsibility to conduct a full review of the generated LAT Report, ensuring that you are aware and have a full understanding of the identified standards and conditions, and any additional limitations that may also be imposed by an approved higher level plan, reservation or notation or any other law or Order of the Province or the Government of Canada that may impact the placement, construction or operation of the proposed disposition, purpose and activity.

The applicant must assess if the proposed disposition, purpose and activity can meet the applicable standards, conditions and any limitations which will subsequently determine if the application can be submitted to the regulatory body. Applicants should complete a thorough review of regulatory and application processes including supporting procedural documents and the generated LAT Reports prior to making this determination.

Where the applicant chooses not to meet, or is not able to meet, one or more Approval Standards or higher level plans within the generated LAT Report as submitted as part of the application, or any affected reservations as identified within the land status report, the applicant is required to complete the appropriate mitigation as part of their supplement submission that addresses individually each of the items not being met.

The information provided within the LAT Tool is a spatial representation of features provided to the applicant for activity and land use planning. The accuracy of these layers varies depending on the resource value being represented. The regulatory body insists that site visits, wildlife surveys and groundtruthing efforts are completed to ensure that you, the applicant can meet the procedures detailed within the *Pre-Application Requirements for Formal Dispositions*, the identified approval standards, operating conditions and *Best Management Practices* as represented within the *Master Schedule of Standards and Conditions*.

Proximity to Watercourse/Waterbodies:

Applicants will ensure that standards or conditions for Watercourse/Waterbody features as identified within the generated LAT Report are followed. It is the responsibility of the applicant to ensure the identified setbacks and buffers are properly established through a pre-site assessment and maintained.

NOTE: Be aware that the submission of a LAT Report as part of an application submission does not imply approval of the activity. The standards and conditions identified within the LAT Report may be subject to change based on regulatory review.

Landscape Analysis Tool (LAT) Report

Licence of Occupation

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Base Features

Green/White Area	White Area
Municipality	Athabasca County
FMA	
FMU	LO1
Provincial Grazing Reserve	
Rocky Mountain Forest Reserve	
PLUZ Areas	
Protected Areas	

Provincial Sanctuaries

Wildlife Corridors	
Restricted Area	
Game Bird	Zone 1
Seasonal	

Landscape Analysis Tool (LAT) Report

Licence of Occupation

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Higher Level Plans

Integrated Resource Plan (Local)	
Integrated Resource Plan (Subregional)	
Access Management Plan	
Landscape Management Plan	

Landscape Analysis Tool (LAT) Report

Licence of Occupation

000005E181

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Additional Application Requirements

Wildlife Survey		DND Area	
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Historical Resources

HRV Rating	Category
------------	----------

Historic Resources Application Required: No

While no specific historic resource concerns have been identified within the proposed activity area, Section 31 of the *Historical Resources Act* states that "a person who discovers a historic resource in the course of making an excavation for a purpose other than for the purpose of seeking historic resources shall forthwith notify the Minister of the discovery." Should a historic resource be encountered with the construction or operation of this disposition, information on who to contact can be found on the Ministry of Culture and Tourism's website in; Standard Requirements under the Historical Resources Act: Reporting the Discovery of Historic Resources.

Landscape Analysis Tool (LAT) Report

Licence of Occupation

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Sensitive Features

Wildlife and Other Sensitive Species

	Intersected		Intersected
Burrowing Owl Range		Mountain Goat and Sheep Areas	
Caribou Range		Disease Buffer	
Caribou Range - Zone A		Ord's Kangaroo Rat Range	
Caribou Range - Zone B		Ord's Kangaroo Rat Key Habitat Area	
Colonial Nesting Birds		Piping Plover Waterbodies	
Critical Habitat of Aquatic Species at Risk		Provincial Hibernacula Buffer	
Endangered and Threatened Plants Ranges		Sensitive Amphibian Ranges	
Greater Short-horned Lizard Habitat		Sensitive Raptor Range	
Greater Short-horned Lizard Range		Sensitive Snake Habitat	
Greater Sage Grouse Core Area		Sensitive Snake Hibernacula Range	
Greater Sage Grouse Recovery Area		Sharp-tailed Grouse Leks and Buffer	
Greater Sage Grouse Leks and Buffer		Sharp-tailed Grouse Survey	
Grizzly Bear Zone		Special Access Area	
High Risk Watersheds		Swift Fox Range	
Key Wildlife and Biodiversity Areas		Trumpeter Swan Waterbodies/Watercourse	
Mountain Goat and Sheep Zone		Trumpeter Swan Watercourse Buffer	

