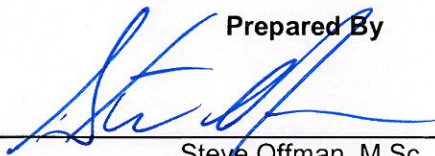


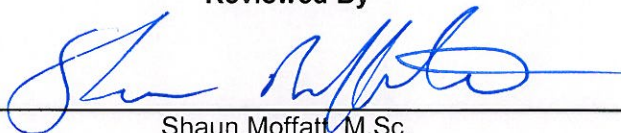
**Rare Plant, Wildlife, Fish and Habitat Assessments for the
Rehabilitation of the Highfield Dam Project
AAFC/AESB Service Contract No.2
FINAL REPORT
December 2010**

Prepared By



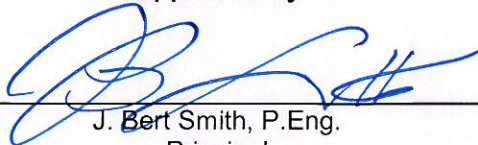
Steve Offman, M.Sc.
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Approved By



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December 10, 2010

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ATTENTION: Ms. Carrie Wallace

RE: Rare Plant, Wildlife, Fish and Habitat Assessment
For the Rehabilitation of the Highfield Dam Project
AAFC/AESB Service Contract No.2
Final Report

Dear Ms. Wallace:

KGS Group is pleased to provide you with three (3) paper copies and an electronic copy of the Final Rare Plant, Wildlife, Fish and Habitat Assessment report. This report summarizes the observations of habitat classification, species of conservation concern, identification of potential effects and discussion of applicable mitigation measures that were outlined in the three separate biological assessments completed at the site. The biological surveys were conducted as supporting information for use in an Environmental Assessment required under the Canadian Environmental Assessment Act for the proposed upgrades to the Highfield Dam. Please do not hesitate to contact us if you have any questions or require additional information.

Prepared By:

A handwritten signature in blue ink, appearing to read 'Shaun Moffatt'.

Shaun Moffatt, M.Sc.
Senior Environmental Scientist

Submitted By:

A handwritten signature in blue ink, appearing to read 'Bert Smith'.

Bert Smith, P.Eng.
Principal

SM/jr
Enclosure

TABLE OF CONTENTS

	<u>PAGE</u>
1.0 INTRODUCTION	1
2.0 HABITAT AND SPECIES SUMMARY	3
2.1 HABITAT DESCRIPTION	3
2.1.1 Terrestrial Habitat	3
2.1.2 Aquatic Habitat	4
2.2 SPECIES OF CONSERVATION CONCERN	6
2.2.1 Vegetation	6
2.2.2 Wildlife	7
2.2.3 Fish	9
3.0 OVERVIEW OF PROJECT EFFECTS AND MITIGATION	10
3.1 PROJECT EFFECTS	10
3.2 PROPOSED MITIGATION MEASURES	12
3.2.1 General Mitigation	12
3.2.2 Activity Restrictions and Specific Mitigation	13
4.0 REFERENCES	17
TABLES	
FIGURES	
APPENDICES	

LIST OF TABLES

1. Species of Conservation Concern

LIST OF FIGURES

1. Site Location Plan

LIST OF APPENDICES

- A. Vegetation / Rare Plant Survey – Final Report
- B. Wildlife Survey – Final Report
- C. Fish and Fish Habitat Assessment – Final Report
- D. Saskatchewan Conservation Data Centre – Species at Risk in Saskatchewan
- E. Saskatchewan Activity Restriction Guidelines for Sensitive Species
- F. Fisheries and Oceans Canada: Saskatchewan Operation Statement – Timing Windows

1.0 INTRODUCTION

Kontzamanis Graumann Smith Macmillan Inc. (KGS Group) was retained by the Agri-Environment Services Branch of Agriculture and Agri-Food Canada (AAFC/AESB) to conduct biological surveys (rare plant, wildlife, fish and habitat assessments) at the Highfield Dam site. The dam, which was constructed in 1942 across Rush Lake Creek (NE 36-15-11 W3M), is located approximately 28 km east of Swift Current, Saskatchewan and 8 km south of the No. 1 Highway (Figure 1). The dam and associated infrastructure and land is owned and operated by AAFC/AESB. The reservoir has a total storage area of 14, 895 dam³ and a flooded area of approximately 517 ha at full supply level (FSL; EI 723.0 m). The water in the reservoir is used to support agricultural lands in the region, in particular the Herbert and Rush Lake Irrigation projects.

A dam safety assessment of the Highfield Dam was conducted by the Prairie Farm Rehabilitation Administration (PFRA) in 1987. Using PFRA's hazard potential classification system, the Highfield Dam was rated as having a high potential for loss of life, significant downstream economic losses, and significant other economic losses caused by flooding due to dam failure. Further, dam safety reviews indicated that the current spillway system cannot pass an inflow design flood (IDF) consistent with industry standards and that there is insufficient freeboard between the FSL and top of dam during passage of less frequent flood events. Preliminary studies are being undertaken by AAFC/AESB to identify appropriate upgrades in order to resolve the dam safety concerns with the current dam components. The option currently favoured involves increasing the spillway capacity through construction of a new spillway on the east side, raising the top of dam elevation and other associated work (Figure 1). Other project enhancements would include: lengthening the west outlet conduit; constructing a bridge over the spillway entrance channel; increasing the capacity of an existing wasteway located on the Herbert Main Canal immediately downstream of the dam; and improving the flood capacity of the existing spillway.

Major activities associated with this project may include borehole drilling; excavating soils; hauling and stockpiling soils, rock and granular materials; placing soil materials; shaping and compacting soils; placing rock and granular materials; placing topsoil; and revegetating disturbed areas. The construction activities will likely be completed using traditional earth

moving equipment including track hoes; rock trucks, graders, front-end loaders, bobcats and scrapers. The proposed borrow area for the earthworks is located southeast of the east end of the dam and overlaps with the existing previously disturbed borrow area used to construct the current dam (Figure 1). The proposed work is anticipated to start in the 2012/2013 construction season; however, there is the potential that delays in the decision making process may lead to postponing the work until the following season.

As AAFC/AESB is the proponent; an Environmental Assessment (EA) will be required under the *Canadian Environmental Assessment Act* (CEAA) for the proposed work. An assessment of the biological systems around the project area was previously conducted in 2003 by Jacques Whitford Environmental Limited ⁽¹⁾. However, in preparation for the EA, AAFC/AESB requires an update to the existing biophysical information within the project area. This data will be used to supplement the existing data by identifying any new species not recorded previously so that AAFC/AESB is working with the most current data available for the project study area. As such, rare plant (Appendix A), wildlife (Appendix B), and fish and fish habitat assessments (Appendix C) have been conducted in order to facilitate identification of potential adverse environmental impacts associated with the proposed project and recommendations and mitigation measures have been proposed for avoidance and/or minimizing the impacts from the proposed work.

As part of the biological surveys conducted at the Highfield Dam property, during the 2010 survey, particular emphasis was placed on determining the existing fish and fish habitat for Rush Lake Creek Downstream of Highfield Dam and determining the presence of rare and/or endangered vegetation and wildlife species within the project study area as recorded by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) ⁽²⁾, the federal *Species at Risk Act* (SARA) ⁽³⁾, and the Saskatchewan Conservation Data Centre (SKCDC) databases. This report summarizes the observations of habitat classification, species of conservation concern, identification of potential effects and discussion of applicable mitigation measures that were outlined in the three separate biological assessments completed at the site. The detailed methods and results for each of the surveys conducted within the project study area are provided in Appendices A, B and C.

2.0 HABITAT AND SPECIES SUMMARY

2.1 HABITAT DESCRIPTION

2.1.1 Terrestrial Habitat

The vegetation and wildlife surveys were completed within the five plant communities that were identified in previous work conducted on the site in 2003 ⁽¹⁾. The five plant communities are as follows (Figure 1).

- Crested Wheat Pasture (CWP);
- Saline Wet Meadow (SWM);
- Wooded Stand (WS);
- Rush Flats (RF), and
- Native Grassland (NG)

KGS Group reviewed and generally agrees with the plant communities described in the previous study. However, KGS Group identified two new plant communities as they were distinct from the surrounding plant communities as described in Appendix A - Section 3.2.1. These included reservoir (RES) that describes the shoreline habitat (along the reservoir) and wetland (WET) that describes the plant community within Rush Lake Creek and the land drainage channel/original creek that winds through the property (Figure 1).

Additionally, the current study determined that the plant community previously referred to by Jacques Whitford as native grassland, is better described as grassland fragments (GF) and will be referred to as such for the remainder of this report. Referring to this community as native grassland implies that these areas are relatively high quality grassland areas dominated by native species when in reality they have been exposed to disturbance from past activities on the site and from the surrounding land use. Due to the combined effects of highly disturbed areas, overgrazing and the encroachment of crested wheat grass which is cultivated in the surrounding fields, this grassland area is highly degraded and; therefore, classified as grassland fragments.

2.1.2 Aquatic Habitat

Highfield Dam Reservoir

A cursory survey of available habitat along the shoreline of the Highfield Dam reservoir was conducted during the 2010 assessment within the small bay that extends from the reservoir approximately 800 m south-southeast of the east outlet structure, and then along the northeast shore of the reservoir towards the dam (Figure 1). At the northern tip of the bay the substrate was comprised entirely of fine silt with a mix of semi-aquatic and terrestrial plants along the shoreline including sedges, foxtail barley (*Hordeum jubatum*), and silverweed (*Argentina anserina*) that extend for several metres into the water. However approximately 180 m south along the northwest shore of the bay and continuing along the shoreline until reaching Highfield Dam, the shoreline is comprised almost entirely of sand with varying levels of gravel, rock, and cobble which could be used as spawning habitat for white sucker and walleye. The shoreline on the southwest point of the bay where it opens to the reservoir has a section of rock cobble which is just outside of the prevailing wind and waves and would provide fairly good spawning habitat for walleye. Most of the northeast shoreline of the reservoir is comprised of rock cobble, boulders and gravel over a layer of sand with some fine silt that has been washed ashore from the reservoir.

Rush Lake Creek

Rush Lake Creek downstream of the Highfield Dam is a relatively shallow, low velocity creek with several natural pools and an abundance of back flooded areas caused by blockages to water flow. A continual trickle of water was flowing through the east outlet structure, even while closed, which provided oxygenated water to the creek. Dissolved oxygen within the channel was consistently at or above optimum concentrations for most fish species during the spring site visit.

During the mid-summer site visit, there were more areas inundated with back flooded stagnant water throughout the creek and dissolved oxygen concentrations fell to sub optimal and lethal levels at more than one location within the project study area. The increase in standing water may, in part be related to the excess growth of pond weed (*Potamogeton sp.*) which was observed throughout all reaches of the channel, and in some cases covered 100% of the

substrate. Areas observed to experience some flow during the spring site visit, had become stagnant and often covered with a layer of lemna (algae) during the summer site visit.

Fish habitat suitability indices (HSI) were calculated for yellow perch, northern pike, white sucker and walleye based on models established by the United States Fish and Wildlife service. The HSI for yellow perch indicated that the limiting factor was percent of backwater/flooded area during summer flow resulting in moderate available habitat for this species. However, dissolved oxygen concentrations in the creek reach lethal levels during mid to late summer and, as such provide poor habitat for yellow perch during the latter half of the open water season. The habitat assessment identified that there was a significant amount of spawning and rearing habitat and some feeding habitat for northern pike. The HSI for northern pike indicated the limiting factor was percent instream vegetation resulting in a moderately high quality habitat for this species. Although northern pike are tolerant to the lower levels of DO, their diet is almost entirely dependant on fish and this creek is not likely able to support a sufficient volume of forage fish to support a population of northern pike. The HSI's for white sucker and walleye indicated that the limiting factor was spawning substrate/habitat resulting in unsuitable habitat available in the creek for these species.

Fish Passage

The Highfield Dam is an existing barrier to both upstream and downstream fish passage between these habitats. There is no constructed fish ladder to provide upstream passage. Downstream passage can only occur when there is discharge through the East Outlet Structure which is limited based on the way it is operated. Discharge occurs for a short period of time during the spring freshet which is typically 3-4 days a year for approximately 60% of the years. Following the spring freshet water is discharged only when the irrigators need irrigation water. Based on the information obtained during the assessment of fish and fish habitat (Appendix C), KGS Group's opinion is that the fish passage should not be a necessary component of the project for the following reasons;

- No large bodied fish were observed or captured in Rush Lake Creek.
- There is appropriate fish habitat in the reservoir for the large-bodied fish that is of equal or better quality than the downstream habitat such that the fish do not need to migrate downstream for required habitat.

- There are numerous physical barriers to fish passage within the project study area, and pooling water and beaver activity observed further downstream when on route to the water return site location indicated that additional barriers to fish passage are present throughout many reaches of the creek.
- In addition to physical barriers, there may be chemical barriers deterring fish passage along reaches of the creek. Water quality parameters within the creek are likely affected by surface run-off throughout the irrigation zone. Dissolved oxygen measured at the water return site approximately 15 km upstream of Reed Lake was dramatically lower than the measurements taken at the downstream of effects station.
- The closest lake downstream of the creek that would provide a source of fish migrating upstream is Reed Lake which is an intermittent high saline lake. This lake is approximately 38 km downstream from the project study area and is known to reach near waterless conditions in dry years.

2.2 SPECIES OF CONSERVATION CONCERN

2.2.1 Vegetation

A total of five provincially extremely rare to rare-uncommon species (S1-S3) were identified within the project study area (Figure 1), with four identified during the current study and one identified during the 2003 study (Table 1). None of the five provincially rare species observed on site are listed under COSWEIC, and as such are not federally protected under the SARA or considered species at risk in Saskatchewan ⁽⁴⁾ (Appendix D). Further, none of the provincially rare species are included in the list of species with activity restrictions imposed by the Saskatchewan Ministry of the Environment (Appendix E).

Two heart-leaved buttercup (*Ranunculus cardiophyllus*) were identified during the current study during the first site visit and located again during the second site visit in the GF plant community (13 U 330312 5575542, and 13 U 330346 5575483). Heart-leaved buttercup is considered extremely rare to rare provincially (S1S2; 5 or fewer occurrences to 6 to 20 occurrences) meaning it is critically imperiled to imperiled as it may be susceptible to extirpation, however, it is considered apparently secure to secure globally (G4G5).

Two narrow-leaved plantain (*Plantago elongata*) were identified during the current study during the second site visit in the SWM plant community approximately 35 m apart (13U 329586 5575981, and 13U 329620 5576017). These were encountered in the approximate location as

previously identified during the 2003 study. Narrow-leaved plantain is considered rare to rare/uncommon provincially (S2S3; 6 to 20 occurrences to 21 to 100 occurrences) meaning it is imperiled to vulnerable as it may be susceptible to extirpation, however, it is considered apparently secure to secure globally (G4).

Stream bank wheatgrass (*Elymus lanceolatus*) was identified during the current study during both site visits in the GF plant community (13U 330362 5575288). Stream bank wheatgrass is considered rare provincially (S2; 6 to 20 occurrences) meaning it is imperiled as it may be susceptible to extirpation, however, it is considered secure globally (G5).

Water weed (*Elodea canadensis*) was identified during the current study during both site visits in the RES plant community (13U 330184 5575660). Water weed is considered rare to rare/uncommon provincially (S2S3; 6 to 20 occurrences to 21 to 100 occurrence) meaning it is imperiled to vulnerable as it may be susceptible to extirpation, however, it is considered secure globally (G5).

Least mouseltail (*Myosurus minimus*) was identified during the 2003 study in a small area in the northwest portion of the SWM plant community situated just south of the boundary with the CWP. Although it could not be located during the current study its approximate location within the study area is shown in Figure 1 based on the information provided in the 2003 study.

2.2.2 Wildlife

Birds

Previous work conducted on the site by Jacques Whitford identified the presence of a breeding pair of loggerhead shrike (*Lanius ludovicianus*) that was observed in a stand of buffalo berry in non-native grassland adjacent to the Highfield Dam (Figure 1). The loggerhead shrike (prairie populations) species is listed as threatened (T) by COSEWIC and is considered provincially rare - uncommon in Saskatchewan (S3B; Table 1).

During the current study the chestnut collared longspur (*Calcarius ornatus*) was observed nesting in the grassland fragments during the spring visit, and was noted to produce alarm calls which are indicative of fledgling activity. Likewise during the current study ferruginous hawks

(*Buteo regalis*) (likely a pair) were observed soaring throughout the project area however, neither bird issued an alarm call to indicate they were nesting nearby. Both of these species are listed as threatened (T) by COSEWIC. However, neither species is considered provincially rare in Saskatchewan (S5B and S4B, respectively; Table 1). The semipalmated sandpiper (*Calidris pusilla*) observed along the shoreline of the reservoir and Rush Lake Creek is a candidate/identified species (C) under COSEWIC, however it has not yet been assessed and is not provincially rare (S4M). All the other species identified in the project area were either considered not at risk (NAR), least concern (LC) or not ranked under COSEWIC.

A total of five provincially extremely rare to rare-uncommon species (S1-S3) were identified within the project study area. The red-tailed hawk has an S1N status (5 or fewer occurrences) and the American wigeon, gadwall, and northern harrier have S2N status (6 to 20 occurrences) included within their provincial ranking. Although these species have an S1 or S2 category for part of its status the 'N' modifier refers to non-breeding populations and is of less concern when in conjunction with a 'B' modifier which refers to breeding populations. All of these species breeding populations are ranked S5 and therefore not a concern. This low concern is confirmed by the fact that these species are not listed on the SKCDC list of species at risk in Saskatchewan (Appendix D). Further, these species either are not listed by COSEWIC or are listed as NAR. Therefore specific mitigations will not be required for the protection of the red-tailed hawk, American wigeon, gadwall, or northern harrier.

One S3B species, great blue heron (*Ardea herodias*), was identified in the project area, however under COSEWIC it is listed as LC and this only applies to a portion of the species range. The great blue heron was given special consideration because it is a colonial nesting species. Several other colonial nesting species were also identified within the study area including the common tern (*Sterna hirundo*), eared grebe (*Podiceps nigricollis*), bank swallow (*Riparia riparia*), and cliff swallow (*Petrochelidon pyrrhonota*). All other species observed in the study area had provincial ratings of S4 or greater, and are not considered species of conservation concern.

Mammals

With the exception of the American badger which is listed as S3/S4 (rare-uncommon to common) and NAR under COSEWIC, all species observed on site during the current study were

listed provincially as either S4 (common) or S5 (very common) and not listed under COSEWIC. The American badger observed on site was a carcass that may have been brought on-site, however, American badgers were also observed along the roadway approximately 1.6 km north of project area.

Amphibians and Reptiles

No reptiles were encountered within or surrounding the project area. Two species of amphibian were encountered within the project area; both within the wetland habitat (WET) represented by the creeks and land drainage channels winding through the property. One of these two species, the northern leopard frog (*Rana pipiens*) is listed as a provincially rare-uncommon species (S3) and under COSEWIC the Western Boreal/Prairie populations are listed as a species of special concern (SC) and therefore protected under SARA as Schedule 1 SC. During the current study the northern leopard frog was observed along the edge of the wetland habitat (UTM 13 U 329767 557929; Figure 1). Previous work conducted on the site by Jacques Whitford in 2003 also identified the presence of the northern leopard frog as shown on Figure 1. The northern leopard frog remains widespread but is of special concern as it has experienced a considerable reduction of range and loss of populations in the past, combined with increased isolation of remaining populations ⁽³⁾.

2.2.3 Fish

No large bodied fish were captured or observed within Rush Lake Creek during either of the 2010 survey site visits. The only species that was found within Rush Lake Creek during the sampling program was the fathead minnow. Within the Highfield Dam reservoir there are four species of sport fish reported to frequently occur including yellow perch, northern pike, white sucker and walleye (Appendix C). None of these species observed or reported are listed as provincially extremely rare to rare-uncommon species (S1-S3) or listed under COSEWIC. Therefore there are no fish species of conservation concern associated with this proposed project.

3.0 OVERVIEW OF PROJECT EFFECTS AND MITIGATION

3.1 PROJECT EFFECTS

Project activities have the potential to impact portions of all of the identified plant communities except for wooded stand. The proposed project activities likely to result in measureable disturbances include widening the dam in order raise the top of dam elevation, the clearing and trenching associated with development of a new spillway channel and the clearing and excavation of the borrow pit area. The plant communities and associated wildlife habitat that will likely be directly affected by the excavation of the borrow pit and the subsequent enhancements to the dam and structures will for the most part be previously disturbed areas.

The crested wheat pasture, saline wet meadow, rush flats and sections of the wetland vegetation community all border the toe of the slope of the existing dam. The impacts to these four plant communities resulting from widening of the embankment in order to support an increase in dam height will likely be insignificant as the vegetation being affected is, for the most part, common and widespread, and only a small area within each of the plant communities falls within the project foot print. Although there are rare plant species identified within the saline wet meadow, these plants are more than 250 m from north embankment of the current dam, and it is unlikely that the proposed work will encroach upon the 50 m set back distance as required by the Saskatchewan Ministry of the Environment. The development of the dam will also likely impact a small area of habitat for small/burrowing mammals on the north side of the dam associated with widening of the embankment.

The crested wheat pasture, grassland fragments, wetland and reservoir plant communities will likely be adversely affected by the development of the proposed spillway. Again only a comparably small area will be used from each plant community in relation to the total available area within each plant community. However, the rare plants identified within the grassland fragments and the reservoir plant communities are in the vicinity of the proposed spillway. The conservation and protection of these species should be considered during development and detail design of the project. Small/burrowing mammal species may potentially be impacted by the excavation of the proposed spillway. However, the area of habitat being disturbed is negligible compared to the available habitat in the surrounding area.

The project activity that will result in the largest loss of vegetation cover is the clearing and excavation of the borrow pit. As indicated above, the western boundary of the grassland fragment southeast of the east outlet structure contains two rare species. The Saskatchewan Ministry of the Environment should be contacted as part of the environmental assessment process in order to provide advice for suitable mitigation procedures to be included as part of the final design. The borrow area will likely overlap with the historic borrow area, regardless, small/burrowing mammal species may potentially be impacted by the excavation activities. However, the area of habitat being disturbed is negligible compared to the available habitat in the surrounding area.

In general, vegetation that may be impacted is limited in both quality and quantity except for the provincially rare plant species identified above. Assuming that the recommended mitigation measures are implemented such that the project does not adversely impact these rare plant species identified, the overall impacts of the project will be negligible. Likewise, as there were no provincially very rare (S1) or rare (S2) wildlife species observed within the project area and as the total habitat that may be impacted is negligible compared to the available habitat in the surrounding area, the environmental effects can likely be reduced/avoided using the appropriate mitigation methods. Assuming that the recommended mitigation measures are implemented such that the project does not adversely impact the wildlife listed under COSEWIC as SC or T the impacts to wildlife will be negligible; primarily affecting small/burrowing mammal habitat. As there were no provincially or federally rare fish species observed within the project area and as the fish habitat that may be impacted is limited in both quality and quantity the impacts of the project will be limited.

Potential environmental effects of the proposed modifications to Highfield Dam are typical of those associated with earth work projects and include the following:

- Potential loss and disturbance of terrestrial and possibly some aquatic vegetation during site preparation and construction;
- Potential disturbance and/or loss of rare plant species;
- Potential impairment of vegetation from dust accumulation during site preparation and construction;
- Temporary disturbance of waterfowl and shorebirds habitat;
- Disturbance of shore birds and migratory birds during nesting and rearing;
- Disturbance of colonial and rare/sensitive species during nesting and rearing;
- Loss and disturbance of wildlife habitat;
- Loss and disturbance of small/burrowing mammals;

- Disturbance/loss of habitat for small/burrowing mammals;
- Reduced quality of wildlife habitat from contamination of soils;
- Increased wildlife-vehicle interactions/wildlife mortalities;
- Potential impact to fish resulting from dewatering of construction area if required;
- Disturbance to fish habitat from construction footprint and activities;
- Loss and disturbance of fish and fish habitat due to contamination from leaks and accidental spills, releases of fuels or other hazardous substances during construction;
- Elevated suspended sediment levels in Rush Lake Creek and Highfield Dam reservoir from construction activities; and
- Disturbance to aquatic biota/habitat from increased dust/sedimentation during construction activities.

3.2 PROPOSED MITIGATION MEASURES

3.2.1 General Mitigation

The potential environmental effects identified can be reduced/avoided using appropriate mitigation methods. In addition to specific requirements that may be issued by DFO as part of fisheries review and or authorization process, the following is a general overview of typical mitigation measures used for similar projects. More specific mitigation methods may be identified during the environmental assessment when a more detailed project description is available. Mitigation measures for reducing and/or preventing the above listed environmental effects include:

- Limiting construction activities to designated and, where possible, previously disturbed areas;
- Adhere to provincial activity restrictions listed in Appendix E and described below;
- Contact SKCDC regarding mitigative advice for S1-S3 species;
- Minimize loss and disturbance of vegetation;
- Minimize loss and disturbance of soils;
- Restrict activities during high wind events and control dust using approved suppressant;
- Re-vegetate disturbed and reclaimed areas after construction with native seed mixes, if possible;
- Provide wildlife awareness information to work crews;
- Operate vehicles during daylight hours as much as possible and adhere to existing speed limits;
- Conduct a fish salvage operation within any areas required to be dewatered during construction activities;
- Use screened intakes suspended in the water column when dewatering the construction area if required;
- Discharge any water over energy dissipation mats to reduce potential erosion and control sedimentation before water re-entering any water body or watercourse;

- Use silt fencing and turbidity curtains where appropriate during construction and remove any accumulated sediment;
- Conduct work from the banks as much as possible to prevent further disturbance to fish habitat;
- Limit construction activities when possible, in areas with higher valued fish habitat;
- Adhere to the DFO in-water work restrictions which would be from April 1 to May 31 at Highfield dam (Southern Saskatchewan) based on the presence of spring spawning fish (and no lake sturgeon; Appendix F);
- Prevent leaks, spills and releases by providing secondary containment for fuel and hazardous material storage;
- Provide drip trays and spill clean-up equipment and materials;
- Excavate contaminated soils; and
- Prepare emergency spill response plan.

3.2.2 Activity Restrictions and Specific Mitigation

Vegetation

The Saskatchewan Ministry of the Environment activity restriction guidelines for sensitive species in natural habitats has a one-size-fits-all approach for plant species which includes a 0 m set back distance for foot traffic, a 25 m set back for small vehicles and a 50 m set back for any high disturbance such as use of heavy machinery for construction, quarries, gravel pits, etc. (Appendix E). The five provincially rare vegetation species do not have set back restrictions assigned by the Saskatchewan Ministry of the Environment; however, it is advised that the SKCDC immediately be informed of their presence as observed during the 2003 and 2010 field programs and that the standard recommended set back restriction be applied for all S1 – S3 species. The earlier these mitigative measures are included into a project proposal, the less likely that delays will occur further down the line should these species of concern become an issue of contest with the Saskatchewan Ministry of the Environment.

Birds

Although the chestnut collared longspur is not considered to be rare/endangered in Saskatchewan and therefore no activity restrictions have been set, as previously stated, it is listed as threatened by COSEWIC. The chestnut collared longspur is dependant on native prairie habitat ⁽⁵⁾, which is where it was observed to be nesting. As such, the population within the project area would be at risk of decline if the grassland fragments were lost outright as a result of the project. Mitigation to prevent this should include ensuring that a portion of the

grassland fragments are preserved and developing an appropriate rehabilitation plan for this section of the site that includes revegetation using a native plant seed mix.

The ferruginous hawks observed within the project area were likely only foraging as they typically nest in relatively high locations, in tall trees, usually in older semi-isolated cottonwoods (*Populus deltoids*). Appropriate nesting habitat was absent from the project area and neither hawk appeared alarmed by the survey team, which would have implied that their range was being encroached upon. Suitable nesting habitat was identified approximately 1.5 km northwest and 2 km northeast of the project area. As ferruginous hawk nest sites are not likely to occur in the project area, activity restriction dates listed by SKCDC should not need to be imposed. Additionally, as the closest available nesting habitat for this species is approximately 1.5 km from the project area, the proposed construction activity is further than the SKCDC recommended set back distance (1000 m) for road construction and other high disturbance categories (Appendix E).

During the 2003 study a loggerhead shrike breeding pair was observed in a stand of buffalo berry in non-native grassland adjacent to the Highfield Dam (Figure 1). Destruction of the buffalo berry stand or construction in the immediate area may directly affect the loggerhead shrike pair as a loss of nesting habitat. The foraging habitat of the pair was primarily in the cropland adjacent to the nest, and would not be affected by construction on the east side of the abutment. Therefore if at the time of construction this nest and breeding pair are present then the appropriate activity restrictions of 50 m, 250m and 400 m setbacks distances for low, medium and high disturbances should be adhered to during the restriction dates from May 1 to August 15 (Appendix E).

The great blue heron seen above the open water of the reservoir during the spring site visit has a provincial rating of S3B which indicates that the species is rare-uncommon in Saskatchewan. This species typically is associated with freshwater and brackish marshes along open water areas although it can be found near open fields. It commonly nests high in trees in swamps and forested areas although it can nest in bushes, on the ground, along rock ledges and cliffs ⁽⁵⁾. While it is likely that the blue heron observed during the spring site visit was breeding in the area, it is less likely that the nesting area was within the project area considering the available habitat. The potential area of impact that may result from proposed development will not likely impact the optimal breeding habitat for this species. It is unlikely that the SKCDC activity

restriction dates will be required for this project. However, should a nest be encountered then the appropriate activity restrictions of 500 m for low impact disturbances and 1000 m for medium to high disturbance should be adhered to during the restriction dates from April 1 to July 31 (Appendix E).

Several species and/or groups of species (colonial nesting birds) have special considerations assigned to them by Saskatchewan Environment regardless of their conservation status. This is done because colonial birds respond as a flock such that if a single bird takes flight in response to disturbance the flock will also take flight resulting in greater disturbance than a single bird for non-colonial species. With the exception of the great blue heron, all of the colonial birds identified within the project area had very common/secure provincial and global status (S5 and G5, respectively). No nests for any of these species were observed during this survey, nor were any of these species observed in colonies within the project area. Therefore, it is unlikely that the SKCDC activity restriction dates for colonial nesting birds will be required for this project. However, the SKCDC set back restrictions would apply for these species if a nest is encountered within the project area at a future date (Appendix E). Recommended set back distances for Gulls/terns are 200 m for low levels of disturbance, and 400 m for medium to high levels of disturbance between May 1 and July 15. Recommended set back distances for Grebes are 100 m for low levels of disturbance, and 200 m for medium to high levels of disturbance between May 15 and July 15.

An American bittern (*Botarus lentiginosus*), was identified within the project area in the Rush Flat vegetation category. Although this species has a Global status of G4 (apparently secure) and a provincial status of S4B (common for breeding), Saskatchewan Environment has assigned a set back category to it (Appendix E). While this species was observed in the project area, no nest was observed and the bird was not issuing an alarm call that would suggest it had fledglings present. Therefore, it is unlikely that restricted activity dates need to be applied. Should a nest be encountered at a future date the set back requirements for this species are 200 m for low levels of disturbance, and 400 m for medium to high levels of disturbance between May 1 and July 31.

Amphibians

The Northern Leopard Frog uses a variety of habitats to meet its overwintering and breeding needs and in the summer is found in a wide variety of habitats, although the preferred habitat seems to be vegetation 15 to 30 cm tall that is relatively close to water ⁽³⁾. Well-oxygenated water bodies, such as streams or larger ponds that do not freeze solid are used for overwintering sites. Temporary ponds that often dry up in late summer that are typically 30 to 60 m in diameter, 1.5 to 2.0 m deep, located in an open area, with a lot of emergent vegetation, and no fish are used for breeding sites. Therefore the species is adversely affected by habitat fragmentation and conversion, including wetland drainage and eutrophication, as well as game fish introduction, collecting and pesticide contamination. While the proposed development, particularly the widening of the berm, will impede into a small portion of the habitat used by the northern leopard frog, the quantity of habitat that would be impacted is negligible compared to that available in the immediate surrounding area. Regardless the appropriate activity restrictions of 10 m, 200m and 500 m setbacks distances for low, medium and high disturbances should be adhered to during the restriction dates from April 1 to October 31 (Appendix E).

4.0 REFERENCES

1. Jacques Whitford Environmental Limited. December 2003. Rare Plant, Wildlife, Fish and Native Habitat Assessment of Cadillac and Highfield Reservoirs, Saskatchewan. Prepared for Prairie Farm Rehabilitation Administration, Swift Current District Office.
2. Government of Canada. 2010. The Committee on the Status of Endangered Wildlife in Canada, found at http://www.cosewic.gc.ca/eng/sct5/index_e.cfm Viewed on October 5, 2010.
3. Government of Canada. 2010. Species At Risk Act Public Registry, found at <http://www.sararegistry.gc.ca> Viewed on October 5, 2010.
4. Saskatchewan Ministry of Environment, Fish and Wildlife Branch. 2010. Species at Risk in Saskatchewan, found at <http://www.biodiversity.sk.ca/Docs/SpeciesAtRiskinSK.pdf> Viewed on October 5 2010.
5. NatureServe 2010. <http://www.natureserve.org> Viewed on Aug 24, 2010.

TABLES

TABLE 1
SPECIES OF CONSERVATION CONCERN - HIGHFIELD DAM REHABILITATION PROJECT

Species		Plant Community							Status		
Common Name	Scientific name	CWP	SWM	WS	RF	GF	WET	RES	Provincial (S)	COESWIC	National (G)
Vegetation											
Heart-leaved buttercup	<i>Ranunculus cardiophyllus</i>					■/□			S1S2	-	G4G5
Least mousetail	<i>Myosurus minimus</i>		●						S2S3	-	G5
Narrow-leaved plantain	<i>Plantago elongata</i>		●/□						S2S3	-	G4
Stream bank wheatgrass	<i>Elymus lanceolatus</i>					■/□			S2	-	G5
Water weed	<i>Elodea canadensis</i>							■/□	S2S3	-	G5
Birds											
American bittern	<i>Botaurus lentiginosus</i>				■				S4B	-	G4
American wigeon	<i>Anas americana</i>						■/□		S5B,S5M,S2N	-	G5
Chestnut-collared longspur	<i>Calcarius ornatus</i>					■/□			S5B	T	G5
Common tern	<i>Sterna hirundo</i>							●/□	S5B, S5M	NAR	G5
Eared grebe	<i>Podiceps nigricollis</i>							●/■/□	S5B	-	G5
Ferruginous hawk	<i>Buteo regalis</i>	□	□		□				S4B, S4M	T	G4
Gadwall	<i>Anas strepera</i>						■	■	S5B,S5M,S2N	-	G5
Great blue heron	<i>Ardea herodias</i>							■	S3B	PS, LC	G5
Loggerhead shrike	<i>Lanius ludovicianus excubitorides</i>	●							S3B	T	G4
Northern harrier	<i>Circus cyaneus</i>	■/□	■/□		■				S5B,S4M,S2N	NAR	G5
Red-tailed hawk	<i>Buteo jamaicensis</i>	■/□						■/□	S5B,S5M,S1N	NAR	G5
Semipalmated sandpiper	<i>Calidris pusilla</i>						□	□	S4M	C	G5
Mammals											
American badger	<i>Taxidea taxus</i>		■						S3S4	NAR	G5
Amphibians											
Northern leopard frog	<i>Rana pipiens</i>						●/■		S3	SC	G5

Notes:

● = 2003 survey; ■ = site visit 1 (May 31 - June 2, 2010); □ = site visit 2 (August 10 - 11, 2010)

Provincial Status (S-Rank): S1= Extremely Rare (<5 occurrences), S2= Rare (6 to 20 occurrences), S3= Rare-Uncommon (21 to 100 occurrences), S4= Common (>100 occurrences), S5= Very Common (>100 occurrences), S#S# indicates range of uncertainty in status

Global Status (G-Rank): G1= Critically Imperiled, G2= Imperiled, G3= Vulnerable, G4= Apparently Secure, G5= Secure, G#G# indicates range of uncertainty in status

Status modifiers: B = For a migratory species, rank applies to the breeding population in the province,

N = For a migratory species, rank applies to the non-breeding population in the province,

M = For a migratory species, rank applies to the transient population,

COSEWIC descriptors T = Threatened; A wildlife species likely to become endangered if no action taken

SC = Special Concern; Likely to be come endangered due to combination of identified threats

NAR = not at risk of extinction

PS = Status applies only to a portion of the species' range

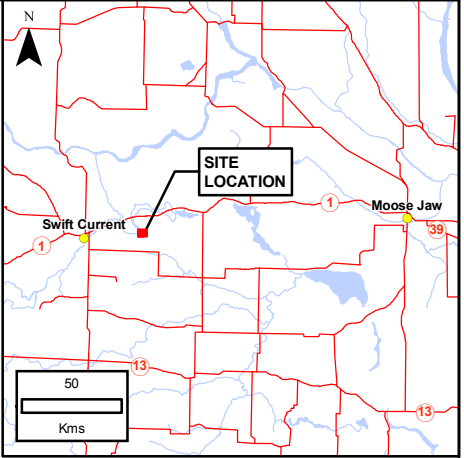
LC = Least Concern

C = Candidate/identified species, not yet assessed

FIGURES

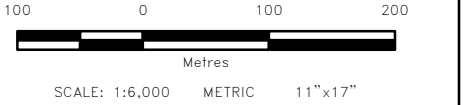
Portions of data presented are owned by the Province of Saskatchewan and are produced under the licence agreement with the Province of Saskatchewan 2010 Queen's Printer.

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11"x17" PLOT SCALE 1:1



- LEGEND:
- Species of Concern
 - Contour
 - Fence
 - Proposed Spillway Channel
 - Road CL
 - Road Edge
 - Sasktel
 - Shoreline
 - Slope Edge
 - Borrow Area
 - Structures
 - Vegetation Community
 - Project Study Area
 - Quarter Section Boundary

NOTES:
1. Imagery from Google Earth (2010 Cnes/Spot Image).
2. Contour data provided by Agriculture and Agri-Food Canada.



All units are metric and in metres unless otherwise specified.
Transverse Mercator Projection, NAD 1983, Zone 13
Elevations are in metres above sea level (MSL)

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REVISIONS / ISSUE

KGS

GROUP

CONSULTING ENGINEERS

Agriculture and Agri-Food Canada

Agriculture et Agroalimentaire Canada

REHABILITATION OF THE HIGHFIELD DAM PROJECT

SITE LOCATION PLAN

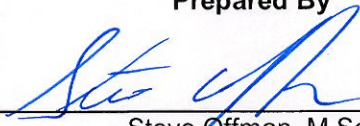
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APPENDICES

APPENDIX A
VEGETATION / RARE PLANT SURVEY
FINAL REPORT

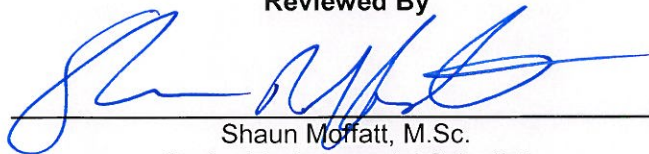
**Vegetation / Rare Plant Survey for the Rehabilitation of the
Highfield Dam Project
AAFC/AESB Service Contract No.2
FINAL REPORT
November 2010**

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TABLE OF CONTENTS

	<u>PAGE</u>
1.0 INTRODUCTION	1
2.0 VEGETATION SURVEY METHODOLOGY	4
2.1 INFORMATION REVIEW	4
2.2 RARE PLANT AND NATIVE VEGETATION SURVEY METHODOLOGY	4
3.0 RESULTS.....	6
3.1 HISTORIC SITE DATA	6
3.2 CURRENT STUDY	6
3.2.1 Community Descriptions	6
3.2.2 Rare species.....	9
4.0 DISCUSSION	11
4.1 NATIVE VEGETATION.....	11
4.2 RARE SPECIES	12
4.3 OVERVIEW OF PROJECT EFFECTS AND MITIGATION.....	13
5.0 REFERENCES.....	15
TABLES	
FIGURES	
APPENDICES	

LIST OF TABLES

1. Vegetation Species List (2010 Survey)
2. Potential Environmental Effects, Mitigation, and Follow-up

LIST OF FIGURES

1. Site Location Plan

LIST OF APPENDICES

- A. Saskatchewan Conservation Data Centre – Species at Risk in Saskatchewan
- B. Saskatchewan Conservation Data Centre 2009 Rare Plant Survey Guidelines
- C. Site Photographic Log
- D. Saskatchewan Activity Restriction Guidelines for Sensitive Species

1.0 INTRODUCTION

Kontzamanis Graumann Smith Macmillan Inc. (KGS Group) was retained by the Agri-Environment Services Branch of Agriculture and Agri-Food Canada (AAFC/AESB) to conduct biological surveys (rare plant, wildlife, fish and habitat assessments) at the Highfield Dam site. The dam, which was constructed in 1942 across Rush Lake Creek (NE 36-15-11 W3M), is approximately 28 km east of Swift Current, Saskatchewan and 8 km south of the No. 1 Highway (Figure 1). The dam and associated infrastructure and land is owned and operated by AAFC/AESB. The reservoir has a total storage area of 14, 895 dam³ and a flooded area of approximately 517 ha at full supply level (FSL; EI 723.0 m). The water in the reservoir is used to support agricultural lands in the region, in particular the Herbert and Rush Lake Irrigation projects.

A dam safety assessment of the Highfield Dam was conducted by the Prairie Farm Rehabilitation Administration (PFRA) in 1987. Using PFRA's hazard potential classification system the Highfield Dam was rated as having a high potential for loss of life, significant downstream economic losses, and significant other economic losses caused by flooding due to dam failure. Further, dam safety reviews indicated that the current spillway system cannot pass an inflow design flood (IDF) consistent with industry standards and that there is insufficient freeboard between the FSL and top of dam during passage of less frequent flood events. Preliminary studies are being undertaken by AAFC/AESB to identify appropriate upgrades in order to resolve the dam safety concerns with the current dam components. The option currently favoured involves increasing the spillway capacity through construction of a new spillway on the east side, raising the top of dam elevation and other associated work (Figure 1). Other project enhancements would include: lengthening the west outlet conduit; constructing a bridge over the spillway entrance channel; increasing the capacity of an existing wasteway located on the Herbert Main Canal immediately downstream of the dam; and improving the flood capacity of the existing spillway.

Major activities associated with this project may include borehole drilling; excavating soils; hauling and stockpiling soils, rock and granular materials; placing soil materials; shaping and compacting soils; placing rock and granular materials; placing topsoil; and revegetating disturbed areas. The construction activities will likely be completed using traditional earth

moving equipment including track hoes; rock trucks, graders, front-end loaders, bobcats and scrapers. The proposed borrow area for the earth works is located southeast of the east end of the dam and overlaps with the existing previously disturbed borrow area used to construct the current dam (Figure 1). The proposed work is anticipated to start in the 2012/2013 construction season; however, there is the potential that delays in the decision making process may lead to postponing the work until the following season.

As AAFC/AESB is the proponent; an Environmental Assessment (EA) will be required under the *Canadian Environmental Assessment Act* (CEAA) for the proposed work. An assessment of the biological systems around the project area was previously conducted in 2003 by Jacques Whitford Environmental Limited ⁽¹⁾. However, in preparation for the EA, AAFC/AESB requires an update to the existing biophysical information within the project area. This data will be used to supplement the existing data by identifying any new species not recorded previously so that AAFC/AESB is working with the most current data available for the project study area. As such, rare plant, wildlife, and fish and fish habitat assessments have been conducted in order to facilitate identification of potential adverse environmental impacts associated with the proposed project and recommendations and mitigation measures have been proposed for avoidance and/or minimizing the impacts from the proposed work.

As part of the vegetation surveys conducted at the Highfield Dam property, during the 2010 survey, particular emphasis was placed on determining the presence of rare and/or endangered species within the project study area as recorded by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), the federal *Species at Risk Act* (SARA), and the Saskatchewan Conservation Data Centre (SKCDC) databases. The SARA is a key federal government commitment to prevent the extinction or extirpation of species, subspecies, and distinct populations and to secure the necessary actions for the recovery of endangered or threatened species. It provides for legal protection of these species and the conservation of their biological diversity ⁽²⁾. The SARA affirms COSEWIC as an independent body of experts responsible for identifying and assessing species at risk. Species that have been designated by COSEWIC may qualify for legal protection and recovery under SARA; however, it is up to government to legally protect species designated by COSEWIC as the SARA applies only to species on the SARA legal list ⁽³⁾. The Saskatchewan Ministry of the Environment is legislated to address species at risk in Saskatchewan under the direction of *The Wildlife Act*, 1998, which included provisions to designate and protect species at risk in Saskatchewan. There area

currently 16 plant species at risk in Saskatchewan (listed under COSEWIC as special concern, threatened, or endangered) that are identified under SARA, 6 of which are identified as a provincial wild species at risk under the *Wildlife Act* ⁽⁴⁾ (Appendix A).

This report outlines the methods and results of the rare and endangered plant and native vegetation survey conducted within the project study area. The report is based upon information obtained during two separate site visits conducted in late spring (May 31 to June 2, 2010), and mid-summer (August 10 to 11, 2010).

2.0 VEGETATION SURVEY METHODOLOGY

2.1 INFORMATION REVIEW

Prior to initiating the field program, KGS Group conducted a review of all pertinent documents from previous studies that were provided by AAFC/AESB. In addition, a literature search was conducted for documents produced after 2003. KGS Group located a single document with pertinent information regarding the regional study area. The document titled Background Report – Swift Current Watershed was issued by the Saskatchewan Watershed Authority (SWA) and contained general information regarding vegetation and wildlife typically associated with the mixed grass ecoregion that encompasses the Swift Current watershed ⁽⁵⁾. Data from these reports will be compared to the results of this study later in the report in the Discussion (Section 4).

2.2 RARE PLANT AND NATIVE VEGETATION SURVEY METHODOLOGY

The vegetation surveys to identify the presence/absence of species within the project study area were conducted in accordance with the Native Plant Society of Saskatchewan guidelines for Rare Plant Surveys ⁽⁶⁾. Multiple surveys were conducted in order to more effectively identify species at a stage when there are identifiable characteristics present on the plant. This is a standard practice for vegetation surveys and is recommended by the SKCDC 2009 Rare Plant Survey Guidelines (Appendix B).

Five plant communities were identified in previous work conducted on the site ⁽¹⁾, and were reaffirmed by the KGS Group project team. The five plant communities are as follows (Figure 1; Appendix C – Photos 1 – 6).

- Crested Wheat Pasture (CWP);
- Saline Wet Meadow (SWM);
- Wooded Stand (WS);
- Rush Flats (RF), and
- Native Grassland (NG)

Although, the Jacques Whitford report refers to some areas as native grassland, the current study determined that this plant community is better described as grassland fragments (GF) and will be referred to as such for the remainder of this report. Justification for this determination will be provided in the discussion below (Section 4.0). Two additional plant communities that were examined during the study included reservoir (RES; Appendix C – Photo 7) that describes the shoreline habitat (along the reservoir) and wetland (WET; Appendix C – Photo 8) that describes the plant community within Rush Lake Creek and the land drainage channel/original creek that winds through the property (Figure 1).

Two survey techniques were used during the vegetation surveys at each of the plant communities. A systematic approach was used to ensure that each plant community within the project study area was included in the survey. This involved establishing equidistant transects throughout the plant communities which the survey team traversed making regular visual observation. A random meander method was also used to cover the area between the transects and to apply special attention to habitat likely to support rare species (atypical habitat, eroded sites, and known habitat of rare species previously identified or potentially present in the project study area). Given the size of the project study area, additional random meandering was used to blanket cover the entire area within the project study area.

Plants were primarily identified to species level in the field; however, verification was required for a few species and, as such, specimens were collected and later identified at a herbarium. Rare plant species locations were recorded using a handheld global positioning system (GPS) device with coordinates recorded in Universal Transverse Mercator (UTM) using North American Datum of 1983 (NAD83) and the locations were marked on a map (Figure 1). GPS coordinates for rare plants identified in the previous work on the site were used to attempt to locate those species during the current study.

3.0 RESULTS

3.1 HISTORIC SITE DATA

A vegetation survey conducted during a previous study at the Highfield Dam property consisted of a single site visit on July 7 and 8, 2003. The study established five plant communities as indicated in section 2.2 and described the dominant plant association and percent plant cover within each community using a series of 1 m² quadrats. A total of 38 species were identified throughout the projects study area including two provincially rare plants the Narrow-leaved plantain and the least mouse-tail (*Myosurus minimus*).

3.2 CURRENT STUDY

Overall a total of 125 plant species were identified within the various project area plant communities during the 2010 field program (Table 1). During the first site visit 68 species were identified, 60 of which were identified again during the second site visit. An additional 57 species, not identified during the first site visit, were identified during the second site visit. The number of species and a description of the dominant species within each of the plant communities are provided in the following section followed by a summary of the rare species recorded.

3.2.1 Community Descriptions

Crested Wheat Pasture

The crested wheat pasture community covers the largest area within the project study area and surrounding land (Figure 1). A total of 25 species were identified in this plant community (Table 1). Crested wheatgrass (*Agropyron cristatum*) and greasewood (*Sarcobatus vermiculatus*) were consistently the dominant plant species throughout the pasture areas. Intermediate wheatgrass (*Thinopyrum intermedium*) was abundant in the northern areas of the pasture bordering the project study area. A mix of various other native species were encountered throughout this plant community, notably Nuttall's saltgrass (*Puccinellia nuttalliana*), inland saltgrass (*Distichlis spicata*) and Sandberg's bluegrass (*Poa secunda*).

Saline Wet Meadow

The saline wet meadow covered approximately 60% of the frontage of the dam and was flanked by the crested wheat pasture and the rush flats (Figure 1). A total of 37 species were identified in this plant community (Table 1). The dominant species in the Saline wet meadow were greasewood, Sandberg's bluegrass, western wheatgrass (*Pascopyrum smithii*), inland saltgrass, and Nuttall's saltgrass. Red fescue (*Festuca rubra*) was found fairly consistently albeit at a low abundance, throughout this plant community. Buffalo berry (*Shepherdia canadensis*) was commonly located in association with mid-upper bank habitat along segments of the old Rush Lake Creek/land drainage.

Situated within the SWM habitat were pockets of habitat that bore floral similarities to the area identified as the rush flats (see below). The dominant species in this area included three-square bulrush (*Schoenoplectus pungens*), baltic rush (*Juncus balticus*), creeping spike rush (*Eleocharis palustris*), and prairie bulrush (*Scirpus paludosus*).

An area approximately 800 m² located on the approach to the east outlet structure was disturbed land. This area was essentially an upland range site transitioning down-slope into the saline wet meadow; however because of its location within the study area it was included with saline wet meadow. The dominant species included western wheatgrass and crested wheatgrass with a mixture of herbaceous vegetation notably Richardson's bitterweed (*Hymenoxys richardsonii*), and spear-leaved goosefoot (*Monolepis nuttalliana*). This area showed signs of compaction likely due to vehicular activity and possibly due to trampling by cattle moving between paddocks and therefore is not considered good quality habitat.

Wooded Stand

The plant community referred to as the wooded stand was located within the CWP just west of Rush Lake Creek approximately 360 m north of the east outlet structure. A total of 5 species were identified in this plant community (Table 1). The wooded stand is essentially composed of a relatively tall and dense stand of buffalo berry with an understory consisting of smooth brome (*Bromus inermis*), Kentucky bluegrass (*Poa pratensis*), crested wheatgrass, and periodic occurrences of Canada goldenrod (*Solidago canadensis*).

Rush Flats

This plant community began just north of the west side of the dam and continued along the west edge of the project study area (Figure 1). A total of 26 species were identified in this plant community (Table 1). The rush flats are a composite of shallow marsh vegetation with pockets of permanent wetland and mesic/wet meadow.

The shallow marsh conditions that cover most of this plant community was dominated by field sow thistle (*Sonchus arvensis*), and Baltic rush. Vegetation surrounding/within temporary pools were characterized by Baltic rush, bentgrass (*Calamagrostis stricta*), and various sedges including graceful sedge (*Carex praegracilis*).

Permanent wetland communities were dominated by three-square bulrush, broad-leaved cattail (*Typha latifolia*), Hard-stem bulrush (*Schoenoplectus acutus*), Baltic rush and creeping spike rush. Mesic/wet meadow range sites typically supported vegetation capable of tolerating high salinity including Nuttall's saltgrass and inland saltgrass.

Grassland Fragments

The areas southeast and southwest of the dam between the road and the reservoir shoreline were categorized as grassland fragments. A total of 68 species were identified in this plant community (Table 1). The dominant species in this plant community varied with position on the slopes and with aspect; however, overall the plant community was dominated by needle and thread grass (*Hesperostipa comata*), green needlegrass (*Nassella viridula*), and western wheatgrass. Other common species included blue grama grass (*Bouteloua gracilis*), needle leaf sedge (*Needleleaf sedge*), spike moss (*Selaginella densa*), Prairie June grass (*Koeleria macrantha*), Porcupine grass, and red fescue.

Reservoir

The reservoir plant community describes the shoreline habitat along the reservoir leading up to and including the eroded exposed sand slope surrounding the grassland fragments. A total of 36 species were identified in this plant community (Table 1). Perennial wetland macrophytes and shoreline woody species were largely absent from the reservoir, particularly the shorelines

along the main basin, indicating substantive ice scour or wide fluctuations in water levels. The dominant species included silverweed (*Argentina anserina*), field sow thistle, foxtail barley (*Hordeum jubatum*), and common yarrow (*Achillea millefolium*). The dominant submergent aquatic vegetation was sago pondweed (*Potamogeton pectinatus*).

Wetland

The wetland community describes the vegetation along Rush Lake Creek and the land drainage channel/old Rush Lake Creek channel that winds through much of the project study area. A total of 30 species were identified in this plant community (Table 1). Many reaches along the creek/channel were completely overgrown, mainly with emergent vegetation. The dominant species were broad-leaved cattail, baltic rush, creeping spike rush, softstem bulrush (*Schoenoplectus tabernaemontani*) and hard stem bulrush.

3.2.2 Rare species

Four provincially extremely rare to rare-uncommon species (S1-S3) were identified within the project study area (Table 1, Figure 1). None of the species identified however, were listed under COSEWIC, federally protected under the SARA or listed as provincial species at risk under *The Wildlife Act* 1998 (Appendix A)

Two heart-leaved buttercup (*Ranunculus cardiophyllus*) were identified during the first site visit and located again during the second site visit in the GF plant community (13 U 330312 5575542, and 13 U 330346 5575483). Heart-leaved buttercup is considered extremely rare to rare provincially (S1S2; 5 or fewer occurrences to 6 to 20 occurrences) meaning it is critically imperiled to imperiled as it may be susceptible to extirpation, however, it is considered apparently secure to secure globally (G4G5).

Two narrow-leaved plantain (*Plantago elongata*) were identified during the second site visit in the SWM plant community approximately 35 m apart (13U 329586 5575981, and 13U 329620 5576017; Appendix C - Photo 9). Narrow-leaved plantain is considered rare to rare/uncommon provincially (S2S3; 6 to 20 occurrences to 21 to 100 occurrence) meaning it is imperiled to vulnerable as it may be susceptible to extirpation, however, it is considered apparently secure to secure globally (G4).

Stream bank wheatgrass (*Elymus lanceolatus*) was identified during both site visits in the GF plant community (13U 330362 5575288). Stream bank wheatgrass is considered rare provincially (S2; 6 to 20 occurrences) meaning it is imperiled as it may be susceptible to extirpation, however, it is considered secure globally (G5).

Water weed (*Elodea canadensis*) was identified during the second site visit in the RES plant community (13U 330184 5575660). Water weed is considered rare to rare/uncommon provincially (S2S3; 6 to 20 occurrences to 21 to 100 occurrence) meaning it is imperiled to vulnerable as it may be susceptible to extirpation, however, it is considered secure globally (G5).

4.0 DISCUSSION

4.1 NATIVE VEGETATION

The mixed grassland ecoregion is dominated by mid grass (wheatgrass and needlegrass) and short grass (blue grama grass) prairie species. Common plants in this ecoregion may include yarrow and prairie sage (*Artemisia ludoviciana*) as well as common shrubs such as hoary sage bush, winter fat (*Krascheninnikovia lanata*), wild rose, and western snowberry ⁽⁵⁾.

The 2010 field program identified 125 plant species while the previous study in 2003 identified 38 species. More species were identified in 2010 because the entire study area was surveyed, using the sampling method outlined in Section 2.2, compared to the 2003 study that used a total of 34 quadrats (1 x 1 m) placed in areas of homogenous vegetation within each community. Hairy speedwell (*Veronica peregrina*), Field dock (*Rumex pseudonatronatus*), willow herb (*Epilobium sp.*) and least mouseltail were identified during the previous study; however, were not encountered during the 2010 field program. While least mouseltail is provincially rare, hairy speedwell, field dock (which is an exotic) and most species of willow herb are common and widespread throughout Saskatchewan. The remaining 34 species previously identified within the project study area were encountered during the current study.

KGS Group reviewed and agrees with the plant communities described in the previous study with some minor exceptions. A small area immediately west of the boundary between the saline wet meadow and the rush flats appeared to be more oriented towards saline wet meadow. The KGS Group project team treated this area as a transition zone between the two plant communities and determined that redefining the boundaries was not required. Additionally, two new plant communities (wetland and reservoir) were identified as they were distinct from the surrounding plant communities as noted in Section 3.2.1.

A more substantial difference however is that the current study determined that the plant community previously referred to by Jacques Whitford as native grassland, is better described as grassland fragments. Referring to this community as native grassland implies that these areas are relatively high quality grassland areas dominated by native species when in reality they have been exposed to disturbance from past activities on the site and from the surrounding land use.

An area within this plant community, southeast of the east outlet structure, has previously experienced substantial disturbance as it was the location of the original borrow pit for the construction of the Highfield Dam. As well, sections have experienced overgrazing as apparent by the increased occurrence of pasture sage (*Artemisia frigida*), a species which increases under heavy grazing and is used as an indicator of overgrazing. Further, crested wheatgrass, either through invasion from tame pasture nearby, or through active reclamation, has begun to encroach along the edges of the grassland fragments. In some areas in the northern section of the plant community, crested wheatgrass is becoming one of the dominant species with approximately 12% cover. Due to the mix of highly disturbed areas, overgrazing and the encroachment of crested wheat grass which is cultivated in the surrounding fields, this grassland area is highly degraded and; therefore, classified as grassland fragments.