Federal Orders:

	Intersected
Greater Sage Grouse	

Grassland and Natural Regions:

	Intersected		Intersected
Central Parkland		Mixed Grass Sub-region layer	
Central Parkland and Northern Fescue		Montane	
Chinook Grasslands		Northern Fescue	
Dry Mixed Grass		Peace River Parkland	
Foothills Fescue		Permafrost	
Foothills Parkland Grasslands		Rough Fescue PNT	
Grassland and Parkland Natural Region		Subalpine or Alpine	

Landscape Analysis Tool (LAT) Report

Licence of Occupation

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Alberta Township System (ATS) Land List

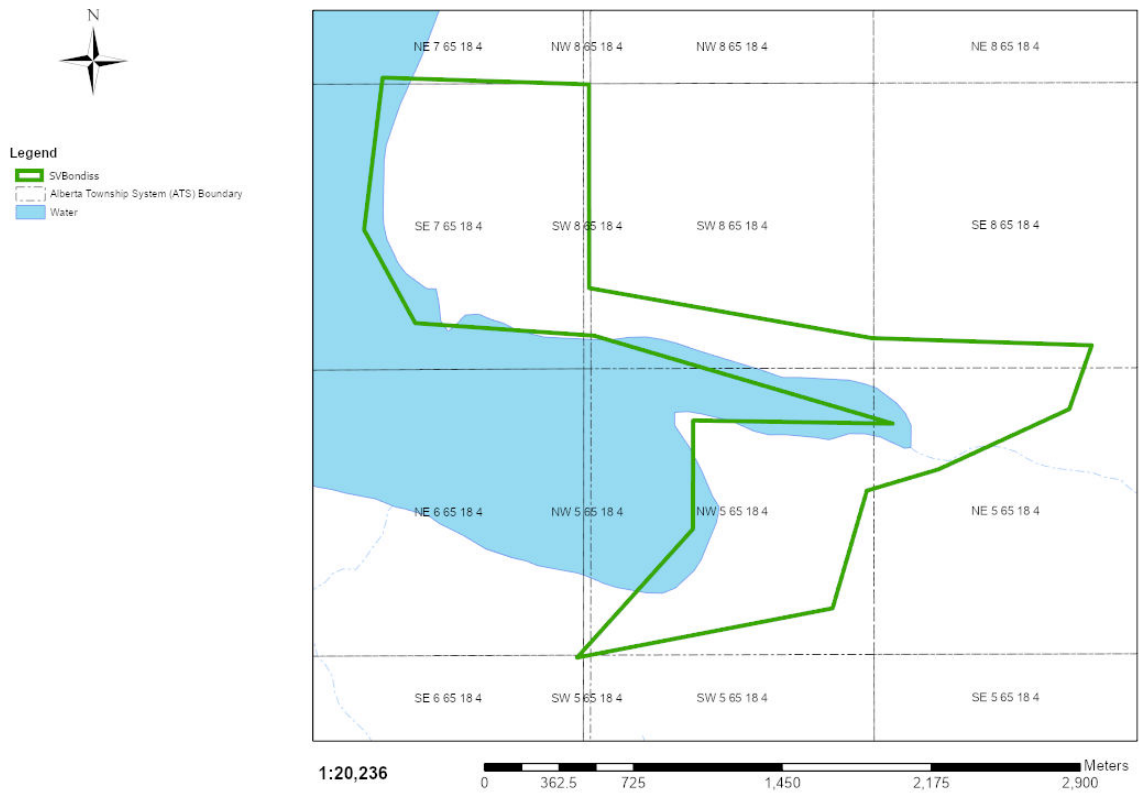
Quarter	Section	Township	Range	Meridian	Road Allow.	Sensitive Features Identified
NW	5	65	18	4		Green / White Area
SE	6	65	18	4		Green / White Area
SE	7	65	18	4		Green / White Area
SW	5	65	18	4	RW	Green / White Area
SE	8	65	18	4		Green / White Area
NW	5	65	18	4	RW	Green / White Area
SW	8	65	18	4	RW	Green / White Area
NE	5	65	18	4		Green / White Area
SW	8	65	18	4		Green / White Area
NE	6	65	18	4		Green / White Area
NE	7	65	18	4		Green / White Area