4.2 RARE SPECIES

The previous study identified two provincially rare species (least mousetail and narrow-leaved plantain) in a small area in the northwest portion of the saline wet meadow plant community situated just south of the boundary with the crested wheat pasture. Though the current study did not locate the least mousetail, the two occurrences of the narrow-leaved plantain were encountered in the approximate location described in the 2003 study (Figure 1). Three additional provincially rare to rare-uncommon species (S1-S3) were identified during the 2010 field program. The two occurrences of the heart-leaved buttercup and the single occurrence of stream bank wheatgrass were encountered along the west edge of the grassland fragments, while the water weed was encountered within the water along the east shore of the reservoir. (Figure 1).

None of the five provincially rare species observed on site previously or during the current study are listed under COSWEIC, and as such are not federally protected under the SARA or considered species at risk in Saskatchewan (Table 1; Appendix A). Further, none of the provincially rare species are included in the list of species with activity restrictions imposed by the Saskatchewan Ministry of the Environment (Appendix D).

The Saskatchewan Ministry of the Environment activity restriction guidelines for sensitive species in natural habitats has a one-size-fits-all approach for plant species which includes a 0 m set back distance for foot traffic, a 25 m set back for small vehicles and a 50 m set back for

any high disturbance such as use of heavy machinery for construction, quarries, gravel pits, etc. The five provincially rare species do not have set back restrictions assigned by the Saskatchewan Ministry of the Environment; however, it is advised that the SKCDC immediately be informed of their presence as observed during the 2003 and 2010 field programs and that the standard recommended set back restriction be applied for all S1 – S3 species. The earlier these mitigative measures are included into a project proposal, the less likely that delays will occur further down the line should these species of concern become an issue of contest with the Saskatchewan Ministry of the Environment.

4.3 OVERVIEW OF PROJECT EFFECTS AND MITIGATION

Project activities have the potential to impact portions of all of the identified plant communities except for wooded stand. The proposed project activities likely to result in measureable disturbances include widening the dam in order raise the top of dam elevation, the clearing and trenching associated with development of a new spillway channel and the clearing and excavation of the borrow pit area.

The crested wheat pasture, saline wet meadow, rush flats and sections of the wetland vegetation community all border the toe of the slope of the existing dam. The impacts to these four plant communities resulting from widening of the embankment will likely be insignificant as the vegetation being affected is, for the most part, common and widespread, and only a small area within each of the plant communities falls within the project foot print. Although there are rare species identified within the saline wet meadow, these plants are more than 250 m from north embankment of the current dam, and it is unlikely that the proposed work will encroach upon the recommended 50 m set back distance.

The crested wheat pasture, grassland fragments, wetland and reservoir plant communities will likely be adversely affected by the development of the proposed spillway. Again only a comparably small area will be used from each plant community in relation to the total available area within each plant community. However, the rare plants identified within the grassland fragments and the reservoir plant communities are in the vicinity of the proposed spillway. The conservation and protection of these species should be considered during development and detail design of the project.

The project activity that will result in the largest loss of vegetation cover is the clearing and excavation of the borrow pit. As indicated above, the western boundary of the grassland fragment southeast of the east outlet structure contains two rare species. The Saskatchewan Ministry of the Environment should be contacted as part of the environmental assessment process in order to provide advice for suitable mitigation procedures to be included as part of the final design.

In general vegetation that may be impacted is limited in both quality and quantity except for the provincially rare species identified above. Assuming that the recommended mitigation measures are implemented such that the project does not adversely impact these rare plant species identified, the overall impacts of the project will be negligible. Potential environmental effects of the proposed modifications to Highfield Dam on native vegetation are typical of those associated with earth work projects and include the following:

- Potential loss and disturbance of terrestrial and possibly some aquatic vegetation during site preparation and construction,
- Potential disturbance and/or loss of rare plant species, and
- Potential impairment of vegetation from dust accumulation during site preparation and construction

These potential environmental effects can be reduced/avoided using the appropriate mitigation methods. The following is a general overview of typical mitigation measures used for similar projects. More specific mitigation methods may be identified during the environmental assessment when a more detailed project description is available. Mitigation measures for reducing and/or preventing the above listed environmental effects include:

- Minimize loss and disturbance to vegetation,
- Limit construction activities to designated and previously disturbed areas,
- Re-vegetate disturbed and reclaimed areas after construction; with native seed mixes, if possible,
- Adhere to provincial activity restrictions listed in Appendix D,
- Contact SKCDC regarding mitigative advice for S1-S3 species.
- Control dust using approved suppressants, and
- Restrict activities during high wind events.

The potential environmental effects and associated mitigative measures and follow-up procedures as listed above are summarized in Table 2.

5.0 REFERENCES

1. Jacques Whitford Environmental Limited. December 2003. Rare Plant, Wildlife, Fish and Native Habitat Assessment of Cadillac and Highfield Reservoirs, Saskatchewan. Prepared for Prairie Farm Rehabilitation Administration, Swift Current District Office.
2. Government of Canada. 2010. Species At Risk Act Public Registry, found at <http://www.sararegistry.gc.ca> Viewed on October 5, 2010.
3. Government of Canada. 2010. The Committee on the Status of Endangered Wildlife in Canada, found at http://www.cosewic.gc.ca/eng/sct5/index_e.cfm Viewed on October 5, 2010.
4. Saskatchewan Ministry of Environment, Fish and Wildlife Branch. 2010. Species at Risk in Saskatchewan, found at <http://www.biodiversity.sk.ca/Docs/SpeciesAtRiskinSK.pdf> Viewed on October 5 2010.
5. Saskatchewan Watershed Authority. January 2009. Background Report – Swift Current Creek Watershed.
6. Bizecki Robinson, D. 1998. Guidelines for Rare Plant Surveys. Native Plant Society of Saskatchewan.

TABLE

TABLE 1
VEGETATION SPECIES LIST (2010 SURVEY) - HIGHFIELD DAM REHABILITATION PROJECT

Species		Plant Community							Status		
Common Name	Scientific name	CWP	SWM	WS	RF	GF	WET	RES	Provincial (S)	COESWIC	National (G)
American sea-blite	<i>Suaeda calceoliformis</i>	□	□						S5	-	G5T5
Alkali cordgrass	<i>Spartina gracilis</i>						□		SNR	-	G5
Awned sedge	<i>Carex atherodes</i>		■/□		■/□		■/□		S5	-	G5
Baltic rush	<i>Juncus balticus</i>		■/□		■/□		■/□		S5	-	G5
Barnyard grass	<i>Echinochloa crus-galli</i>					□		□	SNA	-	GNR
Bentgrass	<i>Calamagrostis stricta</i>				□				SNR	-	G5T5
Blue grama grass	<i>Bouteloua gracilis</i>					■/□			S5	-	G5
Broad-leaved cattail	<i>Typha latifolia</i>				■/□		■/□		S5	-	G5
Broad-leaved pussytoes	<i>Antennaria neglecta</i>	■/□				■/□			S5?	-	G5
Buffalo berry	<i>Shepherdia canadensis</i>	■/□	■/□	■/□	■/□		■/□	■/□	S5	-	G5
Bull thistle	<i>Cirsium vulgare</i>					□			SNA	-	GNR
Burreed	<i>Sparganium euycarpum</i>						□		SNR	-	G5
Canada anemone	<i>Anemone canadensis</i>						■		S5	-	G5
Canada goldenrod	<i>Solidago canadensis</i>	□		■		□	□	□	S5	-	G5
Canada thistle	<i>Cirsium arvense</i>					□	□		SNA	-	GNR
Common annual sunflower	<i>Helianthus annuus</i>					□			S5	-	G5
Common milkweed	<i>Asclepias speciosa</i>						□		S4	-	G5
Common plantain	<i>Plantago major</i>					□		□	SNA	-	G5
Common Sweet Grass	<i>Hierochloe hirta</i>				■				S4S5	-	G5T5
Common yarrow	<i>Achillea millefolium</i>	■/□				■/□	■/□	■/□	S5	-	G5
Creeping spike rush	<i>Eleocharis palustris</i>						■/□		SNR	-	G5
Creeping wild rye	<i>Elmus repens</i>		□					□	SNA	-	GNR
Crested wheatgrass	<i>Agropyron cristatum</i>	■/□	■/□	■/□		■/□	■/□		SNA	-	G5
Dotted blazingstar	<i>Liatris punctata</i>					□			S5	-	G5
Early cinquefoil	<i>Potentilla concinna</i>					□			SNR	-	G5?
Field sow thistle	<i>Sonchus arvensis</i>		■/□		■/□		■/□	□	SNA	-	GNR
Five-hook bassia	<i>Bassia hyssopifolia</i>		□						SNA	-	GNR
Flixweed	<i>Descurainia sophia</i>	■				■			SNA	-	GNR
Foxtail barley	<i>Hordeum jubatum</i>		□		□	□	□	□	S5	-	G5
Goat's beard	<i>Tragopogon dubius</i>					□			SNA	-	GNR
Golden bean	<i>Thermopsis rhombifolia</i>					■			S5	-	G5
Golden dock	<i>Rumex maritimus</i>							□	S5	-	G5
Graceful sedge	<i>Carex praegracilis</i>				■/□				SNR	-	G5
Greasewood	<i>Sarcobatus vermiculatus</i>	■/□	■/□				□		S5?	-	G5
Green needlegrass	<i>Nassella viridula</i>					■/□			SNR	-	G5
Ground plum	<i>Astragalus crassicaupus</i>					■/□			S5	-	G5
Gumweed	<i>Grindelia squarrosa</i>	□	□			□			S5	-	G5

TABLE 1
VEGETATION SPECIES LIST (2010 SURVEY) - HIGHFIELD DAM REHABILITATION PROJECT

Species		Plant Community							Status		
Common Name	Scientific name	CWP	SWM	WS	RF	GF	WET	RES	Provincial (S)	COESWIC	National (G)
Hairy golden aster	<i>Chrysopsis villosa</i>					□			S5	-	G5
Hairy Umbrellawort	<i>Mirabilis hirsuta</i>					□			S4?	-	G5
Hard-stem bulrush	<i>Schoenoplectus acutus</i>				■/□		■/□		SNR	-	G5
Heart-leaved buttercup	<i>Ranunculus cardiophyllus</i>					■/□			S1S2	-	G4G5
Inland saltgrass	<i>Distichlis spicata</i>	■/□	■/□		■/□				S5?	-	G5
Intermediate wheatgrass	<i>Thinopyrum intermedium</i>	■/□							SNR	-	GNR
Kentucky bluegrass	<i>Poa pratensis</i>			■/□		■/□	■/□	□	SNR	-	G5
Knotted rush	<i>Juncus nodosus</i>		■/□		■/□				S5	-	G5
Lady's Thumb	<i>Polygonum persicaria</i>							□	SNA	-	G3G5
Licorice root	<i>Glycyrrhiza lepidota</i>					□		□	S5	-	G5
Little bluestem	<i>Schizachyrium scoparium</i>					□			SNR	-	G5
Low everlasting	<i>Antennaria parvifolia</i>					■/□			S5	-	G5
Low goldenrod	<i>Solidago missouriensis</i>					□	□	□	S5	-	G5
Low sedge	<i>Carex stenophylla</i>					■/□			SNR	-	G5
Many-flowered aster	<i>Aster ericoides</i>	□	□			□		□	S5	-	G5
Marsh ragwort	<i>Senecio congestus</i>							□	S5	-	G5
Mat muhly	<i>Muhlenbergia richardsonis</i>		■/□						SNR	-	G5
Meadow-death camas	<i>Zigadenus venenosus</i>					■			SNR	-	G5
Moss phlox	<i>Phlox hoodii</i>					■/□			S5	-	G5
Narrow-leaved Milk-vetch	<i>Astragalus pectinatus</i>					■/□			S5	-	G5
Narrow-leaved plantain	<i>Plantago elongata</i>		□						S2S3	-	G4
Needle and thread grass	<i>Hesperostipa comata</i>					■/□			SNR	-	G5
Needleleaf sedge	<i>Carex eleocharis</i>					■/□			SNR	-	G5
Nevada bulrush	<i>Scirpus nevadensis</i>							□	SNR	-	G4
Nuttall's saltbush	<i>Atriplex nuttallii</i>		□						SNR	-	G5
Nuttall's saltgrass	<i>Puccinellia nuttalliana</i>	■/□	■/□		■/□			□	SNR	-	G5
Oval-leaved knotweed	<i>Polygonum arenastrum</i>					□			SNA	-	G5?
Owl's clover	<i>Orthocarpus luteus</i>					□		□	SNR	-	G5
Pasture sage	<i>Artemisia frigida</i>		■			■/□		□	S5	-	G5
Peppergrass	<i>Lepidium ruderales</i>		□			□			SNA	-	GNR
Perennial ragweed	<i>Ambrosia coronopifolia</i>		■				■		SNA	-	G5
Plains cottonwood	<i>Populus deltoides</i>							□	S5?	-	G5
Porcupine grass	<i>Hesperostipa curisetata</i>					■/□			SNR	-	G5
Prairie bulrush	<i>Scirpus paludosus</i>				□		□		S5	-	G5
Prairie cinquefoil	<i>Potentilla pensylvanica</i>					□			SNR	-	G5
Prairie crocus	<i>Pulsatilla patens</i>					■/□			S5	-	G5
Prairie june grass	<i>Koeleria macrantha</i>					■/□			SNR	-	G5

TABLE 1
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Species		Plant Community							Status		
Common Name	Scientific name	CWP	SWM	WS	RF	GF	WET	RES	Provincial (S)	COESWIC	National (G)
Prairie muhly	<i>Muhlenbergia cuspidata</i>					□			SNR	-	G4
Prickly wild rose	<i>Rosa acicularis</i>	■/□	■/□		■/□				S5	-	G5
Purple rock-cress	<i>Arabis divaricarpa</i>					■/□			S5?	-	GNA
Pygmy flower	<i>Androsace septentrionalis</i>					□			S5	-	G5
Rabbitbrush	<i>Ericameria nauseosa</i>	□				□			S5	-	G5
Red fescue	<i>Festuca rubra</i>	■/□	■/□			■/□			SNR	-	G5
Red samphire	<i>Salicornia rubra</i>		■/□		■/□				S5?	-	G5
Reed canary grass	<i>Phalaris arundinacea</i>				■/□			□	SNR	-	G5
Ribgrass	<i>Plantago lanceolata</i>		□		□				SNA	-	G5
Richardson's bitterweed	<i>Hymenoxys richardsonii</i>	□	□			□			S5	-	G5
Richardson's pondweed	<i>Potamogeton richardsonii</i>							□	S5	-	G5
Rough cinquefoil	<i>Potentilla norvegica</i>					□		□	S5	-	G5
Sago pondweed	<i>Potamogeton pectinatus</i>							□	SNR	-	G5
Sand reed	<i>Calamovilfa longifolia</i>					□			SNR	-	G5
Sandbar willow	<i>Salix exigua</i>							■/□	S5	-	G5
Sandberg's bluegrass	<i>Poa secunda</i>	■/□	■/□			■/□	■/□		SNR	-	G5
Scarlet mallow	<i>Sphaeralcea coccinea</i>					■/□			S5	-	G5?
Sea milkwort	<i>Glaux maritima</i>				□				S5	-	G5
Sea-side arrow grass	<i>Triglochin maritima</i>		■/□		■/□				S5	-	G5
Sea-side buttercup	<i>Ranunculus cymbalaria</i>						□		S5	-	G5
Shrubby evening primrose	<i>Oenothera biennis</i>					□			S5	-	G5
Siberian water millefoil	<i>Myriophyllum sibiricum</i>						■		S5	-	G5
Silver sagebush	<i>Artemisia cana</i>					■/□			S5	-	G5
Silverweed	<i>Argentina anserina</i>						■/□	■/□	S5	-	G5
Silvery scurfpea	<i>Pedimelum argophyllum</i>					□			S5		G5
Skeleton weed	<i>Lygodesmia juncea</i>					□			S5	-	G5
Slender wheatgrass	<i>Elymus trachycaulus ssp. subsecundus</i>		■				■		SNR	-	G5T5
Slough grass	<i>Beckmannia syzigachne</i>					□		□	SNR	-	G5
Smooth brome	<i>Bromus inermis</i>			■/□					SNR	-	G5
Smooth hawksbeard	<i>Crepis runcinata ssp. glauca</i>		□						S5?	-	G5T4T5
Smooth-fruited Sedge	<i>Carex laeviconica</i>				■/□				SNR	-	G4G5
Softstem bulrush	<i>Schoenoplectus tabernaemontani</i>						■/□		SNR	-	G5
Spear-leaved goosefoot	<i>Monolepis nuttalliana</i>	■/□	■/□		■/□				S5	-	G5
Spike moss	<i>Selaginella densa</i>	■/□	■/□			■/□			SNR	-	G5
Spiny goldenweed	<i>Machaeranthera pinnatifida</i>		□			□			SNR	-	G5T4Q
Stinging nettle	<i>Urtica dioica</i>						■/□	□	S5	-	G5
Stream bank wheatgrass	<i>Elymus lanceolatus</i>					■/□			S2	-	G5

TABLE 1
VEGETATION SPECIES LIST (2010 SURVEY) - HIGHFIELD DAM REHABILITATION PROJECT

Species		Plant Community							Status		
Common Name	Scientific name	CWP	SWM	WS	RF	GF	WET	RES	Provincial (S)	COESWIC	National (G)
Tall wheatgrass	<i>Thinopyrum ponticum</i>	■/□						□	SNA	-	GNR
Threadleaf sedge	<i>Carex filifolia</i>					■/□			SNR	-	G5
Three-square bulrush	<i>Schoenoplectus pungens</i>						■/□		S5	-	G5
Tufted hairgrass	<i>Deschampsia caespitosa</i>					□			SNR	-	G5
Water parsnip	<i>Sium suave</i>				□				S5	-	G5
Water weed	<i>Elodea canadensis</i>							■/□	S2S3	-	G5
Western dock	<i>Rumex aquaticus var. fenestratus</i>	■/□	■/□		■/□	□		■/□	S5	-	G5T5
Western snowberry	<i>Symphoricarpos occidentalis</i>	■/□	■/□			□		□	S5	-	G5T5
Western wheatgrass	<i>Pascopyrum smithii</i>	■/□	■/□		■/□	■/□		□	SNR	-	G5T5
White goosefoot	<i>Chenopodium album</i>		□					□	SNA	-	G5
White sweetclover	<i>Melilotus officinalis</i>					□	□	□	SNA	-	GNR
Wild mint	<i>Mentha arvensis</i>					□		□	S5	-	G5T5
Willow aster	<i>Symphyotrichium lanceolatum</i>				■/□				S5	-	G5T5
Yellow cone-flower	<i>Ratibida columnifera</i>	□				□			S5	-	G5

Notes:

■ = site visit 1 (May 31 - June 2, 2010), □ = site visit 2 (August 10 - 11, 2010)

Provincial Status (S-Rank): S1= Extremely Rare (<5 occurrences), S2= Rare (6 to 20 occurrences), S3= Rare-Uncommon (21 to 100 occurrences), S4= Common (>100 occurrences), S5= Very Common (>100 occurrences), S#S# indicates range of uncertainty in status

Global Status (G-rank): G1= Critically Imperiled, G2= Imperiled, G3= Vulnerable, G4= Apparently Secure, G5= Secure, G#G# indicates range of uncertainty in status

Status modifiers: T = Ranking for subspecies or varieties

NR = Not ranked

NA = Conservation status is not applicable to the species (Typically for exotic species)

COSEWIC descriptors E = Endangered; A Wildlife species facing imminent extirpation or extinction

T = Threatened; A wildlife species likely to become endangered if no action taken

SC = Special Concern; Likely to be come endangered due to combination of identified threats

NAR = not at risk of extinction

DD= Data Deficient to determine status

PS = Status applies only to a portion of the species' range

LC = Least Concern

C = Candidate/identified species, not yet assessed

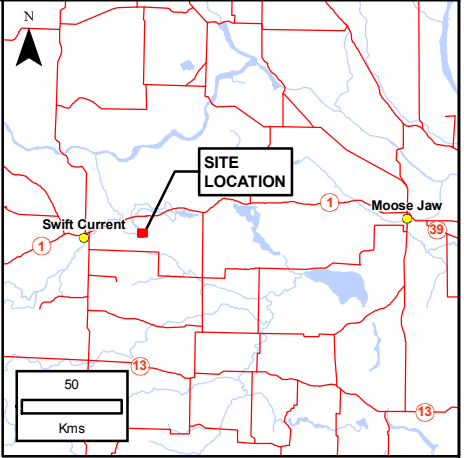
TABLE 2
POTENTIAL ENVIRONMENTAL EFFECTS, MITIGATION AND FOLLOW-UP
HIGHFIELD DAM REHABILITATION PROJECT

Environmental Effect	Mitigation Measures	Follow-up
Vegetation		
Loss and disturbance of terrestrial and possibly some aquatic vegetation during site preparation and construction	<ul style="list-style-type: none"> -Minimize loss and disturbance to vegetation -Limit construction activities to designated and previously disturbed areas -Re-vegetate disturbed and reclaimed areas after construction; with native seed mix if possible. 	<ul style="list-style-type: none"> -Periodic inspections of vegetation during construction -Maintain re-vegetated areas
Potential disturbance and/or loss of rare plant species	<ul style="list-style-type: none"> -Adhere to provincial activity restrictions (Appendix D) -Contact the SKCDC 	None Proposed
Impairment of vegetation from dust accumulation during site preparation and construction	<ul style="list-style-type: none"> -Control dust using approved suppressant -Restrict activities during high wind events 	<ul style="list-style-type: none"> -Periodic inspections of vegetation for accumulated dust -Monitor complaints during and after construction

FIGURES

Portions of data presented are owned by the Province of Saskatchewan and are produced under the licence agreement with the Province of Saskatchewan 2010 Queen's Printer.

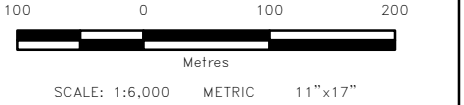
File Name: P:\Projects\2010\10-0217-01\Drawings\GIS\MXDs\Rev0\Plant\10-0217-01_F01_Rev0.mxd
11"x17" PLOT SCALE 1:1



- LEGEND:
- Rare Plant Location
 - Photo Location
 - Contour
 - Fence
 - Proposed Spillway Channel
 - Road CL
 - Road Edge
 - Sasktel
 - Shoreline
 - Slope Edge
 - Borrow Area
 - Structures
 - Vegetation Community
 - Project Study Area
 - Quarter Section Boundary

NOTES:

1. Imagery from Google Earth (2010 Cnes/Spot Image).
2. Contour data provided by Agriculture and Agri-Food Canada.



All units are metric and in metres unless otherwise specified.
Transverse Mercator Projection, NAD 1983, Zone 13
Elevations are in metres above sea level (MSL)

0	10/11/19	ISSUED WITH FINAL	SO
NO.	YY/MM/DD	DESCRIPTION	BY

REVISIONS / ISSUE

KGS
GROUP
CONSULTING
ENGINEERS

Agriculture and
Agri-Food Canada
Agriculture et
Agroalimentaire Canada

REHABILITATION OF THE HIGHFIELD
DAM PROJECT

SITE LOCATION PLAN

NOVEMBER 2010	FIGURE 01	REV: 0
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APPENDICES

APPENDIX A

SASKATCHEWAN CONSERVATION DATA CENTRE SPECIES AT RISK IN SASKATCHEWAN

Species at Risk in Saskatchewan

This list is updated twice per year following COSEWIC Species Assessment Meetings, generally in the spring and the fall.

The federal *Species at Risk Act* establishes Schedule 1 as the official federal list of wildlife species at risk.

The provincial *Wildlife Act, 1998* lists at-risk species in Saskatchewan. These are identified below with an asterisk (*).

Taxonomic Group	Common Name	Scientific name	COSEWIC Status	Last COSEWIC Assessment	SARA status	Schedule	SK CDC Rank	SK Status
Amphibian	Great Plains Toad	<i>Bufo cognatus</i>	Special Concern	April 2010	Special Concern	Schedule 1	S3	
Amphibian	Northern Leopard Frog	<i>Rana pipiens</i>	Special Concern	April 2009	Special Concern	Schedule 1	S3	
Arthropod	Dakota Skipper	<i>Hesperia dacotae</i>	Threatened	November 2003	Threatened	Schedule 1	S1	
Arthropod	Dusky Dune Moth	<i>Copablepharon longipenne</i>	Endangered	November 2007	Endangered	Schedule 1	SNR	
Arthropod	Gold-edged Gem	<i>Schinia avemensis</i>	Endangered	April 2006	Endangered	Schedule 1	SNR	
Arthropod	Monarch Butterfly	<i>Danaus plexippus</i>	Special Concern	April 2010	Special Concern	Schedule 1	S3B	
Arthropod	Mormon Metalmark	<i>Apodemia mormo</i>	Threatened	May 2003	Threatened	Schedule 1	S1	
Arthropod	Pale Yellow Dune Moth	<i>Copablepharon grande</i>	Special Concern	November 2007	Special Concern	Schedule 1	SNR	
Arthropod	Verna's Flower Moth	<i>Schinia verna</i>	Threatened	May 2005	Threatened	Schedule 1	SH	
Bird	Bobolink	<i>Dolichonyx oryzivorus</i>	Threatened	April 2010	No Status	No Schedule ¹	S5B	
Bird	Burrowing Owl*	<i>Athene cunicularia</i>	Endangered	April 2006	Endangered	Schedule 1	S2B	Endangered
Bird	Canada Warbler	<i>Wilsonia canadensis</i>	Threatened	April 2008	Threatened	Schedule 1	S5B	
Bird	Chestnut-collared Longspur	<i>Calcarius ornatus</i>	Threatened	November 2009	No Status	No Schedule ¹	S5B	
Bird	Chimney Swift	<i>Chaetura pelagica</i>	Threatened	April 2007	Threatened	Schedule 1	S3B	
Bird	Common Nighthawk	<i>Chordeiles minor</i>	Threatened	April 2007	Threatened	Schedule 1	S4S5B, S4S5M	
Bird	Eskimo Curlew*	<i>Numenius borealis</i>	Endangered	November 2009	Endangered	Schedule 1	SHM	Extirpated
Bird	Ferruginous Hawk	<i>Buteo regalis</i>	Threatened	April 2008	Threatened	Schedule 1	S4B, S4M	
Bird	Greater Prairie-chicken*	<i>Tympanuchus cupido pinnatus</i>	Extirpated	November 2009	Extirpated	Schedule 1	SX	Extirpated
Bird	Greater Sage-grouse*	<i>Centrocercus urophasianus urophasianus</i>	Endangered	April 2008	Endangered	Schedule 1	S1B, S1N	Endangered
Bird	Horned Grebe	<i>Podiceps auritus</i>	Special Concern	April 2009	No Status	No Schedule ¹	S5B	
Bird	Loggerhead Shrike	<i>Lanius ludovicianus excubitorides</i>	Threatened	May 2004	Threatened	Schedule 1	S4B	
Bird	Long-billed Curlew	<i>Numenius americanus</i>	Special Concern	November 2002	Special Concern	Schedule 1	S4B, S4M	
Bird	McCowan's Longspur	<i>Calcarius mccownii</i>	Special Concern	April 2006	Special Concern	Schedule 1	S3S4B	
Bird	Mountain Plover	<i>Charadrius montanus</i>	Endangered	November 2009	Endangered	Schedule 1	S1B	
Bird	Olive-sided Flycatcher	<i>Contopus cooperi</i>	Threatened	November 2007	Threatened	Schedule 1	S4	
Bird	Passenger Pigeon	<i>Ectopistes migratorius</i>	Extinct					
Bird	Peregrine Falcon	<i>Falco peregrinus anatum</i>	Non-active	April 2007	Threatened	Schedule 1	S1B, S4M, S2N	
Bird	Peregrine Falcon	<i>Falco peregrinus anatum/tundrius</i>	Special Concern	April 2007	No Status	No Schedule ¹		
Bird	Piping Plover*	<i>Charadrius melodus circumcinctus</i>	Endangered	May 2001	Endangered	Schedule 1	S3B	Endangered
Bird	Red Knot	<i>Calidris canutus rufa</i>	Endangered	April 2007	No Status	No Schedule ¹	S2M	
Bird	Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	Threatened	April 2007	Threatened	Schedule 1	S1B, S1M	
Bird	Rusty Blackbird	<i>Euphagus carolinus</i>	Special Concern	April 2006	Special Concern	Schedule 1	S4B	
Bird	Sage Thrasher	<i>Oreoscoptes montanus</i>	Endangered	November 2000	Endangered	Schedule 1	S1B	
Bird	Short-eared Owl	<i>Asio flammeus</i>	Special Concern	April 2008	Special Concern	Schedule 3	S3B, S2N	
Bird	Sprague's Pipit	<i>Anthus spragueii</i>	Threatened	April 2010	Threatened	Schedule 1	S4B	
Bird	Whip-poor-will	<i>Caprimulgus vociferus</i>	Threatened	April 2009	Threatened	Schedule 1	S3B	
Bird	Whooping Crane*	<i>Grus americana</i>	Endangered	April 2010	Endangered	Schedule 1	SXB, S1M	Endangered
Bird	Yellow Rail	<i>Coturnicops noveboracensis</i>	Special Concern	November 2009	Special Concern	Schedule 1	S3B, S2M	
Fish	Bigmouth Buffalo	<i>Ictiobus cyprinellus</i>	Non-active	April 2009	Special Concern	Schedule 3	S3	
Fish	Bigmouth Buffalo	<i>Ictiobus cyprinellus</i> (Saskatchewan-Nelson River pop'ns)	Special Concern		No Status	No Schedule ¹	S3	
Fish	Chesnut Lamprey	<i>Ichthyomyzon castaneus</i>	Special Concern	April 1991	Special Concern	Schedule 3	S3S4	
Fish	Lake Sturgeon	<i>Acipenser fulvescens</i> (Saskatchewan River pop'ns)	Endangered	November 2006	No Status	No Schedule ¹	S2B	

Fish	Lake Sturgeon	<i>Acipenser fulvescens</i> (Red-Assiniboine Rivers - Lake Winnipeg pop'ns)	Endangered	November 2006	No Status	No Schedule ¹	S2B	
Fish	Lake Sturgeon	<i>Acipenser fulvescens</i> (Western Hudson Bay pop'ns)	Endangered	November 2006	No Status	No Schedule ¹	S2B	
Fish	Shortjaw Cisco	<i>Coregonus zenithicus</i>	Threatened	May 2003	Threatened	Schedule 2	S1	
Mammal	Black-footed Ferret*	<i>Mustela nigripes</i>	Extirpated	April 2009	Extirpated [†]	Schedule 1	SNA	Extirpated
Mammal	Black-tailed Prairie Dog	<i>Cynomys ludovicianus</i>	Special Concern	November 2000	Special Concern	Schedule 1	S2	
Mammal	Ord's Kangaroo Rat	<i>Dipodomys ordii</i>	Endangered	April 2006	Endangered	Schedule 1	S2	
Mammal	Plains Bison	<i>Bison bison bison</i>	Threatened	May 2004	No Status	No Schedule ¹	S3	
Mammal	Plains Grizzly Bear*	<i>Ursos arctos</i>	Extirpated	May 2002	Extirpated	Schedule 1	SX	Extirpated
Mammal	Swift Fox*	<i>Vulpes velox</i>	Threatened	November 2009	Endangered	Schedule 1	S1	Endangered
Mammal	Wolverine	<i>Gulo gulo</i>	Special Concern	May 2003	No Status	No Schedule ¹	S3S4	
Mammal	Woodland Caribou	<i>Rangifer tarandus caribou</i> (Boreal pop'n)	Threatened	May 2002	Threatened	Schedule 1	S3	
Moss	Alkaline Wing-nerved Moss	<i>Pterygoneurum kozlovii</i>	Threatened	November 2004	Threatened	Schedule 1	S1	
Reptile	Eastern Yellow-bellied Racer	<i>Coluber constrictor flaviventris</i>	Threatened	November 2004	Threatened	Schedule 1	S3	
Reptile	Greater Short-horned Lizard	<i>Phrynosoma hernandesi</i>	Endangered	April 2007	Endangered	Schedule 1	S2S3	
Reptile	Snapping Turtle	<i>Chelydra serpentina</i>	Special Concern	November 2008	Special Concern	Schedule 1	S3	
Vascular Plant	Athabasca Thrift	<i>Armeria maritima interior</i>	Special Concern	May 2002	Special Concern	Schedule 1	SNR	
Vascular Plant	Buffalograss	<i>Buchloe dactyloides</i>	Threatened	November 2001	Threatened	Schedule 1	S1	
Vascular Plant	Dwarf Woolly-heads ²	<i>Psilocarphus brevissimus</i>	Special Concern	April 2006	Special Concern	Schedule 1	S1S2	
Vascular Plant	Felt-leaf Willow	<i>Salix silicicola</i>	Special Concern	May 2000	Special Concern	Schedule 1	S2S3	
Vascular Plant	Floccose Tansy	<i>Tanacetum huronense</i> var. <i>floccosum</i>	Special Concern	May 2000	Special Concern	Schedule 1	SNR	
Vascular Plant	Hairy Prairie-clover*	<i>Dalea villosa</i> var. <i>villosa</i>	Threatened	May 2000	Threatened	Schedule 1	S1	Endangered
Vascular Plant	Large-headed Woolly Yarrow	<i>Achillea millefolium</i> var. <i>megacephalum</i>	Special Concern	May 2000	Special Concern	Schedule 1	S1	
Vascular Plant	MacKenzie Hairgrass	<i>Deschampsia mackenziana</i>	Special Concern	November 2001	Special Concern	Schedule 1	S2	
Vascular Plant	Sand-dune Short-capsuled Willow	<i>Salix brachycarpa</i> var. <i>psammophila</i>	Special Concern	May 2000	Special Concern	Schedule 1	S2S3	
Vascular Plant	Slender Mouse-ear-cress*	<i>Halimolobos virgata</i>	Threatened	May 2000	Threatened	Schedule 1	S1	
Vascular Plant	Small White Lady's-slipper*	<i>Cypripedium candidum</i>	Endangered	May 2000	Endangered	Schedule 1	S1	Extirpated
Vascular Plant	Small-flowered Sand Verbena*	<i>Tripterocalyx micranthus</i>	Endangered	November 2002	Endangered	Schedule 1	S1	
Vascular Plant	Smooth Goosefoot	<i>Chenopodium subglabrum</i>	Threatened	April 2006	Threatened	Schedule 1	S2	
Vascular Plant	Tiny Cryptanthe*	<i>Cryptantha minima</i>	Endangered	May 2000	Endangered	Schedule 1	S1	Endangered
Vascular Plant	Turnor's Willow	<i>Salix turnorii</i>	Special Concern	May 2000	Special Concern	Schedule 1	S2	
Vascular Plant	Western Spiderwort*	<i>Tradescantia occidentalis</i>	Threatened	November 2002	Threatened	Schedule 1	S1	Endangered

¹ under consideration for addition to Schedule 1

² Synonym used in Saskatchewan is *Psilocarphus elatior*, Tall Woolly-heads.

[†] reintroduction in progress

* identified as a provincial wild species at risk under *The Wildlife Act, 1998*

For more information on Saskatchewan species ranked by the Conservation Data Centre (SK CDC) go to: <http://www.biodiversity.sk.ca>

For more information on the *Committee on the Status of Endangered Wildlife in Canada* (COSEWIC) and its recommendations for listing, go to: <http://www.cosewic.gc.ca>

For more information on the *Species at Risk Act* (SARA) and its registry of protected species go to: <http://www.sararegistry.gc.ca>

Prepared by Jeanette Pepper, Species at Risk Ecologist, Ministry of Environment, Fish and Wildlife Branch, June 2010

APPENDIX B

SASKATCHEWAN CONSERVATION DATA CENTRE 2009 RARE PLANT SURVEY GUIDELINES

STANDARDIZED METHODOLOGY FOR SURVEYS OF RARE PLANTS

Rare plant surveys identify the **spatial distribution of plant species that have been determined to be rare** in a given geographic location. Surveys are required if there is a proposed change to current management strategies or developments that may adversely affect the populations of rare plants, and sufficient information does not already exist to determine if adverse effects are possible. The surveys acquire information necessary to design mitigative procedures. Quantitative vegetation analysis techniques are biased towards dominant species and are not appropriate for the detection of rare species, even though sometimes they result in the discovery of difficult to see species that might be missed by a less direct survey technique, or they can be useful in assessing populations of rare species that are locally common. Documentation of the methods used and the results obtained is necessary for reviewers to be able to judge if adequate effort has been applied to ensure the protection of plant biodiversity.

PLANNING

Advance planning is essential to conduct an acceptable survey and report the findings in useable format. The first step is to identify **THE GOAL OF THE SURVEY**. Next, determine the **area to be surveyed** and the **timing** and **intensity of the survey** required. Not just the actual area of any construction-site disturbance must be studied, but the area influenced by any installations and the future operations of those installations. Factors such as hydrology and air flow must be considered in addition to disturbance of soil and changes of topography. The inclusion of a large buffer zone within the area surveyed will allow for changes which may be required in the project design during construction and subsequent operation. Surveys must be timed in order to allow for the recognition of any rare species that might be found in the area, and of sufficient duration to allow thorough coverage of the habitats included.

Qualified botanists must conduct the survey.

The survey must target **all possible rare species**, not just those that may previously have been reported from the area.

In order to understand what is required the field investigator must have a **detailed project proposal** including:

- information on any facilities or installations
- engineering drawings showing not only the location, but the type of facilities
- information on any disturbance caused by construction and subsequent operation of the facilities
- base maps and aerial photographs in appropriate scales

QUALIFIED BOTANISTS

The following characteristics should apply:

- background knowledge in **plant taxonomy**, and experience as a **field botanist**, including knowledge of designing and implementing surveys
- **knowledge of the local flora**, and appropriate field guides for the area being studied
- desire to conduct field surveys and the **physical capability** to work in the terrain involved
- **knowledge of any regulations** that apply with respect to rare species and familiarity with the agencies that uphold those regulations; collecting permits may be required in some areas or for some species

PRE FIELD PREPARATION

Identification of plant communities from aerial photography will not only provide a basis for the design of the field survey, but they will suggest possible communities that require protection and the necessity for the survey to include a community component.

Records of previous sightings of rare species and the presence of habitats where rare species occur, in or near the area can be used to prepare field staff to identify species they might find.

The following information should be sought for these species:

- detailed description and illustrations/photographs
- preferred habitat and associated species
- ecological information including phenology
- status within the political jurisdiction where the project falls as well as global status
- data on other known locations

Herbarium specimens, provided that they have been accurately identified, are an excellent source to obtain a search image for rare species, especially if surveys must be conducted at times other than optimal for the recognition of a given species. Visiting locations of known populations is even better.

Information is also available in literature reports of environmental impact assessments, rare plant survey reports and from knowledgeable persons. Summaries of this information may be available from the local conservation data centres, which can also provide lists of rare taxa expected within an area. These lists are dynamic and are continually being added to as more information is reported. Be sure to use a current list to ensure that all status information is up-to-date.

Field investigators should be prepared to identify rare species not on any lists for the area and not previously found nearby - extensions to known ranges often occur during surveys for rare species. It is wise to obtain lists not only for the political jurisdiction within which the project falls, but also from adjacent jurisdictions.

MAPS/AIR PHOTOS

The study area will be determined by the project and the goals of the survey. Maps and air photos will help determine possible side effects of the project, and suggest suitable boundaries for the field study, in addition to displaying similar habitats which could be surveyed to determine populations of rare species outside the project area.

Aerial photographs can be used to delineate preliminary boundaries of plant communities to be checked and described in the field.

SURVEY TYPES

Every species that occurs within the project area must be identified to the point that its status can be determined. For example, if there are no species within the Horsetail family [Equisetaceae] that are ranked rare within the jurisdiction, then identity to the family is adequate for the purposes of a rare survey. If there are species within a genus that are categorized as rare, then each species must be identified. If there is a subspecies or variety that is rare, then the plants must be examined in enough detail to determine if they are of the rare taxon.

A **floristic survey** identifies all species within the project area. This is the best type of survey to ensure that no rare plant goes unidentified.

A **targeted survey** will search only for species which have already been reported in an area. The

time required for this type of survey is less than for a complete floristic inventory, but the chance is that rare species will remain undetected.

SEARCH PATTERNS

Two main techniques have been used: a random meander and a systematic transect. The **random meander** covers areas that appear likely to have rare taxa, based on habitat and the judgement of the investigator. A **systematic search** follows transects as a guide to provide the greatest coverage possible of the area. Greatest coverage occurs with parallel transects spaced equidistant over the area. In very large areas the intensity of the effort can be defined using a □species/effort curve□ where the number of species per unit time is used to determine when sampling will cease. Within each habitat type the number of species will be greatest per unit of time in the first few minutes/meters of the survey and will rapidly decrease (this is **not** including the time used in identification of unfamiliar species) as more of the community is surveyed. When an attempt has been made to search any variations within the community with respect to terrain, bordering communities, etc., and the effort is resulting in no more species being found, then an adequate effort is deemed to have been applied. Although not as desirable as a thorough examination of the entire project area, this technique is defensible.

TIMING

A **series of surveys** that will allow plants to be observed at the optimal time for identification is best. Three survey periods are suggested: 1) Early Season: late May to first week of June, 2) Mid Season: mid- to late July and 3) Late Season: mid-August to mid-September. Please allow for variation in local topography and climate, i.e. when surveys are to take place at the higher altitudes or latitudes in the province, or if the weather has been unusually cold, survey times should be moved back by a week or so. When surveys are to take place at the lower latitudes and elevations, or in open, sandy areas with high radiative heating effects, surveys should take place early in the suggested survey period. Preliminary surveys may determine the best times for return visits to confirm identification of species for which both floral and fruiting characters are required for accurate identification. Relative abundance of species may vary annually with weather conditions and predation, etc., so surveys over more than one year are even more valuable to assess populations of rare plants.

DOCUMENTATION

Voucher specimens should only be collected if the population is sufficient to allow removal of an individual. Scientific research permits are required if voucher specimens are taken of species listed in the Wild Species at Risk regulations (see <http://www.environment.gov.sk.ca/Default.aspx?DN=b135c332-9078-4d5f-aff3-84e1aa91cccc> for further details.)

Partial collections of a portion of the plant displaying diagnostic characters can be sufficient for verification without destroying the individual plant. All vouchers should be deposited with a **recognized public herbarium** to make them available for study. Standardized data forms are available from the Saskatchewan Conservation Data Centre for reporting rare species; they detail the information required for each rare plant sighting. When collection is not an option, (i.e., not enough individuals, specimens not suitable for preservation in herbarium),

photographs are an acceptable alternative in most cases. Suitable equipment must be used to picture the diagnostic characters, as well as full plant photos; pictures of the habitat are useful to

document the location.

A complete description of the plant characteristics should accompany any records not documented by a voucher.

The **population numbers** are best given by a count of individuals where they are distinct. When individuals cannot be distinguished, then number of clumps or patches, and area covered should be used. When the number of individuals is very large, an estimate of the population can be obtained by taking the average of several counts within a quadrat and multiplying by the area in which the plant occurs. The size and number of quadrats required will vary with the type of distribution.

The **precise location** should be provided, with distance and direction from a permanent landmark where possible; area boundaries of the population should be noted on a map when the population is spread out and cannot be identified by a point location.

Ecological information such as habitat and phenology, predation, disease, etc. can be important in determining mitigative measures as well as the importance of the population within the range of the plant.

REPORTS

Reports must contain **all of the pertinent information** so that reviewers can make an appraisal knowing how the results were obtained. A full description of methods used, dates when surveys were conducted, maps detailing the study area and locations of rare species found, and notes on the populations must be included. A complete list of references used, persons contacted and herbaria visited in preparation for the field study should be included. A full list of species found in the project area should be attached; this, also, can reflect the thoroughness of the study.

A **discussion** of the potential impacts and mitigative measures should be provided. The blanket statement "the development will not adversely affect the population" is not adequate; the reasons why that decision was reached must be detailed. If mitigative measures are undertaken that try to maintain the population within the area of the development, monitoring of the population will provide ecological information useful in future species management.

APPENDIX C
SITE PHOTOGRAPHIC LOG



PHOTO 1. North view of crested wheat pasture (CWP) taken from top of slope on Highfield Dam (Photo taken at NAD 83 13 U 330079 5575748).



PHOTO 2. North view of saline wet meadow (SWM) taken from top of slope on Highfield Dam (Photo taken at NAD 83 13 U 329991 5575718).



PHOTO 3. North view of wooded stand (WS) taken from the top of slope on Highfield Dam (Photo taken at NAD 83 13 U 329743 5575663).



PHOTO 4. Close-up shot of vegetation (Buffaloberry with under story of smooth brome and Kentucky bluegrass) within the wooded stand (WS) (Photo taken at NAD 83 13 U 329911 5576090).



PHOTO 5. North view of rush flats (RF) taken approximately 100 m north of the north embankment on Highfield Dam (Photo taken at NAD 83 13 U 329465 5575733).



PHOTO 6. South-southeast view of grassland fragments/pasture land (GF) taken from approximately 350 m south east of the east side of Highfield Dam (Photo taken at NAD 83 13 U 330536 5575388).



PHOTO 7. Northwest view of reservoir shoreline (RES) in the foreground, Highfield Dam in the background taken from the grassland fragments plant community (Photo taken at NAD 83 13 U 330247 5575654).



PHOTO 8. Image of cattails within the wetland plant community (WET) in the old Rush Lake Creek channel (Photo taken at NAD 83 13 U 329997 5575837).



PHOTO 9. Image of narrow-leaved plantain within the saline wet meadow plant community (Photo taken at NAD 83 13 U 329586 5575981).

APPENDIX D

SASKATCHEWAN ACTIVITY RESTRICTION GUIDELINES FOR SENSITIVE SPECIES

Saskatchewan Activity Restriction Guidelines for sensitive species in natural
habitats (see Table 1 on this website)
September 2003

- These guidelines are to assist proponents during the planning of proposed projects. If your project will include any activity falling within the listed setback distances, you are advised to contact the appropriate Saskatchewan Environment EcoRegion office early in the planning stage to ensure all work will be completed in a manner that will minimize impact. Discussing your project in advance with Saskatchewan Environment will reduce the chance your project will be delayed during the construction phase due to concerns with potential impacts on rare or endangered species.
- Activity Restriction Guidelines have been provided by the SKCDC for most species identified in Table 1 for nearly a decade through data requests and other directed queries.
- The SKCDC was asked to review their existing activity restriction guidelines due to changes in federal legislation regarding species at risk. (*The Species At Risk Act* (SARA) was proclaimed in June 2003 by the federal government.) The intent of this review was to update and integrate Saskatchewan's guidelines with those used by Environment Canada for species at risk.
- For most species of provincial concern, the set back distances and times have not changed from existing guidelines that we currently distribute. There should be minimal confusion with the disturbance categories as each species has the same set back distances for medium and high disturbance categories.
- The procedure for distributing these guidelines will not change. To clarify, for any given data request submitted to the SKCDC, guidelines are only provided for species of known occurrence in the area of new development.
- The guidelines have been posted on the internet to facilitate public access.
- See the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) website <http://www.cosewic.gc.ca/index.htm> for a complete listing of species at risk in Canada. These species are listed under SARA.
- For Environment Canada's industry guidelines see <http://www.pnr-rpn.ec.gc.ca/nature/petroleum/dg00s00.en.html>
 - Scobie and Faminow developed these guidelines for Environment Canada through consultation with more than 100 leading experts as well as industry representatives.
- The scope of human activities in the environment is a continuum and cannot be easily classified. Three categories of disturbance have been adopted by Environment Canada. However, these are guidelines only and should be treated as such.

- These Activity Restriction Guidelines reflect current knowledge of each species. Changes to the guidelines may occur as information becomes available. Please contribute your knowledge.

Reports and rare species occurrences can be submitted to:

<http://www.biodiversity.sk.ca/submit.htm>

or

Saskatchewan Conservation Data Centre,
Rm. 436, 3211 Albert St.,
Regina, Saskatchewan, S4S 5W6

AMPHIBIANS

- Federal guidelines were adopted for Great Plains Toad and Northern Leopard Frog which are listed under SARA.
- Current set back distances used by Grasslands EcoRegion for wetlands, water bodies and watercourses adopted (0-90m) for species of provincial concern (Canadian Toad and Plains Spadefoot (toad)).

REPTILES

- The existing guidelines stated 200 m for development activities so there was no change. A major issue for snakes is road mortality. Previous reports indicate that the mean distance of movement by hognose snakes is 200 m (Wright and Didiuk 1998).

BIRDS

- The setback distances are not only to address auditory disturbances but also permanent alteration in habitat.
- For Piping Plover, the high water mark is used, as it is typically the same as the outer edge of suitable habitat. This is a globally rare species, G3, therefore permanent habitat loss is of major concern.
- Changed Golden Eagle guidelines to meet Grasslands EcoRegion setbacks.
- No change was made from the existing restriction guidelines for colonial nesting birds and Osprey.
- Sage Grouse are critically imperiled in Saskatchewan. (Setback distances have already been increased to 1000 m on lands managed by PFRA.)

- Nesting habitat of bird species that use the same nest site year after year (i.e., Loggerhead Shrike, Ferruginous Hawk and colonial nesting birds) should not be destroyed at any time.

MAMMALS

- Ord's Kangaroo Rat inhabits highly sensitive active dune areas. This species is listed under SARA therefore federal guidelines were adopted.
- Swift Fox were extirpated from Saskatchewan and is still found in very low numbers. This species is listed under SARA therefore federal guidelines were adopted.

PLANTS

- Plants make up the bulk of the species of concern and the one-size-fits-all approach is an attempt to simplify matters.
- The 0 m setback distance is for foot traffic only (FTO), ATV and other small vehicles would fall under a higher disturbance category.

Literature Cited

Scobie, D. and C. Faminow. 2000. Development of standardized guidelines for petroleum industry activities that affect COSEWIC Prairie and Northern Region Vertebrate Species at Risk. Prepared for: Environment Canada, Prairie and Northern Region, Edmonton, Alberta.

Wright, J. and A. Didiuk. 1998. Status of the Plains Hognose Snake (*Heterodon nasicus nasicus*) in Alberta. Alberta Environmental Protection, Fisheries and Wildlife Management Division, and Alberta Conservation Association, Alberta Wildlife Status Report No. 15, Edmonton, AB. 26 pp.

Table 1. Saskatchewan Activity Restriction Guidelines for sensitive species in natural habitats

These guidelines are to assist proponents during the planning of proposed projects. If your project will include any activity falling within the listed setback distances, you are advised to contact the appropriate Saskatchewan Environment EcoRegion office early in the planning stage to ensure all work will be completed in a manner that will minimize impact. Discussing your project in advance with Saskatchewan Environment will reduce the chance your project will be delayed during the construction phase due to concerns with potential impacts on rare or endangered species.					
Species* (species in capital letters are provincially and/or federally listed)	Key Wildlife Areas	Restricted Activity Dates	Recommended Setback Distances by Disturbance Category		
			Low (e.g., foot traffic, small vehicles (<1 ton), ATVs, operating oil or gas wells, pipelines)	Medium (e.g., trucks>1 ton (gravel, oil, grain), tractors (including farm tractors), pipeline construction (diameters <1 foot), operating compressor station or battery)	High (e.g., road construction, roads, drilling rigs, mines and quarries, construction of compressor station or battery, forest harvest, large-diameter pipeline construction, seismic exploration, blasting, rock crushing, asphalt batching, gravel pit)
AMPHIBIANS					
GREAT PLAINS TOAD	Ponds Used for Breeding, Living, or Hibernating	Year Round	10 m	400 m	500m
NORTHERN LEOPARD FROG	Ponds Used for Breeding, Living, or Hibernating	Apr. 1- Oct. 31	10 m	200 m	500 m
Canadian Toad Plains Spadefoot (Toad)	Ponds Used for Breeding, Living, or Hibernating	Year Round	0 m	90 m	90 m
REPTILES					
Prairie Rattlesnake Western Hognose Snake Smooth Green Snake	Hibernacula	Apr. 1- Sept. 30	50 m	200 m	200 m
		Oct. 1- Mar. 31	0 m	200 m	200 m
EASTERN YELLOW-BELLIED RACER	Hibernacula	Year round	100 m	200 m	1000 m
SHORT-HORNED LIZARD	Eroded Slopes (blue-shale outcrops)	Mar.15- Nov. 15	50 m	200 m	200 m
Snapping Turtle	Nesting Site	Mar. 15- June 30	0 m	400 m	400 m
BIRDS					
LOGGERHEAD SHRIKE	Nest Site	May 1- Aug. 15	50 m	250 m	400 m
RED-HEADED WOODPECKER	Nest Site	Apr. 15- June 30	0 m	100 m	100 m

YELLOW RAIL	Nest Site	May 1- July 15	100 m	150 m	350 m
PEREGRINE FALCON	Nest Site	Apr. 1- Aug. 15	300 m	500 m	1000 m
BURROWING OWL	Nest Site	Apr. 1- July 15	200 m	300 m	500 m
		July 16- Oct. 15	100 m	200 m	500 m
		Oct. 16- Mar. 31	10 m	200 m	500 m
PIPING PLOVER	High Water Mark	May 1- July 31	200 m	400 m	600 m
		Aug. 1- Sept. 30	100 m	200 m	600 m
FERRUGINOUS HAWK Prairie Falcon Bald Eagle	Nest Site	Mar. 15- July 15	500 m	750 m	1000 m
Golden Eagle	Nest Site	Feb. 15- July 15	500 m	1000 m	1000 m
SHORT-EARED OWL	Nest Site	Mar. 25- Aug. 1	100 m	300 m	500 m
SPRAGUE'S PIPIT	Nest Site	Apr. 21- Aug. 31	50 m	200 m	250 m
LONG-BILLED CURLEW	Nest Site	Apr. 15- July 15	100 m	200 m	200 m
SAGE GROUSE	Lek	Mar. 1- July 15	500 m	1000 m	1000 m
		July 16- Feb. 29	100 m	1000 m	1000 m
	Nest Site	April 15- June 15	200 m	300 m	500 m
Gulls/Terns (e.g., Caspian Tern) (Excluding Ring-billed and California Gulls)	Nesting Colony	May 1- July 15	200m	400 m	400 m
Colonial Nesting Birds (e.g., herons, pelicans, cormorants)	Nesting Colony	Apr. 1-July 31	500 m	1000 m	1000 m
Colonial Nesting Grebes (e.g., Western, Clark's and Eared Grebes)	Nesting Colony	May 15- July 15	100 m	200 m	200 m
Osprey	Nest Site	May 1- Aug. 15	500 m	1000 m	1000 m
Cooper's Hawk	Nest Site	Apr. 1- July 31	200 m	400 m	400 m
MOUNTAIN PLOVER Snowy Plover	Nest Site	May 1- July 31	200 m	400 m	500 m

Barred Owl Hawk Owl Great Gray Owl Western and Eastern Screech-Owls	Nest Site	Mar. 1- July 15	100 m	400 m	400 m
American Bittern	Nest Site	May 1- July 31	200 m	400 m	400 m
SAGE THRASHER	Nest Site	May 15- June 30	100 m	200 m	200 m
Trumpeter Swan	Nest Site	Apr. 1- July 31	500 m	1000 m	1000 m
Sharp-tailed Grouse	Lek	Mar. 15- May 15	200 m	400 m	400 m
MAMMALS					
SWIFT FOX	Den	Feb. 15- Aug. 31	500 m	500 m	2000 m
		Sept. 1- Feb. 14	100 m	500 m	2000 m
BLACK-TAILED PRAIRIE DOG	Colony	Year round	0 m	250 m	500 m
ORD'S KANGAROO RAT	Den	Year round	50 m	250 m	500 m

PLANTS

These are the general Activity Restriction Guidelines for federally and provincially listed plants. Contact the Saskatchewan Conservation Data Centre Botanist for mitigation considerations for these and other S1-S3 species. **FOOT TRAFFIC ONLY (FTO)** is permitted for the Low disturbance category. Small vehicles (<1 ton), ATVs, operating oil or gas wells, pipelines fall under Medium disturbance along with the other examples listed for animals. Examples of High level disturbance are the same as indicated for animals.

SAND VERBENA	Population	Year round	0 m FTO	25 m	50 m
TINY CRYPTANTHE	Population	Year round	0 m FTO	25 m	50 m
WESTERN SPIDERWORT	Population	Year round	0 m FTO	25 m	50 m
SLENDER MOUSE-EAR- CRESS	Population	Year round	0 m FTO	25 m	50 m
HAIRY PRAIRIE- CLOVER	Population	Year round	0 m FTO	25 m	50 m
POWELL'S SALTBUSH	Population	Year round	0 m FTO	25 m	50 m
UPLAND EVENING PRIMROSE	Population	Year round	0 m FTO	25 m	50 m
PLAINS GRAPE- FERN	Population	Year round	0 m FTO	25 m	50 m
BUFFALOGRASS	Population	Year round	0 m FTO	25 m	50 m
STALKED MOONWORT	Population	Year round	0 m FTO	25 m	50 m

GASTONY'S CLIFFBRAKE	Population	Year round	0 m FTO	25 m	50 m
PECULIAR MOONWORT	Population	Year round	0 m FTO	25 m	50 m
PALE MOONWORT	Population	Year round	0 m FTO	25 m	50 m
ATHABASCA THRIFT	Population	Year round	0 m FTO	25 m	50 m
BEAKED ANNUAL SKELETON WEED	Population	Year round	0 m FTO	25 m	50 m
BUR RAGWEED	Population	Year round	0 m FTO	25 m	50 m
FELT-LEAF WILLOW	Population	Year round	0 m FTO	25 m	50 m
FLOCCOSE TANSY	Population	Year round	0 m FTO	25 m	50 m
IMPOVERISHED PINWEED	Population	Year round	0 m FTO	25 m	50 m
LARGE-HEADED WOOLY YARROW	Population	Year round	0 m FTO	25 m	50 m
MACKENZIE HAIR-GRASS	Population	Year round	0 m FTO	25 m	50 m
PRICKLY MILK- VETCH	Population	Year round	0 m FTO	25 m	50 m
SAND CHICKWEED	Population	Year round	0 m FTO	25 m	50 m
SMALL LUPINE	Population	Year round	0 m FTO	25 m	50 m
TYRRELL'S WILLOW	Population	Year round	0 m FTO	25 m	50 m
TURNOR'S WILLOW	Population	Year round	0 m FTO	25 m	50 m
SMOOTH ARID GOOSEFOOT	Population	Year round	0 m FTO	25 m	50 m
SHORT- CAPSULED SAND-DUNE WILLOW	Population	Year round	0 m FTO	25 m	50 m
TALL WOOLY- HEADS	Population	Year round	0 m FTO	25 m	50 m
SAND-LOVING BARRENGROUND WILLOW	Population	Year round	0 m FTO	25 m	50 m

FISH

Proponents should be aware of the following listed fish species and the waters in which they live. Contact the Department of Fisheries and Oceans http://www.dfo-mpo.gc.ca/home-accueil_e.htm if your project is in or near these waters.