Landscape Analysis Tool (LAT) Report

Licence of Occupation

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Appendix 7: LAT Report

Biophysical Assessment - Aquatics



Photo 1: Reach 1 – Northernmost boundary of summer village. Some emergent vegetation among developed shoreline



Photo 2: Reach 1 – Retaining wall along developed shoreline. Minimal emergent vegetation. Imported sand along waters edge.



Photo 3: Reach 1 - Transition between developed and undeveloped shoreline. Small section of cleared terrestrial vegetation for water access.



Photo 4: Reach 1 – Riparian vegetation growing in developed shoreline. Rock walls present along shoreline due to wave energy.

Biophysical Assessment - Aquatics



Photo 5: Reach 2 – Section of riparian vegetation extending along shoreline and adjacent emergent vegetation.



Photo 6: Reach 2 – Intact emergent vegetation along developed shoreline.



Photo 7: Reach 2 – Intact emergent vegetation along developed shoreline.



Photo 8: Reach 2 – Two developed sections of shoreline, each employing distinct shoreline armoring methods.

Biophysical Assessment - Aquatics



Photo 9: Reach 2 – Section of intact emergent vegetation. Dock in background extends 30 meters out from shoreline.



Photo 10: Reach 3 – Transition between developed and undeveloped shoreline. Manicured lawn meeting the waters edge. Lack of riparian area.



Photo 11: Reach 3 – Developed shoreline. Docks, manicured lawn and a sandy shoreline present. Lack of emergent vegetation.



Photo 12: Reach 4 – Manicured lawn meets the shoreline. Section of emergent vegetation adjacent to public park.

Biophysical Assessment - Aquatics



Photo 13: Reach 4 – Riparian species growing in shallow water near shoreline. Sections of emergent and submergent vegetation near shoreline.



Photo 14: Reach 4 – Large flock of terns gathered on a dock that is bordering riparian vegetation.



Photo 15: Reach 4 – Sections of riparian area with emergent and submergent vegetation present. Public park in background is well developed with manicured lawns and docks.



Photo 16: Reach 4 – Forested section adjacent to public park and boat launch on the north shore.

Biophysical Assessment - Aquatics



Photo 17: Reach 4 – Walking paths to docks along shoreline.



Photo 18: Reach 4 – Wave energy high along shoreline. Exposed rocks visible.



Photo 19: Reach 4 – Cobble and gravel deposits from wave energy along bay. Some erosional processes noted.



Photo 20: Reach 4 – Looking northwest from the public boat launch on the north shore. Young-of-year Yellow perch schools documented within the bay/back eddy area.

Biophysical Assessment - Aquatics



Photo 21: Reach 5 – Public boat launch. Submergent vegetation in the foreground, sandy beach with picnic table along shoreline.



Photo 22: Reach 5 – Submergent vegetation and woody debris 30 meters west of boat launch



Photo 23: Reach 5 – Public boat launch. Substrate below boat launch is a mix of mostly silty material with small gravel. No emergent vegetation and some submergent vegetation.



Photo 24: Reach 6 – Small section of transitioning shoreline between public boat launch and owned property.