BIGMOUTH BUFFALO	The Qu'Appelle basin; including the waters of Buffalo Pound, Last Mountain, Pasqua, Echo, Mission, Katepwa (The Fishing Lakes), Crooked and Round Lakes.
LAKE STURGEON	The waters of the North Saskatchewan, South Saskatchewan and Saskatchewan Rivers (including large connected waters such as the Torch river) and the waters of the Churchill River below the confluence of the Reindeer River.
CHESTNUT LAMPREY	The waters of the Qu'Appelle River below the outlet of Round Lake and the upper Assiniboine basin including the Whitesand and Shell Rivers.

SHORTJAW CISCO	The waters of Reindeer Lake, Lake Athabasca, Black, Giles and Wapata Lakes.
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*Species in capital letters are listed or pending listing under Saskatchewan's *The Wildlife Act* or are listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and under the federal *Species at Risk Act* (SARA).

See the [INTERIM LIST](#) for further details on Saskatchewan's provincial list.

<http://www.biodiversity.sk.ca/FTP.htm>

See the following website for species listed by COSEWIC.

http://www.cosewic.gc.ca/eng/sct5/index_e.cfm

Species not capitalized are ranked S1-S3 by the SKCDC or require special consideration during the breeding period. See 'Guide to Rank Definitions' at <http://www.biodiversity.sk.ca/FTP.htm>.

For most projects near water, you must obtain work permits as required under provincial legislation. Also, the federal *Fisheries Act* provides for the protection of fish habitat. Under the *Fisheries Act*, no one may carry out any work or undertaking that results in the harmful alteration, disruption or destruction ("HADD") of fish habitat, unless this HADD has been authorized by the Minister of Fisheries and Oceans Canada. The Act also states that no one is permitted to deposit a deleterious (harmful) substance into water containing fish.

In some instances, additional approvals may be required. For example, some docks may need to be approved by the Canadian Coast Guard (Fisheries and Oceans Canada) due to navigation requirements.

When working near water, contact:

Regional Office of SE (list):

<http://www.se.gov.sk.ca/environment/assessment/oilandgas/contacts.PDF>

DFO Offices: Prince Albert – 306-953-8777

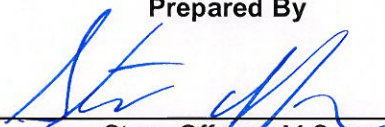
Regina – 306-780-8725

September 2003

APPENDIX B
WILDLIFE SURVEY
FINAL REPORT

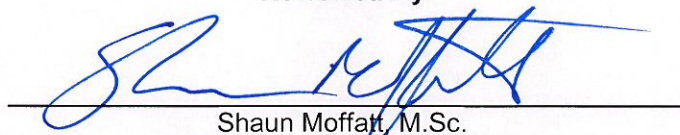
**Wildlife Survey for the Rehabilitation
of the Highfield Dam Project
AAFC/AESB Service Contract No.2
FINAL REPORT
November 2010**

Prepared By



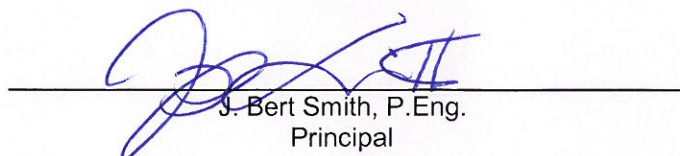
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TABLE OF CONTENTS

	<u>PAGE</u>
1.0 INTRODUCTION.....	1
2.0 WILDLIFE SURVEY METHODOLOGY	4
2.1 INFORMATION REVIEW	4
2.2 WILDLIFE SURVEY METHODOLOGY.....	4
3.0 RESULTS.....	6
3.1 BIRDS	6
3.2 MAMMALS	7
3.3 REPTILES AND AMPHIBIANS	8
4.0 DISCUSSION	9
4.1 BIRDS	9
4.1.1 On-Site Field Surveys	9
4.1.2 Regional Field Surveys	9
4.1.3 Species of Concern	10
4.2 MAMMALS	13
4.2.1 Species.....	13
4.2.2 Potential Impacts to Mammal Habitat.....	14
4.3 REPTILES AND AMPHIBIANS	14
4.3.1 Species.....	14
4.3.2 Potential Impacts to Reptile and Amphibian Habitat.....	15
4.4 OVERVIEW OF PROJECT EFFECTS AND MITIGATION.....	15
5.0 REFERENCES.....	17
TABLES	
FIGURES	
APPENDICES	

LIST OF TABLES

1. Wildlife Species List (2010 Survey)
2. Potential Environmental Effects, Mitigation and Follow-up

LIST OF FIGURES

1. Site Location Plan

LIST OF APPENDICES

- A. Saskatchewan Conservation Data Centre – Species at Risk in Saskatchewan
- B. Site Photographic Log
- C. Saskatchewan Ministry of the Environment – Bird Atlas; Field Checklist 72J06
- D. Saskatchewan Activity Restriction Guidelines for Sensitive Species
- E. Saskatchewan Conservation Data Centre - Rural Municipality Element Occurrence List

1.0 INTRODUCTION

Kontzamanis Graumann Smith Macmillan Inc. (KGS Group) was retained by the Agri-Environment Services Branch of Agriculture and Agri-Food Canada (AAFC/AESB) to conduct biological surveys (rare plant, wildlife, fish and habitat assessments) at the Highfield Dam site. The dam, which was constructed in 1942 across Rush Lake Creek (NE 36-15-11 W3M), is approximately 28 km east of Swift Current, Saskatchewan and 8 km south of the No. 1 Highway (Figure 1). The dam and associated infrastructure and land is owned and operated by AAFC/AESB. The reservoir has a total storage area of 14, 895 dam³ and a flooded area of approximately 517 ha at full supply level (FSL; EI 723.0 m). The water in the reservoir is used to support agricultural lands in the region, in particular the Herbert and Rush Lake Irrigation projects.

A dam safety assessment of the Highfield Dam was conducted by the Prairie Farm Rehabilitation Administration (PFRA) in 1987. Using PFRA's hazard potential classification system the Highfield Dam was rated as having a high potential for loss of life, significant downstream economic losses, and significant other economic losses caused by flooding due to dam failure. Further, dam safety reviews indicated that the current spillway system cannot pass an inflow design flood (IDF) consistent with industry standards and that there is insufficient freeboard between the FSL and top of dam during passage of less frequent flood events. Preliminary studies are being undertaken by AAFC/AESB to identify appropriate upgrades in order to resolve the dam safety concerns with the current dam components. The option currently favoured involves increasing the spillway capacity through construction of a new spillway on the east side, raising the top of dam elevation and other associated work (Figure 1). Other project enhancements would include: lengthening the west outlet conduit; constructing a bridge over the spillway entrance channel; increasing the capacity of an existing wasteway located on the Herbert Main Canal immediately downstream of the dam; and improving the flood capacity of the existing spillway.

Major activities associated with this project may include borehole drilling; excavating soils; hauling and stockpiling soils, rock and granular materials; placing soil materials; shaping and compacting soils; placing rock and granular materials; placing topsoil; and revegetating disturbed areas. The construction activities will likely be completed using traditional earth

moving equipment including track hoes; rock trucks, graders, front-end loaders, bobcats and scrapers. The proposed borrow area for the earth works is located southeast of the east end of the dam and overlaps with the existing previously disturbed borrow area used to construct the current dam (Figure 1). The proposed work is anticipated to start in the 2012/2013 construction season; however, there is the potential that delays in the decision making process may lead to postponing the work until the following season.

As AAFC/AESB is the proponent; an Environmental Assessment (EA) will be required under the *Canadian Environmental Assessment Act* (CEAA) for the proposed work. An assessment of the biological systems around the project area was previously conducted in 2003 by Jacques Whitford Environmental Limited ⁽¹⁾. However, in preparation for the EA, AAFC/AESB requires an update to the existing biophysical information within the project area. This data will be used to supplement the existing data by identifying any new species not recorded previously so that AAFC/AESB is working with the most current data available for the project study area. As such, rare plant, wildlife, and fish and fish habitat assessments have been conducted in order to facilitate identification of potential adverse environmental impacts associated with the proposed project and recommendations and mitigation measures have been proposed for avoidance and/or minimizing the impacts from the proposed work.

As part of the wildlife surveys conducted at the Highfield Dam property, during the 2010 survey, particular emphasis was placed on determining the presence of rare and/or endangered species within the project study area as recorded by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), the federal *Species at Risk Act* (SARA), and the Saskatchewan Conservation Data Centre (SKCDC) databases. The SARA is a key federal government commitment to prevent the extinction or extirpation of species, subspecies, and distinct populations and to secure the necessary actions for the recovery of endangered or threatened species. It provides for legal protection of these species and the conservation of their biological diversity ⁽²⁾. The SARA affirms COSEWIC as an independent body of experts responsible for identifying and assessing species at risk. Species that have been designated by COSEWIC may qualify for legal protection and recovery under SARA; however, it is up to government to legally protect species designated by COSEWIC as the SARA applies only to species on the SARA legal list ⁽³⁾. The Saskatchewan Ministry of the Environment is legislated to address species at risk in Saskatchewan under the direction of *The Wildlife Act*, 1998, which included provisions to designate and protect species at risk in Saskatchewan. There area currently 29

bird, 8 mammal, 3 reptile and 2 amphibian species at risk in Saskatchewan (listed under COSEWIC as special concern, threatened, or endangered) that are identified under SARA, 9 of which are identified as a provincial wild species at risk under the *Wildlife Act* ⁽⁴⁾ (Appendix A).

This report outlines the methods and results of the wildlife surveys conducted within the project area (Figure 1). The report is based upon information obtained during two separate site visits conducted in late spring (May 31 to June 2, 2010), and late summer (August 10 to 11, 2010).

2.0 WILDLIFE SURVEY METHODOLOGY

2.1 INFORMATION REVIEW

Prior to initiating the field program, KGS Group conducted a review of all pertinent documents from previous studies that were provided by AAFC/AESB. In addition, a literature search was conducted for documents produced after 2003. KGS Group located a single document with pertinent information regarding the regional study area. The document titled Background Report – Swift Current Watershed was issued by the Saskatchewan Watershed Authority (SWA) and contained general information regarding vegetation and wildlife typically associated with the mixed grass ecoregion that encompasses the Swift Current watershed ⁽⁵⁾. Data from these reports will be compared to the results of this study later in the report in the Discussion (Section 4).

2.2 WILDLIFE SURVEY METHODOLOGY

Wildlife surveys conducted at the Highfield Dam property during the 2010 season included recording the presence of birds, mammals, and amphibian and reptiles. Particular emphasis was placed on determining the presence of rare and/or endangered species within the project area. As well, special effort was invested into indicating the location of any colonial nesting birds that may be impacted by the proposed project. A detailed trapping program was not included as part of this study.

Field surveys for wildlife were conducted from May 31 to June 2, 2010, and again from August 10 to 11, 2010. Multiple surveys were conducted in order to ensure that the presences of species were not missed due to potential seasonal variations in wildlife behaviour. Additionally, to detect as many bird species as possible, additional surveys were conducted at dawn and dusk in order to produce a species list that is representative of both daytime and nocturnal species. Field sampling was conducted within the boundary established by AAFC/AESB for the project area (Figure 1).

Five plant communities were identified in previous work conducted on the site ⁽¹⁾, and were reaffirmed by the KGS Group project team. The five plant communities are as follows (Figure 1; Appendix B - Photo 1-6):

- Crested Wheat Pasture (CWP);
- Saline Wet Meadow (SWM);
- Wooded Stand (WS);
- Rush Flats (RF), and
- Native Grasslands (NG)

Although, the Jacques Whitford report refers to some areas as native grassland, the current study determined that this plant community is better described as grassland fragments (GF) and will be referred to as such for the remainder of this report. Justification for this determination is provided in the Vegetation / Rare Plant Survey report. Two additional plant communities that were examined during the study included reservoir (RES) which describes the shoreline habitat (along the reservoir) and wetland (WET) which describe the plant community within Rush Lake Creek and land drainage channel/original creek that winds through the property.

The wildlife surveys were conducted using the same transect lines established within each of the five primary plant communities as part of the Vegetation / Rare Plant Survey. The survey team traversed slowly along the transect lines stopping regularly to make visual observation and auditory recordings for all species of birds, mammals, and amphibian and reptiles encountered. All wildlife that was observed was identified to species level. Incidental observations of wildlife and wildlife activity were recorded along the transect lines and at any point while within the boundary of the project area. Wildlife observation included actual observations of wildlife species within their residence habitat and in foraging habitat. Wildlife activity observations included tracks, scat, and carcasses.

The locations of rare wildlife species observed and photographs taken on site were recorded using a handheld global positioning system (GPS) device with coordinates recorded in Universal Transverse Mercator (UTM) using North American Datum of 1983 (NAD83) and the locations marked on a map (Figure 1).

3.0 RESULTS

3.1 BIRDS

A total of 44 species of birds were detected within the various project area plant communities (Table 1). Out of this list, 31 species were likely to be nesting or otherwise immediately associated with habitat falling within the study area based on the behaviour observed as discussed in Section 4.0. The saline wet meadow was the plant community that appeared to have the highest number of bird species associated with it; yielding a total of 19 species during the two site visits. While the reservoir community had the second highest number of species associated with it; yielding a total of 17 species during the two site visits.

Previous work conducted on the site by Jacques Whitford identified 27 species ⁽¹⁾, 19 of which were also identified in the current study. Species identified in the Jacques Whitford study that were not identified during the current study include American white pelican (*Pelecanus erythrorhynchos*), double-crested cormorants (*Phalacrocorax auritus*), mallard (*Anas platyrhynchos*), redhead (*Aythya americana*), American coots (*Fulica americana*), Franklin's gull (*Larus pipixcan*), sora (*Porzana carolina*) and one Federally protected species the loggerhead shrike (*Lanius ludovicianus*).

Two bird species, the chestnut collared longspur (*Calcarius ornatus*) and ferruginous hawk (*Buteo regalis*) were identified within the project area during the current study and are listed as threatened (T) by COSEWIC. However, neither species is considered provincially rare in Saskatchewan (S5B and S4B, respectively; Table 1). The chestnut collared longspur was observed nesting in the native grassland during the spring visit, and was noted to produce alarm calls which are indicative of fledgling activity. Ferruginous hawks (likely a pair) were observed soaring throughout the project area; neither bird issued an alarm call. The semipalmated sandpiper (*Calidris pusilla*) is a candidate/identified species (C) under COSEWIC, however it has not yet been assessed. All the other species identified in the project area were either considered not at risk (NAR), least concern (LC) or not ranked under COSEWIC.

A single species, red-tailed hawk (*Buteo jamaicensis*) with a provincial status which includes S1N ('N' refers to non-breeding populations) was identified within the project area, although it is listed as NAR under COSEWIC. Three bird species, American wigeon (*Anas americana*),

gadwall (*Anas strepera*), and northern harrier (*Circus cyaneus*) identified in the project area had provincial ratings which included S2N. The northern harrier is listed as NAR under COSEWIC, while the other two are not listed. While these species are listed as S1 or S2 for their non-breeding populations, the breeding populations are all very common (S5B). One S3B species, great blue heron (*Ardea Herodias*), was identified in the project area, however under COSEWIC it is listed as LC and this only applies to a portion of the species range. All other species observed in the study area had provincial ratings of S4 or greater, and are not considered species of conservation concern.

Several bird species considered to be colonial nesting species were identified within the study area. These included great blue heron, common tern (*Sterna hirundo*), eared grebe (*Podiceps nigricollis*), bank swallow (*Riparia riparia*), and cliff swallow (*Petrochelidon pyrrhonota*).

3.2 MAMMALS

The current surveys indicated the presence of 9 mammal species within the project area (Table 1). During the spring visit, seven species were detected either through the presence of tracks and/or scat, or through observation of live animals or carcasses. Species detected during the spring visit included American badger (*Taxidea taxus*), coyote (*Canis latrans*), meadow vole (*Microtus pennsylvanicus*), mule deer (*Odocoileus hemionus*), common muskrat (*Ondatra zibethicus*), pronghorn antelope (*Antilocapra americana*), and thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*). During the summer survey, two additional species were detected including the white-tailed deer (*Odocoileus virginianus*) and white-tailed jackrabbit (*Lepus townsendii*). With the exception of the American badger which is listed as S3/S4 (rare-uncommon to common) and NAR under COSEWIC, all species were listed provincially as either S4 (common) or S5 (very common) and not listed under COSEWIC.

Previous work conducted on the site by Jacques Whitford ⁽¹⁾ also identified the presence of coyote as observed during the current study. They also identified the presence of Richardson's ground squirrel (*Spermophilus richardsonii*) throughout the project study area based solely on the presence of burrows. However these burrows may have been for the thirteen-lined ground squirrel that was physically observed during the current study.

3.3 REPTILES AND AMPHIBIANS

No reptiles were encountered within or surrounding the project area. Two species of amphibian were encountered within the project area; both within the wetland habitat (WET) represented by the creeks and land drainage channels winding through the property. A tiger salamander (*Ambystoma tigrinum*; Appendix B - Photo 7) was observed in Rush Lake Creek approximately 75 m downstream of the east outlet structure. The tiger salamander is not ranked provincially and the Prairie/Boreal populations are listed as NAR under COSEWIC. The Northern leopard frog (*Rana pipiens*; Appendix B - Photo 8) was observed along the edge of the wetland habitat (UTM 13 U 329767 557929; Figure 1). The northern leopard frog is listed as a provincially rare-uncommon species (S3) whereas under COSEWIC the Western Boreal/Prairie populations are listed as a species of special concern (SC) and the Eastern populations are listed as NAR.

Previous work conducted on the site by Jacques Whitford also identified the presence of the northern leopard frog, but did not identify the presence of any other amphibians or reptiles ⁽¹⁾.

4.0 DISCUSSION

4.1 BIRDS

4.1.1 On-Site Field Surveys

While the sample size does not lend these data to rigorous statistical analysis, it may be noteworthy that the greatest numbers of species were detected in the shoreline and saline wet meadow. The presence of permanent water and other landscape/structural elements such as woody vegetation tend to add habitat complexity that can yield a greater number of resident species within a given patch of landscape. Examples of birds encountered within the project area with a well documented affinity for water or wetlands include, among others sighted, the American avocet (*Recurvirostra americana*), Common snipe (*Gallinago gallinago*), Marbled Godwit (*Limosa fedoa*) and willet (*Tringa semipalmata*). In the case of the saline wet meadow, the presence of abundant plants such as greasewood (*Sarcobatus vermiculatus*) and Buffalo berry (*Shepherdia argentea*) provides additional structure and habitat complexity, likely contributing to greater species counts.

During the current study, a few observed species, particularly birds of prey including ferruginous hawk, Red-tailed hawk and Swainson's hawk (*Buteo swainsoni*) were likely nesting off-site as there were no available nesting areas on-site. However, given their propensity to range widely while hunting, they were likely utilizing opportunities in the project area. Some sightings likely represented non-territorial, non-breeding individuals utilizing shoreline foraging opportunities particularly given the lack of preferred nesting habitat. This may be the case for the greater yellowlegs (*Tringa melanoleuca*) sighting, as well as that of the great blue heron. Others including bank swallow and cliff swallow, are often found in close proximity to water where eroded banks, which are in abundance along the northern bands of the Highfield reservoir, can provide nesting habitat.

4.1.2 Regional Field Surveys

Two other bird surveys were conducted in the regional area in addition to the current 2010 survey and the previous 2003 survey conducted on the site. One of these was conducted approximately 60 km northwest of the project area and identified 198 species of birds within a

1500 km² area surrounding the Matador. Of the 198 species, 10 are breeding in the area as permanent residents, 82 are breeding in the area as summer residents, 16 are summer residents or visitors that do not breed in the area and 17 are winter residents that do not breed in the area; while the remaining 73 species are spring and autumn transients ^(5, 6).

The second survey overlaps with the project area and was conducted as part of the Saskatchewan Ministry of the Environment Bird Atlas (Appendix C). This survey identified 155 birds, 8 of which are federally protected species including short-eared owl (*Asio flammeus*), Sprague's pipit (*Anthus spragueii*), loggerhead shrike, ferruginous hawk, whooping crane (*Grus americana*), piping plover (*Charadrius melodus*), long-billed curlew (*Numenius americanus*) and burrowing owl (*Anthene cunicularia*).

4.1.3 Species of Concern

The chestnut collared longspur and ferruginous hawk, as previously stated, are listed as threatened by COSEWIC; however, are not considered to be rare/endangered in Saskatchewan. The chestnut collared longspur is dependant on native prairie habitat ⁽⁷⁾, which is where it was observed to be nesting. Although this species is not considered rare provincially, the population within the project area would be at risk of decline if the grassland fragments were lost outright as a result of the project. Mitigation to prevent this should include ensuring that a portion of the grassland fragments are preserved and developing an appropriate rehabilitation plan for this section of the site that includes revegetation using a native plant seed mix.

The ferruginous hawks observed within the project area were likely foraging as they typically nest in relatively high locations, in tall trees, usually in older semi-isolated cottonwoods (*Populus deltoids*). Appropriate nesting habitat was absent from the project area. Further to the point, neither hawk appeared alarmed by the survey team, which would have implied that their range was being encroached upon. Suitable nesting habitat was identified approximately 1.5 km northwest and 2 km northeast of the project area. As ferruginous hawk nest sites are not likely to occur in the project area, activity restriction dates listed by SKCDC should not need to be imposed. Further, it is highly unlikely that a nest would be in close proximity to the proposed construction activity. As the closest available nesting habitat for this species is approximately 1.5 km from the project area, the proposed construction activity is further than the SKCDC

recommended set back distance (1000 m) for road construction and other high disturbance categories (Appendix D).

The Red-tailed hawk has a provincial status of S5B, S5M, and S1N. The provincial status modifier 'B' refers to breeding populations, 'M' refers to transient populations, and 'N' refers to non-breeding populations. Although the species technically has an S1 category for part of its status, ratings with 'N' modifiers are of low concern when coupled with 'B' modifier ratings. This low concern is confirmed by the fact that the species does not appear in the SKCDC rural municipality element occurrence lists of species with S rank (Appendix E) and protection status, nor on the SKCDC list of species at risk in Saskatchewan (Appendix A). This species is listed as NAR by COSEWIC. Specific mitigations will not be considered for the protection of the red-tailed hawk.

The American wigeon, gadwall, and northern harrier have S2N status included within their provincial ranking. As stated above, the 'N' modifier is of less concern when in conjunction with a 'B' modifier. Once again, this low concern is confirmed by the fact that these species are not listed on SKCDC element occurrence lists of species with S rank (Appendix E) and protection status or on the SKCDC list of species at risk in Saskatchewan (Appendix A). Further, these species either are not listed by COSEWIC or are listed as NAR. Therefore specific mitigations will not be considered for the protection of the American wigeon, gadwall, or northern harrier.

The great blue heron, has a provincial rating of S3B which indicates that the species is rare-uncommon in Saskatchewan. This species was only seen above the open water of the reservoir during the spring site visit. This species typically is associated with freshwater and brackish marshes along open water areas although it can be found near open fields. It commonly nests high in trees in swamps and forested areas although it can nest in bushes, on the ground, along rock ledges and cliffs ⁽⁷⁾. While it is likely that the blue heron observed during the spring site visit was breeding in the area, it is less likely that the nesting area was within the project area. The potential area of impact that may result from proposed development will not likely impact the optimal breeding habitat for this species. It is unlikely that the SKCDC activity restriction dates will be required for this project. However, should a nest be encountered the SKCDC has a specific set back regulation for heron nests. These set back distances are 500 m for low impact disturbances (foot traffic), and 1000 m for medium (gravel trucks, etc.) to high disturbance categories (Appendix D).

Several species and/or groups of species (colonial nesting birds) have special considerations assigned to them by Saskatchewan Environment regardless of their conservation status. This is done because colonial birds respond as a flock such that if a single bird takes flight in response to disturbance the flock will also take flight resulting in greater disturbance than a single bird for non-colonial species. With the exception of the great blue heron, all of the colonial birds identified within the project area had very common/secure provincial and global status (S5 and G5, respectively). No nests for any of these species were observed during this survey, nor were any of these species observed in colonies within the project area. Therefore, it is unlikely that the SKCDC activity restriction dates for colonial nesting birds will be required for this project. However, the SKCDC set back restrictions would apply for these species if a nest is encountered within the project area at a future date (Appendix D). Recommended set back distances for Gulls/terns are 200 m for low levels of disturbance, and 400 m for medium to high levels of disturbance. Recommended set back distances for Grebes are 100 m for low areas of disturbance, and 200 m for medium to high levels of disturbance.

An American bittern (*Botarus lentiginosus*), was identified within the project area in the Rush Flat vegetation category. Although this species has a Global status of G4 (apparently secure) and a provincial status of S4B (common for breeding), Saskatchewan Environment has assigned a set back category to it (Appendix D). While this species was observed in the project area, no nest was observed and the bird was not issuing an alarm call that would suggest it had fledglings present. Therefore, it is unlikely that restricted activity dates need to be applied. Should a nest be encountered at a future date the set back requirements for this species are 200 m for low levels of disturbance, and 400 m for medium to high levels of disturbance.

Of the eight federally protected species identified in the Saskatchewan Bird Atlas, only the ferruginous hawk and loggerhead shrike have been identified within the project area. As described in detail previously, the ferruginous hawk was identified during the fall visit of the current study and, though unlikely to occur, should a nest be encountered on site appropriate mitigative measures should be imposed. The loggerhead shrike was observed in the project area during the 2003 study; however it was not observed and no auditory calls were detected during either site visit in 2010. Nevertheless, should a nest be detected for this species, or any other species of conservation concern appropriate measures should be made to avoid disturbance of the nest including keeping in accord with the Saskatchewan Environment activity restrictions and the SKCDC should be contacted for further advice. The burrowing owl was the

only other species, among the eight species of conservation concern, detected in the vicinity of the project area. The closest recorded occurrence of a burrowing owl is approximately 7.5 km northwest of the project area. The survey area for the SKCDC covered a range of approximately 1000 km² which is well outside the range of the current study area and, therefore, included more diverse habitats and subsequently increased the potential to observe many species that would be unlikely to typically occur within the project area

4.2 MAMMALS

4.2.1 Species

The Mixed Grass Ecoregion supports fifty-one mammal species ⁽⁶⁾. Mammal species common to the Swift Current watershed included Mule deer, white-tailed deer (*odocoileus virinianus*), elk (*Cervus elaphus*), coyote, pronghorn antelope (*Antilocarpa Americana*), badger, Richardson's ground squirrel (*Spermophilus richardsonii*), white-tailed jack rabbit, northern pocket gopher (*Thomomys talpoides*), and the recently re-introduced S1 species the swift fox (*Vulpes velox*) ⁽⁵⁾.

The olive-backed pocket mouse (*Perognathus fasciatus*) is the single mammal species of conservation concern listed in the SKCDC database for the rural municipalities of Excelsior and Coulee within which the project area is located (Appendix E). Neither of the previous studies indicated its presence within the project area. The SKCDC database lists a wildlife habitat protection area approximately 3.5 km north-northwest of the Highfield dam along Rush Lake Creek. This area is likely beyond any potential impacts from the proposed work.

Eight of the nine mammal species identified in the current study are listed as S4 or S5 provincially and, as such, are considered to have stable populations. The single species of conservation concern identified within the project area was the American badger (S3S4). Species with S3 ranking are considered Rare-Uncommon in Saskatchewan with usually between 20 to 100 occurrences throughout the province and may be susceptible to large-scale disturbances. American badgers were also observed along the roadway approximately 1.6 km north of project area. This species is likely considered S4 within the region encompassing the project area.

4.2.2 Potential Impacts to Mammal Habitat

The habitat that will likely be directly affected by the excavation of the borrow pit and the subsequent enhancements to the dam and structures will for the most part be previously disturbed areas. The borrow area will likely overlap with the historic borrow area. The development of the dam will likely impact a small area of habitat on the north side of the dam, as the toe of the slope would have to be expanded in order to support an increase in dam height. In both of these disturbed area, the mammal species that would most likely be impacted by the development includes small/burrowing mammals. However, the area of habitat being disturbed is negligible compared to the available habitat in the surrounding area.

4.3 REPTILES AND AMPHIBIANS

4.3.1 Species

Two species of amphibians were observed within the wetland habitat winding through the project area. The tiger salamander was inadvertently captured in minnow trap situated within Rush Lake Creek downstream of the causeway, and was released unharmed back into the same location.

No provincially very rare (S1) or rare (S2) species were encountered during the biological survey. Of the species observed during the current study, only the northern leopard frog (Western Boreal/Prairie populations) is listed under COSEWIC as SC and under SARA as Schedule 1 SC. This species remains widespread but is of special concern as it has experienced a considerable reduction of range and loss of populations in the past, combined with increased isolation of remaining populations ⁽³⁾. The species was formerly abundant across the province south of 55°N; however, populations have greatly decreased since the 1970's. This species is still widespread, but populations tend to be isolated ⁽³⁾. The species has reoccupied much of its historic range, although densities are far below previous levels, which is why it remains as Schedule 1 SC under SARA.