Biophysical Assessment - Aquatics



Photo 25: Reach 6 – Public boat launch and dock in background, adjacent to riparian area with emergent and submergent vegetation.



Photo 26: Reach 7 – Lack of emergent vegetation and riparian zone. Typical of high disturbance to shoreline reaches.



Photo 27: Reach 7 – Retaining walls along shoreline with minimal emergent vegetation.



Photo 28: Reach 8 – Property being developed. No dock present. Emergent and submergent vegetation intact. Reach spans one property.

Biophysical Assessment - Aquatics



Photo 29: Reach 8 – Emergent and submergent vegetation abundant. Reach spans one property.



Photo 30: Reach 9 – Retaining wall along shoreline with minimal riparian area.



Photo 31: Reach 9 – Lack of emergent vegetation and no riparian area. Small sandy area located along shoreline.



Photo 32: Reach 10 – Undeveloped section of shoreline with trees and shrubs.

Biophysical Assessment - Aquatics



Photo 33: Reach 10 – Property cleared of upland vegetation. Shoreline cleared of riparian vegetation. Some emergent vegetation intact.



Photo 34: Reach 10 - Undeveloped section of shoreline, with intact riparian area.



Photo 35: Reach 11 – Undeveloped shoreline. Upland, riparian, emergent and submergent vegetation throughout area. Reach to the east at lake outlet. Water level dropped.



Photo 36: Reach 12 – Development of shoreline adjacent to lake outlet. Some intact emergent vegetation between docks. Significant submergent vegetation present.

Biophysical Assessment - Aquatics



Photo 37: Reach 13 – Small section of minimally disturbed shoreline. Spanning one property.



Photo 38: Reach 14 – Developed shoreline with minimal emergent vegetation. Typical for section. Small sections of shoreline are undeveloped usually between properties.



Photo 39: Reach 15 – Shoreline dominated by riparian, emergent and submergent vegetation.



Photo 40: Reach 16 – Riparian, emergent and submergent vegetation interrupted by docks.

Biophysical Assessment – Riparian Area at Skeleton Lake Outlet



Photo 41: Mowed section on the east side of Bondiss Drive. Standing water present within the ditch.



Photo 42: Riparian area for outflow from Skeleton Lake. West side of Bondiss Drive. Appears to have minimal to no flow. Photo looking upstream.



Photo 43: Outlet from Skeleton Lake. Photo looking east and downstream. Large intact riparian area.



Photo 44: Skeleton Lake outflow at Bondiss Drive.

Biophysical Assessment - Wetlands



Photo 45: Wetland soil augured to 30 cm.



Photo 46: Woody deciduous swamp. East side of Bondiss Drive, and south of Spruce Avenue. Standing water present.



Photo 47: Woody deciduous swamp. East side of Bondiss Drive, and south of Spruce Avenue.



Photo 48: Woody deciduous swamp transition to upland forest.



Photo 49: Brush pile in clearing on eastside of Range Road 185. Brush pile is likely a fire hazard.



Photo 50: BM-d2.2 Ecosite adjacent to Park Drive and large treed area further upslope from the woody deciduous swamp.



Photo 51: BM-f3.1 Ecosite found north of riparian area at Skeleton Lake outlet and immediately upslope from the woody deciduous swamp.



Photo 52: BM-d1.3 Ecosite is treed area north of the intersection of Old timers Drive and Bondiss Drive.

Biophysical Assessment - Wildlife



Photo 53: Deer tracks in ditch along Range Road 185.



Photo 54: Red-necked Grebe and two babies in Skeleton Lake seen in Reach 12.



Photo 55: Two of many pelicans seen on docks and on at Skeleton Lake.



Photo 56: Loon with baby seen in Reach 9 on Skeleton Lake.

Biophysical Assessment – Noxious Weeds



Photo 57: White Cockle, a noxious weed growing near brush pile east side of Range Road 185.



Photo 58: Ox-eye Daisy, a noxious weed growing in several ditches and on properties within the Summer Village.