4.3.2 Potential Impacts to Reptile and Amphibian Habitat

While the proposed development, particularly the widening of the berm, will impede into a small portion of the habitat used by the northern leopard frog, the quantity of habitat that would be impacted is negligible compared to that available in the immediate surrounding area. The Northern Leopard Frog uses a variety of habitats to meet its overwintering and breeding needs and in the summer is found in a wide variety of habitats, although the preferred habitat seems to be vegetation 15 to 30 cm tall that is relatively close to water ⁽³⁾. Well-oxygenated water bodies, such as streams or larger ponds that do not freeze solid are used for overwintering sites. Temporary ponds that often dry up in late summer that are typically 30 to 60 m in diameter, 1.5 to 2.0 m deep, located in an open area, with a lot of emergent vegetation, and no fish are used for breeding sites. Therefore the species is adversely affected by habitat fragmentation and conversion, including wetland drainage and eutrophication, as well as game fish introduction, collecting and pesticide contamination.

4.4 OVERVIEW OF PROJECT EFFECTS AND MITIGATION

Project activities have the potential to impact portions of all of the identified plant communities except for the wooded stand. The proposed project activities likely to result in measureable disturbances include widening the dam in order raise the top of dam elevation, the clearing and trenching associated with development of a new spillway channel and the clearing and excavation of the borrow pit area. The proposed borrow area for the earth works is located southeast of the east end of the dam and overlaps with the existing previously disturbed borrow area used to construct the current dam (Figure 1).

Potential environmental effects of the proposed modifications to Highfield Dam on wildlife are typical of those associated with earth work projects and include the following:

- Temporary disturbance of waterfowl and shorebirds habitat,
- Disturbance of shore birds and migratory birds during nesting and rearing,
- Disturbance of colonial and rare/sensitive species during nesting and rearing,
- Loss and disturbance of wildlife habitat,
- Loss and disturbance of small/burrowing mammals,
- Disturbance/loss of habitat for small/burrowing mammals,

- Reduced quality of wildlife habitat for contamination of soils, and
- Increased wildlife-vehicle interactions/wildlife mortalities.

As there were no provincially very rare (S1) or rare (S2) species observed within the project area and as the total habitat that may be impacted is negligible compared to the available habitat in the surrounding area, the environmental effects can likely be reduced/avoided using the appropriate mitigation methods. The following is a general overview of typical mitigation measures used for similar projects. More specific mitigation methods may be identified during the environmental assessment when a more detailed project description is available. Mitigation measures for reducing and/or preventing the above listed environmental effects include:

- Limiting construction activities to designated and, if possible, previously disturbed areas,
- Adhere to provincial activity restrictions (Appendix D),
- Minimize loss and disturbance of vegetation,
- Minimize loss and disturbance of soils,
- Revegetate disturbed areas,
- Prevent leaks, spills and releases by providing secondary containment for fuel,
- Provide drip trays and spill clean-up equipment,
- Excavate contaminated soils,
- Prepare emergency spill response plan,
- Provide wildlife awareness information to work crews, and
- Operate vehicles during daylight hours and adhere to existing speed limits.

The potential environmental effects and associated mitigative measures and follow-up procedures as listed above are summarized in Table 2.

5.0 REFERENCES

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TABLES

TABLE 1
WILDLIFE SPECIES LIST (2010 SURVEY) - HIGHFIELD DAM REHABILITATION PROJECT

Species			Plant Community							Status		
Common Name	Scientific name	Observation	CWP	SWM	WS	RF	GF	WET	RES	Provincial (S)	COESWIC	National (G)
Birds												
American avocet	<i>Recurvirostra americana</i>	Observed							■	S5B, S5M	--	G5
American bittern	<i>Botaurus lentiginosus</i>	Observed				■				S4B	-	G4
American robin	<i>Turdus migratorius</i>	Observed						■/□		S5B	-	G5
American wigeon	<i>Anas americana</i>	Observed						■/□		S5B,S5M,S2N	-	G5
Bank swallow	<i>Riparia riparia</i>	Observed							■/□	S5B,S5M	-	G5
Black-billed magpie	<i>Pica hudsonia</i>	Auditory				■				S5	-	G5
Blue-winged teal	<i>Anas discors</i>	Observed						□		S5B, S5M	-	G5
Bobolink	<i>Dolichonyx oryzivorus</i>	Auditory		■						S5B	-	G5
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	Observed	■/□	■/□			■			S5B	-	G5
Brown-headed cowbird	<i>Molothrus ater</i>	Observed		■						S5B	-	G5
Chestnut-collared longspur	<i>Calcarius ornatus</i>	Observed					■/□			S5B	T	G5
Clay-colored sparrow	<i>Spizella pallida</i>	Auditory	■/□	■/□			■			S5B	-	G5
Cliff swallow	<i>Petrochelidon pyrrhonota</i>	Observed							■	S5B,S5M	-	G5
Common tern	<i>Sterna hirundo</i>	Observed							□	S5B, S5M	NAR	G5
Eared grebe	<i>Podiceps nigricollis</i>	Observed							■/□	S5B	-	G5
Eastern kingbird	<i>Tyrannus tyrannus</i>	Observed		■/□			■			S5B,S5M	-	G5
Ferruginous hawk	<i>Buteo regalis</i>	Observed	□	□		□				S4B, S4M	T	G4
Gadwall	<i>Anas strepera</i>	Observed						■	■	S5B,S5M,S2N	-	G5
Gray catbird	<i>Dumetella carolinensis</i>	Auditory		■/□						S5B	-	G5
Great blue heron	<i>Ardea herodias</i>	Observed							■	S3B	PS, LC	G5
Great horned owl	<i>Bubo virginianus</i>	Observed		□						S5B, S5N	-	G5
Greter yellowlegs	<i>Tringa melanoleuca</i>	Observed							■	S5B, S5M	-	G5
Horned lark	<i>Eremophila alpestris</i>	Auditory					■			S5B,S5M,S5N	-	G5
Killdeer	<i>Charadrius vociferus</i>	Auditory		■						S5B	-	G5
Le Conte's sparrow	<i>Ammodramus leconteii</i>	Auditory				■/□				S4B	-	G4
Marbled godwit	<i>Limosa fedoa</i>	Auditory					■/□			S5B,S5M	-	G5
Northern harrier	<i>Circus cyaneus</i>	Observed	■/□	■/□		■				S5B,S4M,S2N	NAR	G5
Northern shoveler	<i>Anas clypeata</i>	Observed							■	S5B,S5M	-	G5
Red-tailed hawk	<i>Buteo jamaicensis</i>	Observed	■/□						■/□	S5B,S5M,S1N	NAR	G5
Red-winged blackbird	<i>Agelaius phoeniceus</i>	Observed				■				S5B	-	G5
Ring-necked duck	<i>Aythya collaris</i>	Observed							■	S5B,S5M	-	G5
Ruddy duck	<i>Oxyura jamaicensis</i>	Observed							□	S5B	-	G5
Semipalmated sandpiper	<i>Calidris pusilla</i>	Observed						□	□	S4M	C	G5
Song sparrow	<i>Melospiza melodia</i>	Auditory		□			□			S5B	-	G5
Spotted sandpiper	<i>Actitis macularius</i>	Observed						□	□	S5B, S5M	-	G5
Swainson's hawk	<i>Buteo swainsoni</i>	Observed	■/□	■/□		■/□				S4B	-	G5
Upland sandpiper	<i>Bartramia longicauda</i>	Auditory				■/□				S5B,S5M	-	G5

TABLE 1
WILDLIFE SPECIES LIST (2010 SURVEY) - HIGHFIELD DAM REHABILITATION PROJECT

Species			Plant Community							Status		
Common Name	Scientific name	Observation	CWP	SWM	WS	RF	GF	WET	RES	Provincial (S)	COESWIC	National (G)
Birds (cont'd)												
Vesper sparrow	<i>Pooecetes gramineus</i>	Auditory		■/□		■/□	■			S5B	-	G5
Western kingbird	<i>Tyrannus verticalis</i>	Observed		■						S5B,S5M	-	G5
Western meadowlark	<i>Sturnella neglecta</i>	Auditory	■/□	■/□		■				S5B	-	G5
Willet	<i>Tringa semipalmata</i>	Observed		■					■	S5B,S4M	-	G5
Wilson's phalarope	<i>Phalaropus tricolor</i>	Observed		■		■		■	■	S5B,S5M	-	G5
Wilson's snipe	<i>Gallinago gallinago</i>	Auditory		■/□		■				S5B,S5M	-	G5
Yellow warbler	<i>Dendroica petechia</i>	Auditory		■			■		■	S5B	-	G5
Mammals												
American badger	<i>Taxidea taxus</i>	carcass		■						S3S4	NAR	G5
Common muskrat	<i>Ondatra zibethicus</i>	observed							■/□	S5	-	G5
Coyote	<i>Canis latrans</i>	tracks, scat		■						S5	-	G5
Meadow vole	<i>Microtus pennsylvanicus</i>	observed				■				S5	-	G5
Mule deer	<i>Odocoileus hemionus</i>	tracks, scat	■	■			■			S5	-	G5
Pronghorn antelope	<i>Antilocapra americana</i>	tracks		■			■			S4	-	G5
Thirteen-lined ground squirrel	<i>Spermophilus tridecemlineatus</i>	observed	■/□	■/□			■/□			S5	-	G5
White-tailed deer	<i>Odocoileus virginianus</i>	observed				□				S5	-	G5
White-tailed Jackrabbit	<i>Lepus townsendii</i>	observed					□			S4	-	G5
Amphibian and Reptiles												
Northern leopard frog	<i>Rana pipiens</i>	observed						■		S3	SC,NAR	G5
Tiger salamander	<i>Ambystoma tigrinum</i>	observed						□		SNR	NAR	G5

Notes:

■ = site visit 1 (May 31 - June 2, 2010), □ = site visit 2 (August 10 - 11, 2010)

Provincial Status (S-Rank): S1= Extremely Rare, S2= Rare, S3= Rare-Uncommon, S4= Common, S5= Very Common.

Global Status (G-rank): G1= Critically Imperiled, G2= Imperiled, G3= Vulnerable, G4= Apparently Secure, G5= Secure, G#G# indicates range of uncertainty in status

Status modifiers: B = For a migratory species, rank applies to the breeding population in the province,

N = For a migratory species, rank applies to the non-breeding population in the province,

M = For a migratory species, rank applies to the transient population,

T = Ranking for subspecies or varieties.

COSEWIC descriptors E = Endangered; A Wildlife species facing imminent extirpation or extinction

T = Threatened; A wildlife species likely to become endangered if no action taken

SC = Special Concern; Likely to become endangered due to combination of identified threats

NAR = not at risk of extinction

DD= Data Deficient to determine status

PS = Status applies only to a portion of the species' range

LC = Least Concern

C = Candidate/identified species, not yet assessed

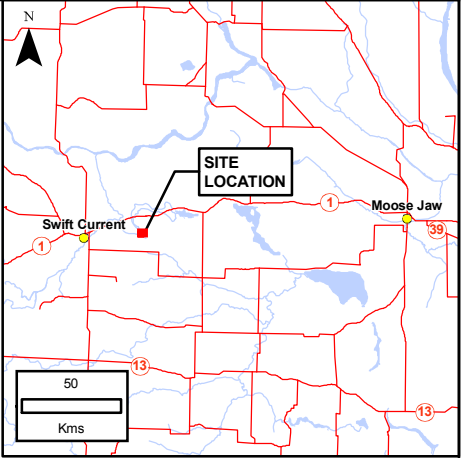
TABLE 2
POTENTIAL ENVIRONMENTAL EFFECTS, MITIGATION AND FOLLOW-UP
HIGHFIELD DAM REHABILITATION PROJECT

Environmental Effect	Mitigation Measures	Follow-up
Wildlife		
Temporary disturbance of waterfowl and shorebird habitat during construction	-Limit construction activities to designated and previously disturbed areas	-None Proposed
Disturbance of shore bird and migratory bird nesting and rearing due to construction activities	-Adhere to provincial activity restrictions if required (Appendix D)	-None proposed
Disturbance of colonial bird and rare/sensitive species nesting and rearing due to construction activities	-Adhere to provincial activity restrictions if required (Appendix D)	-None proposed
Loss and disturbance of wildlife habitat associated with construction	-Minimize loss and disturbance of vegetation -Limit construction activities to designated and previously disturbed areas -Re-vegetate disturbed or reclaimed areas during and after construction	-Periodic inspections during and after construction -Maintain re-vegetated areas -Ensure adherence to contract specifications and license terms and conditions
Loss and disturbance of small/burrowing mammals during site preparation and construction	-Minimize area of disturbance -Confine construction activities to previously disturbed areas	-Maintain records of small and burrowing mammal mortalities due to construction activities and vehicles
Disturbance/loss of habitat for small/burrowing mammals from disruption and compaction of soils during site preparation and construction	-Minimize disturbance of soils -Restrict activities to previously disturbed areas	-Periodic inspections of disturbed areas -Ensure adherence to contract specifications
Reduced quality of wildlife habitat from contamination of soils during construction from leaks, accidental spills, or releases of fuels or other hazardous substances	-Prevent leaks, spills and releases by providing secondary containment for fuel and hazardous material storage -Require drip trays for equipment -Provide spill clean-up equipment and materials -Excavation of contaminated soil with disposal at an approved site -Prepare emergency spill response plan	-Periodic inspections for leaks, spills and releases -Ensure adherence to contract specification and license terms and conditions -Periodic updates of emergency response plan
Increased wildlife-vehicle interactions and associated wildlife mortalities, vehicle damage and human injury or death	-Operate transport trucks during daylight hours -Provide wildlife awareness information to drivers -Adhere to existing speed limits	-Maintain records of vehicle-wildlife interactions

FIGURES

Portions of data presented are owned by the Province of Saskatchewan and are produced under the licence agreement with the Province of Saskatchewan 2010 Queen's Printer.

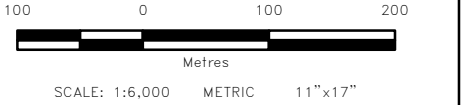
File Name: P:\Projects\2010\10-0217-01\Drawings\GIS\MXDs\Rev0\10-0217-01_F01_Rev0.mxd
11"x17" PLOT SCALE 1:1



LEGEND:

- Northern Leopard Frog
- Photo Location
- Contour
- Fence
- Proposed Spillway Channel
- Road CL
- Road Edge
- Sasktel
- Shoreline
- Slope Edge
- Borrow Area
- Structures
- Vegetation Community
- Project Study Area
- Quarter Section Boundary

NOTES:
1. Imagery from Google Earth (2010 Cnes/Spot Image).
2. Contour data provided by Agriculture and Agri-Food Canada.



All units are metric and in metres unless otherwise specified.
Transverse Mercator Projection, NAD 1983, Zone 13
Elevations are in metres above sea level (MSL)

0	10/11/19	ISSUED WITH FINAL	SFM
NO.	YY/MM/DD	DESCRIPTION	BY

REVISIONS / ISSUE

KGS GROUP CONSULTING ENGINEERS

Agriculture and Agri-Food Canada
Agriculture et Agroalimentaire Canada

REHABILITATION OF THE HIGHFIELD DAM PROJECT

SITE LOCATION PLAN

NOVEMBER 2010	FIGURE 01	REV: 0
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APPENDICES

APPENDIX A

SASKATCHEWAN CONSERVATION DATA CENTRE - SPECIES AT RISK IN SASKATCHEWAN

Species at Risk in Saskatchewan

This list is updated twice per year following COSEWIC Species Assessment Meetings, generally in the spring and the fall.

The federal *Species at Risk Act* establishes Schedule 1 as the official federal list of wildlife species at risk.

The provincial *Wildlife Act, 1998* lists at-risk species in Saskatchewan. These are identified below with an asterisk (*).

Taxonomic Group	Common Name	Scientific name	COSEWIC Status	Last COSEWIC Assessment	SARA status	Schedule	SK CDC Rank	SK Status
Amphibian	Great Plains Toad	<i>Bufo cognatus</i>	Special Concern	April 2010	Special Concern	Schedule 1	S3	
Amphibian	Northern Leopard Frog	<i>Rana pipiens</i>	Special Concern	April 2009	Special Concern	Schedule 1	S3	
Arthropod	Dakota Skipper	<i>Hesperia dacotae</i>	Threatened	November 2003	Threatened	Schedule 1	S1	
Arthropod	Dusky Dune Moth	<i>Copablepharon longipenne</i>	Endangered	November 2007	Endangered	Schedule 1	SNR	
Arthropod	Gold-edged Gem	<i>Schinia avemensis</i>	Endangered	April 2006	Endangered	Schedule 1	SNR	
Arthropod	Monarch Butterfly	<i>Danaus plexippus</i>	Special Concern	April 2010	Special Concern	Schedule 1	S3B	
Arthropod	Mormon Metalmark	<i>Apodemia mormo</i>	Threatened	May 2003	Threatened	Schedule 1	S1	
Arthropod	Pale Yellow Dune Moth	<i>Copablepharon grande</i>	Special Concern	November 2007	Special Concern	Schedule 1	SNR	
Arthropod	Verna's Flower Moth	<i>Schinia verna</i>	Threatened	May 2005	Threatened	Schedule 1	SH	
Bird	Bobolink	<i>Dolichonyx oryzivorus</i>	Threatened	April 2010	No Status	No Schedule ¹	S5B	
Bird	Burrowing Owl*	<i>Athene cunicularia</i>	Endangered	April 2006	Endangered	Schedule 1	S2B	Endangered
Bird	Canada Warbler	<i>Wilsonia canadensis</i>	Threatened	April 2008	Threatened	Schedule 1	S5B	
Bird	Chestnut-collared Longspur	<i>Calcarius ornatus</i>	Threatened	November 2009	No Status	No Schedule ¹	S5B	
Bird	Chimney Swift	<i>Chaetura pelagica</i>	Threatened	April 2007	Threatened	Schedule 1	S3B	
Bird	Common Nighthawk	<i>Chordeiles minor</i>	Threatened	April 2007	Threatened	Schedule 1	S4S5B, S4S5M	
Bird	Eskimo Curlew*	<i>Numenius borealis</i>	Endangered	November 2009	Endangered	Schedule 1	SHM	Extirpated
Bird	Ferruginous Hawk	<i>Buteo regalis</i>	Threatened	April 2008	Threatened	Schedule 1	S4B, S4M	
Bird	Greater Prairie-chicken*	<i>Tympanuchus cupido pinnatus</i>	Extirpated	November 2009	Extirpated	Schedule 1	SX	Extirpated
Bird	Greater Sage-grouse*	<i>Centrocercus urophasianus urophasianus</i>	Endangered	April 2008	Endangered	Schedule 1	S1B, S1N	Endangered
Bird	Horned Grebe	<i>Podiceps auritus</i>	Special Concern	April 2009	No Status	No Schedule ¹	S5B	
Bird	Loggerhead Shrike	<i>Lanius ludovicianus excubitorides</i>	Threatened	May 2004	Threatened	Schedule 1	S4B	
Bird	Long-billed Curlew	<i>Numenius americanus</i>	Special Concern	November 2002	Special Concern	Schedule 1	S4B, S4M	
Bird	McCowan's Longspur	<i>Calcarius mccownii</i>	Special Concern	April 2006	Special Concern	Schedule 1	S3S4B	
Bird	Mountain Plover	<i>Charadrius montanus</i>	Endangered	November 2009	Endangered	Schedule 1	S1B	
Bird	Olive-sided Flycatcher	<i>Contopus cooperi</i>	Threatened	November 2007	Threatened	Schedule 1	S4	
Bird	Passenger Pigeon	<i>Ectopistes migratorius</i>	Extinct					
Bird	Peregrine Falcon	<i>Falco peregrinus anatum</i>	Non-active	April 2007	Threatened	Schedule 1	S1B, S4M, S2N	
Bird	Peregrine Falcon	<i>Falco peregrinus anatum/tundrius</i>	Special Concern	April 2007	No Status	No Schedule ¹		
Bird	Piping Plover*	<i>Charadrius melodus circumcinctus</i>	Endangered	May 2001	Endangered	Schedule 1	S3B	Endangered
Bird	Red Knot	<i>Calidris canutus rufa</i>	Endangered	April 2007	No Status	No Schedule ¹	S2M	
Bird	Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	Threatened	April 2007	Threatened	Schedule 1	S1B, S1M	
Bird	Rusty Blackbird	<i>Euphagus carolinus</i>	Special Concern	April 2006	Special Concern	Schedule 1	S4B	
Bird	Sage Thrasher	<i>Oreoscoptes montanus</i>	Endangered	November 2000	Endangered	Schedule 1	S1B	
Bird	Short-eared Owl	<i>Asio flammeus</i>	Special Concern	April 2008	Special Concern	Schedule 3	S3B, S2N	
Bird	Sprague's Pipit	<i>Anthus spragueii</i>	Threatened	April 2010	Threatened	Schedule 1	S4B	
Bird	Whip-poor-will	<i>Caprimulgus vociferus</i>	Threatened	April 2009	Threatened	Schedule 1	S3B	
Bird	Whooping Crane*	<i>Grus americana</i>	Endangered	April 2010	Endangered	Schedule 1	SXB, S1M	Endangered
Bird	Yellow Rail	<i>Coturnicops noveboracensis</i>	Special Concern	November 2009	Special Concern	Schedule 1	S3B, S2M	
Fish	Bigmouth Buffalo	<i>Ictiobus cyprinellus</i>	Non-active	April 2009	Special Concern	Schedule 3	S3	
Fish	Bigmouth Buffalo	<i>Ictiobus cyprinellus</i> (Saskatchewan-Nelson River pop'ns)	Special Concern		No Status	No Schedule ¹	S3	
Fish	Chesnut Lamprey	<i>Ichthyomyzon castaneus</i>	Special Concern	April 1991	Special Concern	Schedule 3	S3S4	
Fish	Lake Sturgeon	<i>Acipenser fulvescens</i> (Saskatchewan River pop'ns)	Endangered	November 2006	No Status	No Schedule ¹	S2B	

Fish	Lake Sturgeon	<i>Acipenser fulvescens</i> (Red-Assiniboine Rivers - Lake Winnipeg pop'ns)	Endangered	November 2006	No Status	No Schedule ¹	S2B	
Fish	Lake Sturgeon	<i>Acipenser fulvescens</i> (Western Hudson Bay pop'ns)	Endangered	November 2006	No Status	No Schedule ¹	S2B	
Fish	Shortjaw Cisco	<i>Coregonus zenithicus</i>	Threatened	May 2003	Threatened	Schedule 2	S1	
Mammal	Black-footed Ferret*	<i>Mustela nigripes</i>	Extirpated	April 2009	Extirpated [†]	Schedule 1	SNA	Extirpated
Mammal	Black-tailed Prairie Dog	<i>Cynomys ludovicianus</i>	Special Concern	November 2000	Special Concern	Schedule 1	S2	
Mammal	Ord's Kangaroo Rat	<i>Dipodomys ordii</i>	Endangered	April 2006	Endangered	Schedule 1	S2	
Mammal	Plains Bison	<i>Bison bison bison</i>	Threatened	May 2004	No Status	No Schedule ¹	S3	
Mammal	Plains Grizzly Bear*	<i>Ursos arctos</i>	Extirpated	May 2002	Extirpated	Schedule 1	SX	Extirpated
Mammal	Swift Fox*	<i>Vulpes velox</i>	Threatened	November 2009	Endangered	Schedule 1	S1	Endangered
Mammal	Wolverine	<i>Gulo gulo</i>	Special Concern	May 2003	No Status	No Schedule ¹	S3S4	
Mammal	Woodland Caribou	<i>Rangifer tarandus caribou</i> (Boreal pop'n)	Threatened	May 2002	Threatened	Schedule 1	S3	
Moss	Alkaline Wing-nerved Moss	<i>Pterygoneurum kozlovii</i>	Threatened	November 2004	Threatened	Schedule 1	S1	
Reptile	Eastern Yellow-bellied Racer	<i>Coluber constrictor flaviventris</i>	Threatened	November 2004	Threatened	Schedule 1	S3	
Reptile	Greater Short-horned Lizard	<i>Phrynosoma hernandesi</i>	Endangered	April 2007	Endangered	Schedule 1	S2S3	
Reptile	Snapping Turtle	<i>Chelydra serpentina</i>	Special Concern	November 2008	Special Concern	Schedule 1	S3	
Vascular Plant	Athabasca Thrift	<i>Armeria maritima interior</i>	Special Concern	May 2002	Special Concern	Schedule 1	SNR	
Vascular Plant	Buffalograss	<i>Buchloe dactyloides</i>	Threatened	November 2001	Threatened	Schedule 1	S1	
Vascular Plant	Dwarf Woolly-heads ²	<i>Psilocarphus brevissimus</i>	Special Concern	April 2006	Special Concern	Schedule 1	S1S2	
Vascular Plant	Felt-leaf Willow	<i>Salix silicicola</i>	Special Concern	May 2000	Special Concern	Schedule 1	S2S3	
Vascular Plant	Floccose Tansy	<i>Tanacetum huronense</i> var. <i>floccosum</i>	Special Concern	May 2000	Special Concern	Schedule 1	SNR	
Vascular Plant	Hairy Prairie-clover*	<i>Dalea villosa</i> var. <i>villosa</i>	Threatened	May 2000	Threatened	Schedule 1	S1	Endangered
Vascular Plant	Large-headed Woolly Yarrow	<i>Achillea millefolium</i> var. <i>megacephalum</i>	Special Concern	May 2000	Special Concern	Schedule 1	S1	
Vascular Plant	MacKenzie Hairgrass	<i>Deschampsia mackenziana</i>	Special Concern	November 2001	Special Concern	Schedule 1	S2	
Vascular Plant	Sand-dune Short-capsuled Willow	<i>Salix brachycarpa</i> var. <i>psammophila</i>	Special Concern	May 2000	Special Concern	Schedule 1	S2S3	
Vascular Plant	Slender Mouse-ear-cress*	<i>Halimolobos virgata</i>	Threatened	May 2000	Threatened	Schedule 1	S1	
Vascular Plant	Small White Lady's-slipper*	<i>Cypripedium candidum</i>	Endangered	May 2000	Endangered	Schedule 1	S1	Extirpated
Vascular Plant	Small-flowered Sand Verbena*	<i>Tripterocalyx micranthus</i>	Endangered	November 2002	Endangered	Schedule 1	S1	
Vascular Plant	Smooth Goosefoot	<i>Chenopodium subglabrum</i>	Threatened	April 2006	Threatened	Schedule 1	S2	
Vascular Plant	Tiny Cryptanthus*	<i>Cryptantha minima</i>	Endangered	May 2000	Endangered	Schedule 1	S1	Endangered
Vascular Plant	Turnor's Willow	<i>Salix turnorii</i>	Special Concern	May 2000	Special Concern	Schedule 1	S2	
Vascular Plant	Western Spiderwort*	<i>Tradescantia occidentalis</i>	Threatened	November 2002	Threatened	Schedule 1	S1	Endangered

¹ under consideration for addition to Schedule 1

² Synonym used in Saskatchewan is *Psilocarphus elatior*, Tall Woolly-heads.

[†] reintroduction in progress

* identified as a provincial wild species at risk under *The Wildlife Act, 1998*

For more information on Saskatchewan species ranked by the Conservation Data Centre (SK CDC) go to: <http://www.biodiversity.sk.ca>

For more information on the *Committee on the Status of Endangered Wildlife in Canada* (COSEWIC) and its recommendations for listing, go to: <http://www.cosewic.gc.ca>

For more information on the *Species at Risk Act* (SARA) and its registry of protected species go to: <http://www.sararegistry.gc.ca>

Prepared by Jeanette Pepper, Species at Risk Ecologist, Ministry of Environment, Fish and Wildlife Branch, June 2010

APPENDIX B
SITE PHOTOGRAPHIC LOG



PHOTO 1. North view of crested wheat pasture (CWP) taken from top of slope on Highfield Dam (Photo taken at NAD 83 13 U 330079 5575748).



PHOTO 2. North view of saline wet meadow (SWM) taken from top of slope on Highfield Dam (Photo taken at NAD 83 13 U 329991 5575718).



PHOTO 3. North view of wooded stand (WS) taken from the top of slope on Highfield Dam (Photo taken at NAD 83 13 U 329743 5575663).



PHOTO 4. Close-up shot of vegetation (Buffaloberry with under story of smooth brome and Kentucky bluegrass) within the wooded stand (WS) (Photo taken at NAD 83 13 U 329911 5576090).



PHOTO 5. North view of rush flats (RF) taken approximately 100 m north of the north embankment on Highfield Dam (Photo taken at NAD 83 13 U 329465 5575733).



PHOTO 6. South-southeast view of grassland fragments/pasture land (GF) taken from approximately 350 m south east of the east side of Highfield Dam (Photo taken at NAD 83 13 U 330536 5575388).



PHOTO 7. Image of tiger salamander approximately 75 m downstream of the east outlet on Rush Lake Creek (Photo taken at NAD 83 13 U 330125 5575868).

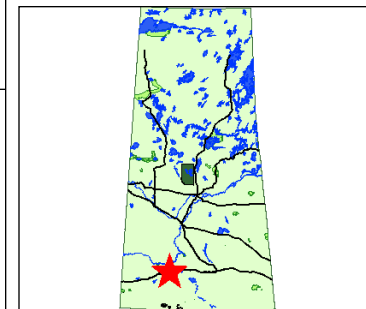
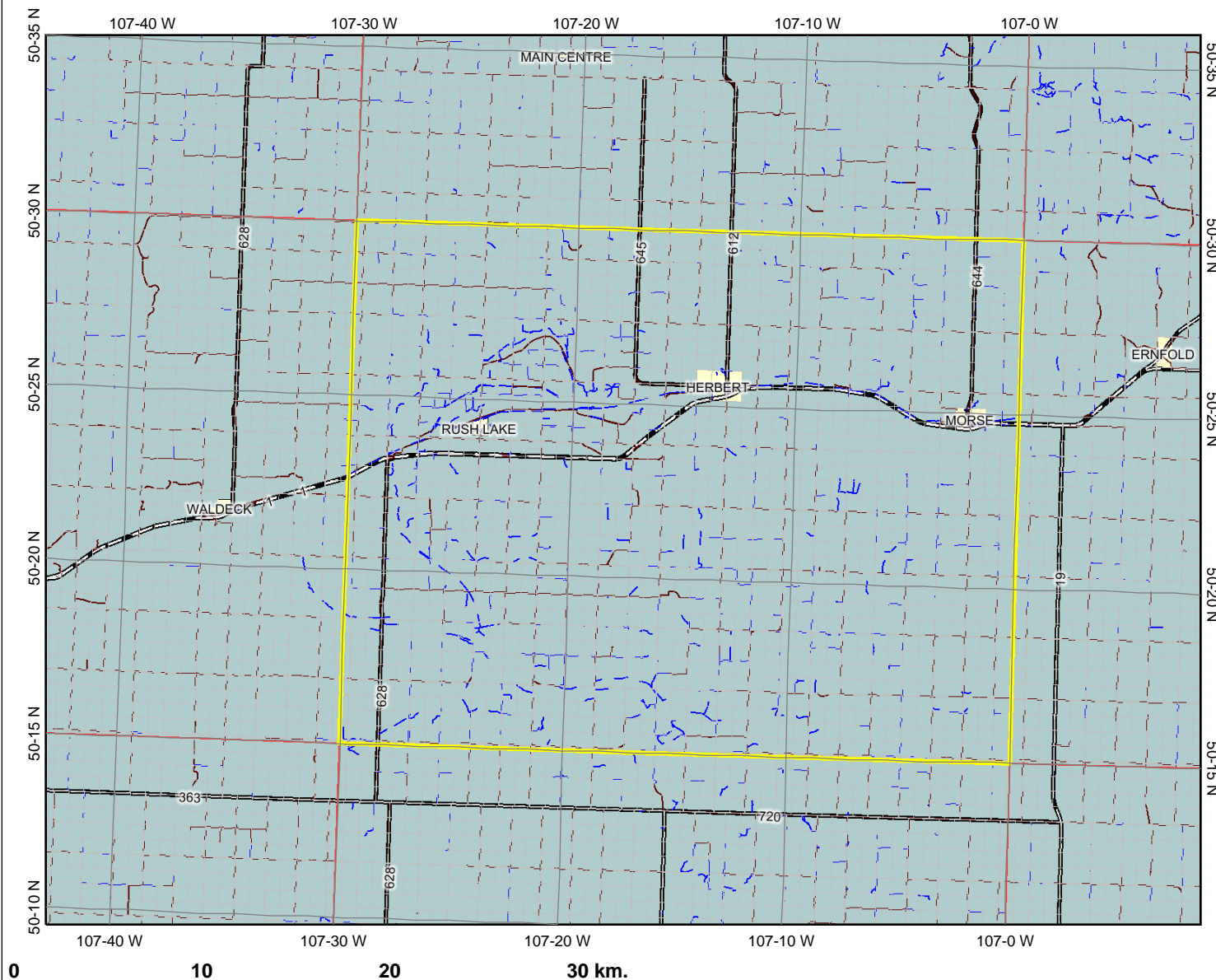


PHOTO 8. Image of northern leopard frog encountered within wetland habitat (WET) in land drainage/old creek situated approximately 250 m north of the center along Highfield Dam (Photo taken at NAD 83 13 U 329778 5575895).

APPENDIX C

SASKATCHEWAN MINISTRY OF THE ENVIRONMENT - BIRD ATLAS; FIELD CHECKLIST 72J06

Internet Mapping Framework



Legend

- Saskatchewan Boundary
- Sask Mask
- NTS 250 Mapsheets
- NTS 50 Mapsheets
- Quarter Sections
- SURN Roads
- Resource / Recreation
- Collector
- SURN Highways
- Urban Municipalities
- National Parks
- Provincial Parks
- Historic Park
- Wilderness Park
- Recreation Park
- Natural Environment Park
- Air Weapons Range
- Ecoregions
 - Aspen Parkland
 - Athabasca Plain
 - Boreal Transition
 - Churchill River Upland
 - Cypress Upland
 - Interlake Plain
 - Mid-Boreal Lowland
 - Mid-Boreal Uplands
 - Mixed Grassland
 - Moist Mixed Grassland
 - Selwyn Lake Upland
 - Tazin Lake Upland



Scale: 1:331,172

This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

*Landowner permission is required
whenever accessing private land*

Field Checklist: 72j06 Atlas of Saskatchewan Birds

Name: _____
Address: _____
Phone: _____
Observers: _____

Date (dd mm yy): _____
Location: _____
Latitude: _____
Longitude: _____
Legal: q sec twp rge m
UTM: Zone E N

Habitat (to the nearest 10%)

Habitat	%	Habitat	%
Grassland		Deciduous Forest	
Slough/Marsh		Mixedwood Forest	
Bog/Fen		Coniferous Forest	
Creek/River		Badlands	
Riparian Woodland		Cultivated	
Aspen Grove		Urban	

Weather

Start Temp: _____ End Temp: _____

Wind (Beaufort Scale), check start(s) and end(s):

Code	Speed	Conditions	s	e
0	<2 kph	smoke rises vertically		
1	2-5 kph	some smoke drift		
2	<6-11 kph	leaves rustle		
3	<12-19 kph	leaves & twigs in motion		
4	<20-29 kph	small branches move		
5	<30-39 kph	small trees sway		
6	>40 kph	large branches in motion		

Sky condition codes, check start (s) and end (e)

Conditions	s	e	Conditions	s	e
0 clear, few clouds			4 drizzle		
1 partly cloudy			5 snow		
2 cloudy, overcast			6 showers		
3 fog or smoke					

Species	#	BC
SHORT-EARED OWL	1	
RED-HEADED WOODPECKER	1	
YELLOW-BELLIED SAPSUCKER	1	
DOWNY WOODPECKER	1	
Hairy WOODPECKER	1	
WESTERN KINGBIRD	2	
EASTERN KINGBIRD	2	
HORNED LARK	14	
NORTHERN ROUGH-WINGED SWALLOW	1	
CLIFF SWALLOW	1	
BARN SWALLOW	1	
BLACK-BILLED MAGPIE	2	
AMERICAN CROW	1	
BROWN CREEPER	1	
SEDGE WREN	2	
TOWNSEND'S SOLITAIRE	2	
AMERICAN ROBIN	1	
VARIABLE THRUSH	1	
NORTHERN MOCKINGBIRD	1	
BROWN THRASHER	1	
AMERICAN PIPIT	1	
SPRAGUE'S PIPIT	3	
BOHEMIAN WAXWING	1	
LOGGERHEAD SHRIKE	1	
EUROPEAN STARLING	1	
WARBLING VIREO	1	
TENNESSEE WARBLER	1	
YELLOW-RUMPED WARBLER	1	
PINE WARBLER	1	
BLACKBOLL WARBLER	1	
LAZULI BUNTING	1	
DICKCISEL	1	
AMERICAN TREE SPARROW	1	
CLAY-COLORED SPARROW	2	
VESTER SPARROW	10	
LARK SPARROW	1	
LARK BUNTING	3	
SAVANNAH SPARROW	7	
HAIRD'S SPARROW	7	
GRASSHOPPER SPARROW	6	
LE CONTE'S SPARROW	1	
SHARP-TAILED SPARROW	1	
LINCOLN'S SPARROW	1	
WHITE-CROWNED SPARROW	1	
LAPLAND LONGSPUR	1	
SMITH'S LONGSPUR	1	
CHESTNUT-COLLARED LONGSPUR	6	
SNOW BUNTING	1	

Breeding Status Codes (BC)

Code	Species present
B01	Possible Breeding
B02	Possible Breeding
B03	Possible Breeding
B04	Possible Breeding
B05	Possible Breeding
B06	Possible Breeding
B07	Possible Breeding
B08	Confirmed Breeding
B09	Confirmed Breeding
B10	Confirmed Breeding
B11	Confirmed Breeding
B12	Confirmed Breeding
B13	Confirmed Breeding
B14	Confirmed Breeding
B15	Confirmed Breeding
B16	Confirmed Breeding
V	Non-breeding
S	Non-breeding
F	Non-breeding
W	Non-breeding
U	Status Unknown

Species	#	BC
BOBOLINK	1	
RED-WINGED BLACKBIRD	3	
WESTERN MEADOWLARK	6	
YELLOW-HEADED BLACKBIRD	1	
BREWER'S BLACKBIRD	2	
BROWN-HEADED COWBIRD	7	
BALTIMORE ORIOLE	1	
COMMON REDPOLL	1	
HOARY REDPOLL	1	
AMERICAN GOLDFINCH	1	
HOUSE SPARROW	2	

Species	#	BC
COMMON LOON	2	
PIED-BILLED GREBE	1	
HORNED GREBE	1	
EARED GREBE	1	
WESTERN GREBE	2	
CLARK'S GREBE	1	
AMERICAN WHITE PELICAN	1	
DOUBLE-CRESTED CORMORANT	1	
AMERICAN BITTERN	1	
GREAT BLUE HERON	1	
GREAT EGRET	4	
SNOWY EGRET	1	
BLACK-CROWNED NIGHT-HERON	2	
WHITE-FACED IBIS	1	
TUNDRA SWAN	2	
GREATER WHITE-FRONTED GOOSE	2	
SNOW GOOSE	2	
ROSS' GOOSE	1	
CANADA GOOSE	1	
GREEN-WINGED TEAL	1	
MALLARD	1	
NORTHERN PINTAIL	1	
BLUE-WINGED TEAL	1	
CINNAMON TEAL	1	
NORTHERN SHOVELER	1	
GADWALL	2	
EURASIAN WIGEON	1	
AMERICAN WIGEON	1	
CANVASBACK	1	
REDHEAD	1	
RING-NECKED DUCK	1	
LESSER SCAUP	1	
OLDSQUAW	1	
WHITE-WINGED SCOTER	1	
COMMON GOLDENEYE	2	
HARROW'S GOLDENEYE	1	
RUFFLEHEAD	1	
COMMON MERGANSER	1	
RED-BREASTED MERGANSER	1	
RUDDY DUCK	1	
TURKEY VULTURE	1	
BALD EAGLE	2	
NORTHERN HARRIER	1	
BROAD-WINGED HAWK	1	
SWAINSON'S HAWK	1	
FERRUGINOUS HAWK	1	
ROUGH-LEGGED HAWK	2	
GOLDEN EAGLE	1	

Species	#	BC
MERLIN	1	
PRAIRIE FALCON	2	
GRAY PARTRIDGE	1	
GREATER PRAIRIE CHICKEN	1	
SHARP-TAILED GROUSE	2	
AMERICAN COOT	1	
SANDHILL CRANE	1	
WHOOPIING CRANE	1	
BLACK-BELLIED PLOVER	1	
SEMPALMATED PLOVER	1	
PIPPING PLOVER	7	
KILLDEER	1	
AMERICAN AVOCET	1	
GREATER YELLOWLEGS	1	
LESSER YELLOWLEGS	2	
WILLET	3	
UPLAND SANDPIPER	1	
WHIMBREL	1	
LONG-BILLED CURLEW	2	
HUDSONIAN GODWIT	1	
RUDDY TURNSTONE	1	
RED KNOT	1	
SANDLING	1	
SEMPALMATED SANDPIPER	2	
WESTERN SANDPIPER	1	
WHITE-RUMPED SANDPIPER	1	
BAIRD'S SANDPIPER	2	
PECTORAL SANDPIPER	1	
STILT SANDPIPER	1	
SHORT-BILLED DOWITCHER	1	
LONG-BILLED DOWITCHER	2	
WILSON'S PHALAROPE	1	
RED-NECKED PHALAROPE	1	
FRANKLIN'S GULL	1	
RING-BILLED GULL	1	
CALIFORNIA GULL	1	
CASPIAN TERN	1	
COMMON TERN	1	
ARCTIC TERN	1	
FORSTER'S TERN	1	
BLACK TERN	1	
ROCK DOVE	1	
BAND-TAILED PIGEON	1	
MOURNING DOVE	1	
GREAT HORNED OWL	2	
SNOWY OWL	1	
BURROWING OWL	3	
LONG-EARED OWL	1	

APPENDIX D

**SASKATCHEWAN ACTIVITY RESTRICTION GUIDELINES
FOR SENSITIVE SPECIES**

Saskatchewan Activity Restriction Guidelines for sensitive species in natural
habitats (see Table 1 on this website)
September 2003

- These guidelines are to assist proponents during the planning of proposed projects. If your project will include any activity falling within the listed setback distances, you are advised to contact the appropriate Saskatchewan Environment EcoRegion office early in the planning stage to ensure all work will be completed in a manner that will minimize impact. Discussing your project in advance with Saskatchewan Environment will reduce the chance your project will be delayed during the construction phase due to concerns with potential impacts on rare or endangered species.
- Activity Restriction Guidelines have been provided by the SKCDC for most species identified in Table 1 for nearly a decade through data requests and other directed queries.
- The SKCDC was asked to review their existing activity restriction guidelines due to changes in federal legislation regarding species at risk. (*The Species At Risk Act* (SARA) was proclaimed in June 2003 by the federal government.) The intent of this review was to update and integrate Saskatchewan's guidelines with those used by Environment Canada for species at risk.
- For most species of provincial concern, the set back distances and times have not changed from existing guidelines that we currently distribute. There should be minimal confusion with the disturbance categories as each species has the same set back distances for medium and high disturbance categories.
- The procedure for distributing these guidelines will not change. To clarify, for any given data request submitted to the SKCDC, guidelines are only provided for species of known occurrence in the area of new development.
- The guidelines have been posted on the internet to facilitate public access.
- See the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) website <http://www.cosewic.gc.ca/index.htm> for a complete listing of species at risk in Canada. These species are listed under SARA.
- For Environment Canada's industry guidelines see <http://www.pnr-rpn.ec.gc.ca/nature/petroleum/dg00s00.en.html>
 - Scobie and Faminow developed these guidelines for Environment Canada through consultation with more than 100 leading experts as well as industry representatives.
- The scope of human activities in the environment is a continuum and cannot be easily classified. Three categories of disturbance have been adopted by Environment Canada. However, these are guidelines only and should be treated as such.

- These Activity Restriction Guidelines reflect current knowledge of each species. Changes to the guidelines may occur as information becomes available. Please contribute your knowledge.

Reports and rare species occurrences can be submitted to:

<http://www.biodiversity.sk.ca/submit.htm>

or

Saskatchewan Conservation Data Centre,
Rm. 436, 3211 Albert St.,
Regina, Saskatchewan, S4S 5W6

AMPHIBIANS

- Federal guidelines were adopted for Great Plains Toad and Northern Leopard Frog which are listed under SARA.
- Current set back distances used by Grasslands EcoRegion for wetlands, water bodies and watercourses adopted (0-90m) for species of provincial concern (Canadian Toad and Plains Spadefoot (toad)).

REPTILES

- The existing guidelines stated 200 m for development activities so there was no change. A major issue for snakes is road mortality. Previous reports indicate that the mean distance of movement by hognose snakes is 200 m (Wright and Didiuk 1998).

BIRDS

- The setback distances are not only to address auditory disturbances but also permanent alteration in habitat.
- For Piping Plover, the high water mark is used, as it is typically the same as the outer edge of suitable habitat. This is a globally rare species, G3, therefore permanent habitat loss is of major concern.
- Changed Golden Eagle guidelines to meet Grasslands EcoRegion setbacks.
- No change was made from the existing restriction guidelines for colonial nesting birds and Osprey.
- Sage Grouse are critically imperiled in Saskatchewan. (Setback distances have already been increased to 1000 m on lands managed by PFRA.)

- Nesting habitat of bird species that use the same nest site year after year (i.e., Loggerhead Shrike, Ferruginous Hawk and colonial nesting birds) should not be destroyed at any time.

MAMMALS

- Ord's Kangaroo Rat inhabits highly sensitive active dune areas. This species is listed under SARA therefore federal guidelines were adopted.
- Swift Fox were extirpated from Saskatchewan and is still found in very low numbers. This species is listed under SARA therefore federal guidelines were adopted.

PLANTS

- Plants make up the bulk of the species of concern and the one-size-fits-all approach is an attempt to simplify matters.
- The 0 m setback distance is for foot traffic only (FTO), ATV and other small vehicles would fall under a higher disturbance category.

Literature Cited

Scobie, D. and C. Faminow. 2000. Development of standardized guidelines for petroleum industry activities that affect COSEWIC Prairie and Northern Region Vertebrate Species at Risk. Prepared for: Environment Canada, Prairie and Northern Region, Edmonton, Alberta.

Wright, J. and A. Didiuk. 1998. Status of the Plains Hognose Snake (*Heterodon nasicus nasicus*) in Alberta. Alberta Environmental Protection, Fisheries and Wildlife Management Division, and Alberta Conservation Association, Alberta Wildlife Status Report No. 15, Edmonton, AB. 26 pp.

Table 1. Saskatchewan Activity Restriction Guidelines for sensitive species in natural habitats

These guidelines are to assist proponents during the planning of proposed projects. If your project will include any activity falling within the listed setback distances, you are advised to contact the appropriate Saskatchewan Environment EcoRegion office early in the planning stage to ensure all work will be completed in a manner that will minimize impact. Discussing your project in advance with Saskatchewan Environment will reduce the chance your project will be delayed during the construction phase due to concerns with potential impacts on rare or endangered species.					
Species* (species in capital letters are provincially and/or federally listed)	Key Wildlife Areas	Restricted Activity Dates	Recommended Setback Distances by Disturbance Category		
			Low (e.g., foot traffic, small vehicles (<1 ton), ATVs, operating oil or gas wells, pipelines)	Medium (e.g., trucks>1 ton (gravel, oil, grain), tractors (including farm tractors), pipeline construction (diameters <1 foot), operating compressor station or battery)	High (e.g., road construction, roads, drilling rigs, mines and quarries, construction of compressor station or battery, forest harvest, large-diameter pipeline construction, seismic exploration, blasting, rock crushing, asphalt batching, gravel pit)
AMPHIBIANS					
GREAT PLAINS TOAD	Ponds Used for Breeding, Living, or Hibernating	Year Round	10 m	400 m	500m
NORTHERN LEOPARD FROG	Ponds Used for Breeding, Living, or Hibernating	Apr. 1- Oct. 31	10 m	200 m	500 m
Canadian Toad Plains Spadefoot (Toad)	Ponds Used for Breeding, Living, or Hibernating	Year Round	0 m	90 m	90 m
REPTILES					
Prairie Rattlesnake Western Hognose Snake Smooth Green Snake	Hibernacula	Apr. 1- Sept. 30	50 m	200 m	200 m
		Oct. 1- Mar. 31	0 m	200 m	200 m
EASTERN YELLOW-BELLIED RACER	Hibernacula	Year round	100 m	200 m	1000 m
SHORT-HORNED LIZARD	Eroded Slopes (blue-shale outcrops)	Mar.15- Nov. 15	50 m	200 m	200 m
Snapping Turtle	Nesting Site	Mar. 15- June 30	0 m	400 m	400 m
BIRDS					
LOGGERHEAD SHRIKE	Nest Site	May 1- Aug. 15	50 m	250 m	400 m
RED-HEADED WOODPECKER	Nest Site	Apr. 15- June 30	0 m	100 m	100 m

YELLOW RAIL	Nest Site	May 1- July 15	100 m	150 m	350 m
PEREGRINE FALCON	Nest Site	Apr. 1- Aug. 15	300 m	500 m	1000 m
BURROWING OWL	Nest Site	Apr. 1- July 15	200 m	300 m	500 m
		July 16- Oct. 15	100 m	200 m	500 m
		Oct. 16- Mar. 31	10 m	200 m	500 m
PIPING PLOVER	High Water Mark	May 1- July 31	200 m	400 m	600 m
		Aug. 1- Sept. 30	100 m	200 m	600 m
FERRUGINOUS HAWK Prairie Falcon Bald Eagle	Nest Site	Mar. 15- July 15	500 m	750 m	1000 m
Golden Eagle	Nest Site	Feb. 15- July 15	500 m	1000 m	1000 m
SHORT-EARED OWL	Nest Site	Mar. 25- Aug. 1	100 m	300 m	500 m
SPRAGUE'S PIPIT	Nest Site	Apr. 21- Aug. 31	50 m	200 m	250 m
LONG-BILLED CURLEW	Nest Site	Apr. 15- July 15	100 m	200 m	200 m
SAGE GROUSE	Lek	Mar. 1- July 15	500 m	1000 m	1000 m
		July 16- Feb. 29	100 m	1000 m	1000 m
	Nest Site	April 15- June 15	200 m	300 m	500 m
Gulls/Terns (e.g., Caspian Tern) (Excluding Ring-billed and California Gulls)	Nesting Colony	May 1- July 15	200m	400 m	400 m
Colonial Nesting Birds (e.g., herons, pelicans, cormorants)	Nesting Colony	Apr. 1-July 31	500 m	1000 m	1000 m
Colonial Nesting Grebes (e.g., Western, Clark's and Eared Grebes)	Nesting Colony	May 15- July 15	100 m	200 m	200 m
Osprey	Nest Site	May 1- Aug. 15	500 m	1000 m	1000 m
Cooper's Hawk	Nest Site	Apr. 1- July 31	200 m	400 m	400 m
MOUNTAIN PLOVER Snowy Plover	Nest Site	May 1- July 31	200 m	400 m	500 m

Barred Owl Hawk Owl Great Gray Owl Western and Eastern Screech-Owls	Nest Site	Mar. 1- July 15	100 m	400 m	400 m
American Bittern	Nest Site	May 1- July 31	200 m	400 m	400 m
SAGE THRASHER	Nest Site	May 15- June 30	100 m	200 m	200 m
Trumpeter Swan	Nest Site	Apr. 1- July 31	500 m	1000 m	1000 m
Sharp-tailed Grouse	Lek	Mar. 15- May 15	200 m	400 m	400 m
MAMMALS					
SWIFT FOX	Den	Feb. 15- Aug. 31	500 m	500 m	2000 m
		Sept. 1- Feb. 14	100 m	500 m	2000 m
BLACK-TAILED PRAIRIE DOG	Colony	Year round	0 m	250 m	500 m
ORD'S KANGAROO RAT	Den	Year round	50 m	250 m	500 m

PLANTS

These are the general Activity Restriction Guidelines for federally and provincially listed plants. Contact the Saskatchewan Conservation Data Centre Botanist for mitigation considerations for these and other S1-S3 species. **FOOT TRAFFIC ONLY (FTO)** is permitted for the Low disturbance category. Small vehicles (<1 ton), ATVs, operating oil or gas wells, pipelines fall under Medium disturbance along with the other examples listed for animals. Examples of High level disturbance are the same as indicated for animals.

SAND VERBENA	Population	Year round	0 m FTO	25 m	50 m
TINY CRYPTANTHE	Population	Year round	0 m FTO	25 m	50 m
WESTERN SPIDERWORT	Population	Year round	0 m FTO	25 m	50 m
SLENDER MOUSE-EAR- CRESS	Population	Year round	0 m FTO	25 m	50 m
HAIRY PRAIRIE- CLOVER	Population	Year round	0 m FTO	25 m	50 m
POWELL'S SALTBUSH	Population	Year round	0 m FTO	25 m	50 m
UPLAND EVENING PRIMROSE	Population	Year round	0 m FTO	25 m	50 m
PLAINS GRAPE- FERN	Population	Year round	0 m FTO	25 m	50 m
BUFFALOGRASS	Population	Year round	0 m FTO	25 m	50 m
STALKED MOONWORT	Population	Year round	0 m FTO	25 m	50 m

GASTONY'S CLIFFBRAKE	Population	Year round	0 m FTO	25 m	50 m
PECULIAR MOONWORT	Population	Year round	0 m FTO	25 m	50 m
PALE MOONWORT	Population	Year round	0 m FTO	25 m	50 m
ATHABASCA THRIFT	Population	Year round	0 m FTO	25 m	50 m
BEAKED ANNUAL SKELETON WEED	Population	Year round	0 m FTO	25 m	50 m
BUR RAGWEED	Population	Year round	0 m FTO	25 m	50 m
FELT-LEAF WILLOW	Population	Year round	0 m FTO	25 m	50 m
FLOCCOSE TANSY	Population	Year round	0 m FTO	25 m	50 m
IMPOVERISHED PINWEED	Population	Year round	0 m FTO	25 m	50 m
LARGE-HEADED WOOLY YARROW	Population	Year round	0 m FTO	25 m	50 m
MACKENZIE HAIR-GRASS	Population	Year round	0 m FTO	25 m	50 m
PRICKLY MILK- VETCH	Population	Year round	0 m FTO	25 m	50 m
SAND CHICKWEED	Population	Year round	0 m FTO	25 m	50 m
SMALL LUPINE	Population	Year round	0 m FTO	25 m	50 m
TYRRELL'S WILLOW	Population	Year round	0 m FTO	25 m	50 m
TURNOR'S WILLOW	Population	Year round	0 m FTO	25 m	50 m
SMOOTH ARID GOOSEFOOT	Population	Year round	0 m FTO	25 m	50 m
SHORT- CAPSULED SAND-DUNE WILLOW	Population	Year round	0 m FTO	25 m	50 m
TALL WOOLY- HEADS	Population	Year round	0 m FTO	25 m	50 m
SAND-LOVING BARRENGROUND WILLOW	Population	Year round	0 m FTO	25 m	50 m

FISH

Proponents should be aware of the following listed fish species and the waters in which they live. Contact the Department of Fisheries and Oceans http://www.dfo-mpo.gc.ca/home-accueil_e.htm if your project is in or near these waters.

BIGMOUTH BUFFALO	The Qu'Appelle basin; including the waters of Buffalo Pound, Last Mountain, Pasqua, Echo, Mission, Katepwa (The Fishing Lakes), Crooked and Round Lakes.
LAKE STURGEON	The waters of the North Saskatchewan, South Saskatchewan and Saskatchewan Rivers (including large connected waters such as the Torch river) and the waters of the Churchill River below the confluence of the Reindeer River.
CHESTNUT LAMPREY	The waters of the Qu'Appelle River below the outlet of Round Lake and the upper Assiniboine basin including the Whitesand and Shell Rivers.

SHORTJAW CISCO	The waters of Reindeer Lake, Lake Athabasca, Black, Giles and Wapata Lakes.
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*Species in capital letters are listed or pending listing under Saskatchewan's *The Wildlife Act* or are listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and under the federal *Species at Risk Act* (SARA).

See the [INTERIM LIST](#) for further details on Saskatchewan's provincial list.

<http://www.biodiversity.sk.ca/FTP.htm>

See the following website for species listed by COSEWIC.

http://www.cosewic.gc.ca/eng/sct5/index_e.cfm

Species not capitalized are ranked S1-S3 by the SKCDC or require special consideration during the breeding period. See 'Guide to Rank Definitions' at <http://www.biodiversity.sk.ca/FTP.htm>.

For most projects near water, you must obtain work permits as required under provincial legislation. Also, the federal *Fisheries Act* provides for the protection of fish habitat. Under the *Fisheries Act*, no one may carry out any work or undertaking that results in the harmful alteration, disruption or destruction ("HADD") of fish habitat, unless this HADD has been authorized by the Minister of Fisheries and Oceans Canada. The Act also states that no one is permitted to deposit a deleterious (harmful) substance into water containing fish.

In some instances, additional approvals may be required. For example, some docks may need to be approved by the Canadian Coast Guard (Fisheries and Oceans Canada) due to navigation requirements.

When working near water, contact:

Regional Office of SE (list):

<http://www.se.gov.sk.ca/environment/assessment/oilandgas/contacts.PDF>

DFO Offices: Prince Albert – 306-953-8777

Regina – 306-780-8725

September 2003

APPENDIX E

SASKATCHEWAN CONSERVATION DATA CENTRE - RURAL MUNICIPALITY ELEMENT OCCURRENCE LIST



Saskatchewan Conservation Data Centre

Rural Municipality Element Occurrence List of Plant/Animal Species with S Rank and Protection Status - May 2006

COULEE

Sprague's Pipit

Anthus spragueii

S4B Threatened
(proposed)

Burrowing Owl

Athene cunicularia

S2B ENDANGERED

Smooth Arid Goosefoot

Chenopodium subglabrum

S2

Compound Fleabane

Erigeron compositus

S3?

Migratory Bird Concentration Site

Migratory Bird Concentration Site

S3

Northern Leopard Frog

Rana pipiens

S3 Special Concern
Category

EXCELSIOR

Narrow-leaved Water Plantain

Alisma gramineum S3

Golden Eagle

Aquila chrysaetos S3B,S4M,S3N

Great Blue Heron

Ardea herodias S3B

Low Milk-vetch

Astragalus lotiflorus S3

Burrowing Owl

Athene cunicularia S2B ENDANGERED

Ferruginous Hawk

Buteo regalis S4B,S4M

Piping Plover

Charadrius melodus circumcinctus S3B ENDANGERED

Clustered Oreocarya

Cryptantha celosioides S1

Smooth Wild-rye

Elymus glaucus S2

Prairie Falcon

Falco mexicanus S3B,S3M,S3N

Migratory Bird Concentration Site

Migratory Bird Concentration Site S3

Long-billed Curlew

Numenius americanus S4B,S4M Vulnerable
(proposed)

Olive-backed Pocket Mouse

Perognathus fasciatus S3

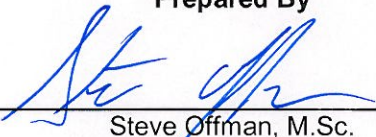
Northern Leopard Frog

Rana pipiens S3 Special Concern
Category

APPENDIX C
FISH AND FISH HABITAT ASSESSMENT
FINAL REPORT

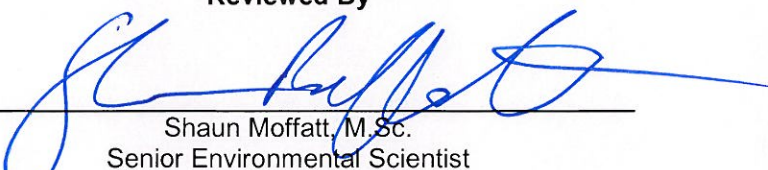
**Fish and Fish Habitat Assessment for the Rehabilitation
of the Highfield Dam Project
AAFC/AESB Service Contract No.2
FINAL REPORT
November 2010**

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TABLE OF CONTENTS

	<u>PAGE</u>
1.0 INTRODUCTION	1
2.0 FISH AND FISH HABITAT SURVEY METHODOLOGY	4
2.1 INFORMATION REVIEW	4
2.2 FISH COMMUNITY	4
2.2.1 Minnow Trapping	4
2.2.2 Seine Netting	5
2.3 FISH HABITAT	6
2.3.1 Habitat Mapping	6
2.3.2 Water Quality	7
2.3.3 HSI Model	7
3.0 RESULTS	9
3.1 FISH COMMUNITY	9
3.2 FISH HABITAT	10
3.2.1 Rush Lake Creek	10
3.2.2 Old Rush Lake Creek Channel (Land Drainage)	14
3.2.3 Northeast Shoreline of Highfield Reservoir	14
4.0 DISCUSSION	16
4.1 FISH COMMUNITY	16
4.2 FISH HABITAT	17
4.2.1 Yellow Perch	17
4.2.2 Northern Pike	18
4.2.3 Additional Large-Bodied Fish	19
4.2.4 Forage Fish	20
4.3 FISH PASSAGE	20
4.4 OVERVIEW OF PROJECT EFFECTS AND MITIGATION MEASURES	21
5.0 REFERENCES	24

TABLES

FIGURES

APPENDICES

LIST OF TABLES

1. Fish Community Survey Sample Station Locations
2. Field Water Quality
3. Perch Habitat Suitability Index
4. Northern Pike Habitat Suitability Index
5. White Sucker Habitat Suitability Index
6. Walleye Habitat Suitability Index
7. Potential Environmental Effects, Mitigation and Follow-up

LIST OF FIGURES

1. Site Location Plan
2. Rush Lake Creek Fish Habitat General Plan
3. Rush Lake Creek Fish Habitat Detail Plan (3 sheets)

LIST OF APPENDICES

- A. Saskatchewan Ministry of the Environment Special Collection Permit (10-11)
- B. Site Photographic Log
- C. Fisheries and Oceans Canada: Saskatchewan Operation Statement – Timing Windows

1.0 INTRODUCTION

Kontzamanis Graumann Smith Macmillan Inc. (KGS Group) was retained by the Agri-Environment Services Branch of Agriculture and Agri-Food Canada (AAFC/AESB) to conduct biological surveys (rare plant, wildlife, fish and habitat assessments) at the Highfield Dam site. The dam, which was constructed in 1942 across Rush Lake Creek (NE 36-15-11 W3M), is approximately 28 km east of Swift Current, Saskatchewan and 8 km south of the No. 1 Highway (Figure 1). The dam, associated infrastructure and land is owned and operated by AAFC/AESB. The reservoir has a total storage volume of 14, 895 dam³ and a flooded area of approximately 517 ha at full supply level (FSL El 723.0 m). The water in the reservoir is used to support agricultural lands in the region, in particular the Herbert and Rush Lake Irrigation projects.

A dam safety assessment of the Highfield Dam was conducted by the Prairie Farm Rehabilitation Administration (PFRA) in 1987. Using PFRA's hazard potential classification system the Highfield Dam was rated as having a high potential for loss of life, significant downstream economic losses, and significant other economic losses caused by flooding due to dam failure. Further, dam safety reviews indicated that the current spillway system cannot pass an inflow design flood (IDF) consistent with industry standards and that there is insufficient freeboard between the FSL and top of dam during passage of less frequent flood events. Preliminary studies are being undertaken by AAFC/AESB to identify appropriate upgrades in order to resolve the dam safety concerns with the current dam components. The option currently favoured involves increasing the spillway capacity through construction of a new spillway on the east side, raising the top of dam elevation and other associated work (Figure 1). Other project enhancements would include: lengthening the west outlet conduit; constructing a bridge over the spillway entrance channel; increasing the capacity of an existing wasteway located on the Herbert Main Canal immediately downstream of the dam; and improving the flood capacity of the existing spillway.

Major activities associated with this project may include borehole drilling; excavating soils; hauling and stockpiling soils, rock and granular materials; placing soil materials; shaping and compacting soils; placing rock and granular materials; placing topsoil; and revegetating disturbed areas. The construction activities will likely be completed using traditional earth

moving equipment including track hoes; rock trucks, graders, front-end loaders, bobcats and scrapers. The proposed borrow area for the earth works is located southeast of the east end of the dam and overlaps with the existing previously disturbed borrow area used to construct the current dam (Figure 1). The proposed work is anticipated to start in the 2012/2013 construction season; however, there is the potential that delays in the decision making process may lead to postponing the work until the following season.

As AAFC/AESB is the proponent; an Environmental Assessment (EA) will be required under the *Canadian Environmental Assessment Act* (CEAA) for the proposed work. An assessment of the biological systems around the project area was previously conducted in 2003 by Jacques Whitford Environmental Limited ⁽¹⁾. However, in preparation for the EA, AAFC/AESB requires an update to the existing biophysical information within the project area. This data will be used to supplement the existing data by identifying any new species not recorded previously so that AAFC/AESB is working with the most current data available for the project study area. As such, rare plant, wildlife, and fish and fish habitat assessments have been conducted in order to facilitate identification of potential adverse environmental impacts associated with the proposed project and recommendations and mitigation measures have been proposed for avoidance and/or minimizing the impacts from the proposed work.

Particular attention was put towards determining the existing fish and fish habitat for Rush Lake Creek Downstream of Highfield Dam as, with the exception of the work conducted by Jacques Whitford, there was no existing data. The Department of Fisheries and Oceans Canada (DFO) who have the decision-making authority for the conservation and protection of fish and fish habitat typically has concerns with projects of this nature as the proposed work has the potential to adversely affect fish and fish habitat if not properly mitigated. Fish and Fish habitat can be impacted directly through project activities as well as indirectly through the release of deleterious materials into the watercourse. Typically the DFO is also concerned with fish passage and therefore the existing level of passage and relative importance of fish passage was also investigated. If the proposed work is likely to result in a harmful alteration, disruption or destruction (HADD) of fish habitat, then an authorization under subsection 35(2) of the *Fisheries Act* is required prior to commencement of the proposed work.

This report outlines the methods and results of the fish and fish habitat assessment conducted within the project area (Figure 1) and the evaluation of overall fish passage. The report is based upon information obtained during two separate site visits conducted in late spring (May 31 to June 2, 2010), and late summer (August 10 to 11, 2010).

2.0 FISH AND FISH HABITAT SURVEY METHODOLOGY

2.1 INFORMATION REVIEW

Prior to initiating the field program, KGS Group conducted a review of all pertinent documents from previous studies that were provided by AAFC/AESB. In addition, a literature search was conducted for documents produced after 2003. KGS Group located a single document with pertinent information regarding the regional study area. The document titled Background Report – Swift Current Watershed was issued by the Saskatchewan Watershed Authority (SWA) and contained general information regarding fish species likely to be encountered within the Swift Current watershed ⁽²⁾. Data from these reports will be compared to the results of this study later in the report in the Discussion (Section 4).

2.2 FISH COMMUNITY

The fish community surveys included minnow trapping and seine netting completed during the two site visits (spring - May 31 to June 2, 2010 and summer - August 10 to 11, 2010). These surveys were conducted in accordance with the Saskatchewan Ministry of the Environment Special Collection Permit (10-11) issued in April 2010 (Appendix A). Fish sample stations were established at locations immediately downstream of the east outlet and in areas of open water extending to approximately 250 m downstream of the outlet (Figure 2). The downstream sample stations were selected based on habitat conditions that were likely to support both rearing and feeding activities of various fish species.

2.2.1 Minnow Trapping

Minnow traps (42 cm x 23 cm) baited with bread products and dry dog food were set at sample stations for varying durations including overnight sets and daytime sets in order to maximize the sampling effort. Sample stations were selected based on the areas sampled during the previous study by Jacques Whitford. Additional sampling stations were located further downstream where conditions seemed likely to support fish species. All trap locations were recorded using a hand held global positioning system (GPS) device with coordinates listed in Universal Transverse Mercator (UTM; Table 1). When the traps were retrieved any fish captured were identified, photographed, and preserved for use as voucher specimens. Captured

fish for use as voucher specimens were euthanized and preserved in 85% ethyl alcohol to be stored for two years. Ten percent of the specimens were sent for outside verification of nomenclature to Dr. Terry Dick at the University of Manitoba.

The sample locations and sets during the spring site visit included the following (Figure 2; Table 1);

- Six minnow traps (MT1-6) were set at approximately 3 p.m. on May 31, 2010 and left for 17 hours overnight for retrieval on June 1;
- Three minnow traps (MT3, MT4, and MT5) were reset and three minnow traps (MT1b, MT2b, and MT6b) were set further downstream at approximately 9 a.m. on June 1, and retrieved after nine hours; and
- Six minnow traps (MT3, MT4, MT5, MT1b, MT2b, and MT6b) were reset on June 1, 2010 for a second overnight period and retrieved on June 2, after approximately 17 hours, the traps were retrieved.

The sample locations and sets during the mid-summer site visit included the following (Figure 2; Table 1);

- Seven minnow traps (MT1, MT3, MT4, MT5, MT1b, MT2b, and MT6b) were set at the spring sample locations at approximately 3:00 p.m. on August 10, 2010 and left overnight for approximately 16 hours; and
- All seven minnow traps were reset for at approximately 7 a.m. on August 11, and retrieved after 10 hours.

2.2.2 Seine Netting

A seine net (4' x 20') was used during both site visits in the pool areas immediately downstream of the east outlet structure and at a location approximately 240 m downstream of the east outlet structure. The seine net sampling was conducted at the established minnow trap sampling locations where there was a large enough pool to enable seine netting. This process involved one crew member wading perpendicular from the bank until the net was extended after which both crew members would move along the bank for a set distance. The crew member in the water then circled in to shore and the net was pulled to shore while the lead lines at the base of the net were pinched together preventing fish from escaping the net while being pulled ashore. As seine nets are typically used in open, relatively shallow beach areas, the length of each seine haul was dependant on conditions within the creek (open pools).

The seine net sample locations during the spring site visit included the following (Figure 2; Table 1);

- Two seine hauls were completed in the vicinity of each of the minnow traps MT3, MT4 and MT5 for a total of 6 seine hauls in the pool immediately downstream of the east outlet structure; and
- Three seine hauls were completed in the pool area between MT1b and MT2b.

The seine net sample locations during the mid-summer site visit included the following (Figure 2; Table 1);

- Two seine hauls were completed in the vicinity of each of the minnow traps MT3 and MT4 for a total of 4 seine hauls in the pool immediately downstream of the east outlet structure; and
- Three seine hauls were completed in the pool area between MT1b and MT2b.

2.3 FISH HABITAT

2.3.1 Habitat Mapping

Habitat survey points (H1 to H14) were established every 50 m along Rush Lake Creek downstream of the dam for observing available habitat. These points were established in advance of the site visit and a handheld GPS device was used to locate these points while in the field. Fish habitat characteristics and any potential barriers to fish passage were examined and documented along these 50 m reaches starting from immediately downstream of the east outlet structure at Highfield Dam (H1) and continued up to the boundary with the project study area (H14). Additionally, a detailed fish habitat assessment of the creek was conducted for the area extending approximately 400 m downstream of the outlet (H1 to H9; Figure 2 and 3), in order to be consistent with prior work conducted by Jacques Whitford ⁽¹⁾.

Habitat characteristics assessed included embeddedness and epifaunal substrate availability (cobbles, rocks, woody debris, undercuts), condition of riparian zone, channel characteristics (width, depth, flow status), and potential for spawning, feeding, and rearing of fish species.

2.3.2 Water Quality

Water quality parameters were measured during both the spring and summer visit within the project study area as summarized in Table 2. Water quality parameters were also collected at two locations further downstream of the project study area to identify potential chemical barriers to fish passage. The first was the water return site which is immediately downstream of the land that receives irrigation waters from Rush Lake Creek. This site was not accessible during the spring site visit due to road conditions. The second location was collected further downstream and is representative of typical water quality in Rush Lake Creek for the duration of its path to Reed Lake which is the receiving water for the creek.

Water quality parameters including temperature, conductivity, dissolved oxygen, and pH were measured in the field using a YSI 650 MDS display and 556 Multiprobe System). Additionally turbidity was measured in the field using a WTW Turb 355 IR/T portable turbidity meter.

2.3.3 HSI Model

The fish habitat data was used to establish habitat units to assist in determining the quantity and quality of habitat and to calculate Habitat Suitability Indexes (HSI) for selected fish species. The HSI for four fish species known to occur within the reservoir were calculated for the 400 m reach of Rush Lake Creek.

HSI models were completed using the models established by the Fish and Wildlife Service of the United States Department of the Interior for yellow perch (*Perca flavescens*) ⁽³⁾, northern pike (*Esox lucius*) ⁽⁴⁾, white sucker (*Catostomus commersonii*) ⁽⁵⁾, and walleye (*Sander vitreus*) ⁽⁶⁾. Each model is comprised of several habitat variables which are potentially limiting factors on development of a specific species, and a suitability index (SI) is established for each variable. Values measured for these habitat variables from the Rush Lake Creek, within the project study area, were compared to the suitability index for that variable which resulted in site specific SI values.

Within each model, the HSI value is determined by the variable with the lowest SI value; as that variable would ultimately be the limiting factor impacting development of the species. The HSI model for walleye used a slightly different process as it groups the variables into four

subcomponents (food, cover, water quality, or reproduction), the SI for each of the four components are then calculated and the component with the lowest SI value is assigned as the HSI for that species.

Fish habitat was also examined within the old Rush Lake Creek channel that is west of the current channel and connects to it approximately 200 m downstream of the east outlet. The intention was to determine if sufficient accessible fish habitat was present to compensate any potential loss from the proposed work that may occur in the upper reaches of the existing channel.

Fish habitat was also examined along the south side (reservoir side) of the Highfield Dam and along the east shore upstream of the dam and within the small bay that extends from the reservoir approximately 800 m south-southeast of the east outlet structure (Figure 1). The intention was to determine if the existing fish habitat along the shore is suitable to support large bodied fish known to exist within the reservoir.

3.0 RESULTS

3.1 FISH COMMUNITY

No large bodied fish were captured or observed within Rush Lake Creek during either site visit. The only species that was found during the sampling program was the fathead minnow (FHMN; Appendix B – Photo1).

During the spring site visit only four specimens of FHMN were captured in total from only two of the nine minnow trap sampling locations. A single FHMN was captured in MT3 situated approximately 15 m downstream of the east outlet while three FHMN were captured in minnow trap MT1B situated approximately 240 m downstream of the east outlet (Table 1).

During the spring seine net sampling only 5 specimens of FHMN were captured during a total of nine seine hauls (Table 1). A total of three FHMN were captured from the six seine hauls completed in the pool area surrounding sample locations MT3 to MT5. Two additional FHMN were captured from the three seine hauls completed in the small pool area between sample locations MT1B and MT2B. A small school of FHMN was observed within the water just upstream of MT1B, just prior to these three seine hauls (Table 1).

During the mid-summer site visit FHMN were observed within the large pool immediately downstream of the east outlet. However, beyond this pool no fish were observed in the creek within the project study area and no specimens were captured in the minnow traps or seine nets used downstream of the initial pool. In total 14 specimens of FHMN were captured from only two of the seven minnow trap sampling locations. Four seine hauls in the pool resulted in the capture of an additional 17 FHMN (Table 1).

3.2 FISH HABITAT

3.2.1 Rush Lake Creek

Habitat Mapping

Rush Lake Creek below the Highfield Dam is a relatively shallow, low velocity creek with several natural pools and an abundance of back flooded areas caused by blockages to water flow. A continual trickle of water was flowing through the east outlet structure even while closed, which provided oxygenated water to the creek.

Stations H1 – H2 represent the first 50 m reach of the creek (Figure 3). The substrate within this reach of the creek was comprised of fine sediment; though there were boulders (riprap along both banks and across the channel within the pooling area immediately downstream of the outlet. There were two class 1 pools (> 1m in depth) at the base of the outlet that extends for approximately 15 m from the outlet structure. The pools were separated by a small line of riprap; however, the rock was mostly submerged creating the effect of a single pool (Appendix B - Photo 2). The depth of the pool area was augmented by back flooding from excessive vegetation growth, particularly broadleaf cattail (*Typha latifolia*), which effectively choked out the creek. The dense stand of cattail began approximately 20 m downstream of the outlet and continued for approximately 90 m downstream; beyond station H3 (Appendix B – Photo 3).

Water levels between stations H2 and H3 were, for the most part, less than 4 cm deep, with the exception of a class 3 (< 0.5 m deep) pool along the east bank (MT1) with water levels approximately 0.30 m in depth (Figure 3; Appendix B – Photo 3). There was no discernable flow in this reach at the time of the assessment. The substrate within the pool, and where visible through the thick vegetation, consisted of fine silt. Based on the depth of the pool and the more pronounced new growth of vegetation, It was determined that during high water, the channel is likely more defined at this location; this was observed during the mid-summer site visit.

Between stations H3 and H4 the creek emerged from the vegetation with an average depth of approximately 0.25 m and width of approximately 0.8 m, though there was little to no visible flow (Figure 3). The substrate within this reach was comprised of fine silt. The vegetation directly

flanking the open water consisted entirely of broadleaf cattail, bordered by grasses, and shrubs along the slope of the bank.

The channel characteristics were distinctly different for the reach between stations H4 and H5 compared to the upstream conditions (Figure 3). The substrate was comprised of approximately 80 % silt, and 20 % fine sand with some pebbles. In the downstream portion of this reach (approximately 15 m upstream of station H5) was a small patch (1.5 -2 m) of rock cobble and boulders (location of MT6B; Appendix B – Photo 4). The water level increased to approximately 0.5 m to 0.8 m and had a slightly increased flow. The channel in this reach was well defined compared to areas further upstream and there were a few undercuts along the banks. The increase in water level was due to the confluence between the old Rush Lake Creek channel and the existing channel which join approximately 5 m downstream of station H5. The vegetation immediately flanking the open water in this reach consisted of broadleaf cattail, intermixed with Baltic rush (*Juncus balticus*), while the vegetation along the bank consisted mostly of grass species.

The reach of the creek between stations H5 and H6 contains a 10 m section with the most diverse fish habitat observed throughout the project study area (Figure 3). This reach starts out as a class 1 flat with overhanging shrubs on the west bank and a mix of shrubs and cattail on the east bank. Approximately 25 m downstream the channel widens into a class 1 pool that was approximately 4.5 m wide (location of MT2B; Appendix B – Photo 5). On the downstream end of the pool is a thick stand of cattail on an embankment which causes the creek to narrow to a width of approximately 1 m for a distance of approximately 6 m before opening back up into a class 1 pool approximately 5.5 m wide (Station H6; Appendix B – Photo 6). Within the narrow 6 m section, there was visible flow and the substrate comprised of 15% fine sand and 85 % silt with a patch of boulders and approximately 20 % cover from woody debris and decomposing vegetation. The west bank comprised of 100% shrubs that were hanging over the water and the bank itself was essentially a 5-6 m long undercut. The riparian vegetation from this point forward was mostly shrubs comprised primarily of snowberry (*Symphoricarpos albus*) and prickly wild rose (*Rosa acicularis*) with patches of broadleaf cattail within the channel. This reach was identified as an area with high potential to support fish species and, as such was selected as a fish sample station (location of MT1B, Appendix B – Photo 7).

The section of creek between stations H6 and H7 was a 5 m wide class 2 (0.5 – 1 m deep) flat (Appendix B – Photo 8) with substrate that was made up of approximately 15% fine sand and 85% silt (Figure 3). There was little to no visible flow as the creek was blocked by a barbwire fence coated in woody debris that ran through the middle of the channel approximately 10 m upstream of station H7 (Appendix B – Photo 9). Immediately downstream of the fence/blockage, the creek narrows to approximately 1.5 m in width with water level was less than 0.1 m in depth.

The first 30 m of the creek between station H7 and H8 continued as a shallow channel increasing to approximately 2.5 to 3 m wide with minimal visible flow (Figure 3). The substrate was a mix of approximately 10% fine sand, and 90% silt with approximately 5% cover by decomposing vegetation. The west bank was comprised of 100% shrub cover while the east bank was a mix of sedges, grasses and shrubs (Appendix B – Photo 10). The remaining 20 m of the creek is a shallow flat shaded by shrub vegetation on both banks.

The first 25 m between stations H8 and H9 was a shallow cattle crossing with little to no definable habitat characteristics (Figure 3). The substrate comprised of approximately 50 % silt and 50 % fine sand. There was a slight increase in visible flow in the first half of the reach where the water was less than 0.3 m deep and approximately 0.9 m wide. The banks consisted of eroded soils and minimal vegetation within the water or along the banks (Appendix B – Photo 11). The channel narrowed in the latter half of the reach to less than 0.5 m in width at a large thicket approximately 10 m upstream of station H9.

After station H9, the creek experiences frequent back flooding conditions due to embankments and thickets of vegetation blocking flow; in some cases the water was so stagnant that thick layers of algae coated the surface of the water (Station H10; Appendix B – Photo 12).

During the mid-summer site visit, there were more areas inundated with back flooded stagnant water throughout the creek. The increase in standing water may, in part be related to the excess growth of pond weed (*Potamogeton sp.*) which was observed throughout all reaches of the channel, and in some cases covered 100% of the substrate (Appendix B – Photo 13). Areas previously observed during the spring site visit to experience some flow, had become stagnant and often covered with a layer of lemna (algae). This was particularly evident in the pool between MT1B and MT2B (Appendix B – Photo 14) and in the pool immediately downstream of the east outlet (Appendix B – Photo 15).

Water Quality Parameters

During both the spring and summer site visits, field water quality parameters were sampled from four points along the creek within the project study area, as well as additional points further downstream. These data were to be used as part of the habitat suitability indices for select fish species; however, the data in general can be used towards determining general availability of habitat for a variety of fish species. Additionally these data can be indicative of chemical barriers to fish passage.

Dissolved oxygen within the channel was consistently at or above optimum concentrations for most fish species during the spring site visit. However, during the summer site visit, dissolved oxygen concentrations fell to sub optimal and lethal levels at more than one location within the project study area (Table 2). Further measurements taken during the spring site visit indicated dissolved oxygen reduced to toxic conditions for fish at the water return site compared to the downstream of effects location, indicating a potential chemical barrier to fish passage (Table 2).

HSI Models

Fish habitat suitability indices were developed based on models established by the United States Fish and Wildlife service. The HSI models are scaled to produce an index between 0 (unsuitable habitat) and 1 (optimal habitat). The SI values for each variable used in the model and overall HSI values for yellow perch, northern pike, white sucker and walleye are found on tables 3 – 6, respectively.

The HSI for yellow perch indicated that the limiting factor was percent of backwater/flooded area during summer flow resulting in moderate available habitat for this species (0.4; Table 3). The HSI for northern pike indicated the limiting factor was percent instream vegetation resulting in a moderately high quality habitat for this species (0.7; Table 4). The HSI's for white sucker and walleye indicated that the limiting factor was spawning substrate/habitat resulting in unsuitable habitat available in the creek for these species (0.1; Table 5 and 0.04; Table 6, respectively).

3.2.2 Old Rush Lake Creek Channel (Land Drainage)

The old Rush Lake Creek channel winds through much of the project study area and connects with the existing channel just downstream from habitat station H5. The channel characteristics within the creek were examined during the spring site visit and were determined to be similar to those found within the existing Rush Lake Creek.

Approximately 30 percent of the channel contained either pools, or back flooded pooling areas. The current in several section of the channel appeared to have higher velocities than those observed in Rush Lake Creek. The substrate was primarily comprised of fine sediment. Within several sections of the channel there were thickets of cattails which would serve as both spawning and foraging habitat for northern pike (Appendix B – Photo 16). The banks were generally steeper compared to those within the upstream reaches of Rush Lake Creek and there were more undercuts and woody debris which is typically considered beneficial for foraging habitat of many forage and sport fish (Appendix B – Photo 17). Approximately 80 m upstream of the confluence with Rush Lake Creek, the wetted width of the old channel narrowed to approximately 0.3 m and was inundated with sedges, grasses and periodic cattails.

3.2.3 Northeast Shoreline of Highfield Reservoir

A cursory survey of the available habitat along the shoreline of highfield reservoir was conducted during the spring site visit first within the small bay that extends from the reservoir approximately 800 m south-southeast of the east outlet structure, and then along the northeast shore towards the dam. At the northern tip of the bay the substrate was comprised entirely of fine silt with a mix of semi-aquatic and terrestrial plants along the shoreline including sedges, foxtail barley (*Hordeum jubatum*), and silverweed (*Argentina anserina*) that extend for several meters into the water. However approximately 180 m south along the northwest shore of the bay and continuing along the shoreline until reaching Highfield Dam, the shoreline is comprised almost entirely of sand with varying levels of gravel, rock, and cobble which could be used as spawning habitat for white sucker and walleye (Appendix B – Photo 18). The shoreline on the southwest point of the bay where it opens to the reservoir has a section of rock cobble which is just outside of the prevailing wind and waves and would provide fairly good spawning habitat for walleye. Most of the northeast shoreline of the reservoir is comprised of rock cobble, boulders

and gravel over a layer of sand with some fine silt that has been washed ashore from the reservoir.

4.0 DISCUSSION

4.1 FISH COMMUNITY

Within the Swift Current watershed, 19 species have been identified; the most common large bodied fish include northern pike, yellow perch, and white sucker. The most common minnow species identified in the watershed include fathead minnow, brook stickleback (*Culaea inconstans*), and Iowa darter (*Etheostoma exile*) ⁽²⁾. Many of the constructed reservoirs along the watershed provide additional habitat for fish populations; however, due to fluctuating water levels, low oxygen and loss of habitat, many of these reservoirs often do not support longstanding fish populations ⁽²⁾. Highfield Reservoir is an example of one of one of the reservoirs with poorer conditions. Although the reservoir is frequently used for sport fishing, the conditions do not lend for maintaining continuous fish populations.

Highfield reservoir in the past was stocked with sport fish; however, it has not been actively managed for sport fish since the mid-1980's in part due to the low success of fish population resulting from low oxygenated water ^(1, 7). However, the Jacques Whitford (2003) report suggested that northern Pike and yellow perch have established reproducing populations. More likely, these sport fish are accessing the reservoir from the Swift Current Watershed during periods of high water. Additional fish species known to occur in the Highfield reservoir include sport fish such as walleye and white sucker, and forage fish such as fathead minnow ⁽⁷⁾. However, recent information suggests that the water conditions continue to hinder development of longstanding populations. For example, in 2009 walleye, northern pike, and white sucker suffered a large winterkill due to low oxygen conditions in the reservoir ⁽⁷⁾.

No large-bodied (sport) fish were observed or captured within Rush Lake Creek during the 2010 biological survey. The only forage fish (minnow species) observed or captured within the creek was the fathead minnow. Aside from the work conducted by Jacques Whitford in 2003, no existing fish or fish habitat data was available for Rush Lake Creek downstream of the Highfield Dam. The fathead minnow was the single species captured during the previous examination of the fish community within Rush Lake Creek ⁽¹⁾. Further discussion of the success of this species within the creek will be discussed below in section 4.2.4 (Forage Fish). Low oxygenated water is also likely a limiting factor in sustaining fish populations within Rush Lake Creek, as described below.

4.2 FISH HABITAT

The four species of sport fish reported to frequent the waters of Highfield Reservoir included yellow perch, northern pike, white sucker and walleye. There is limited optimal fish habitat within Rush Lake Creek for most fish species. The two most probable large-bodied fish species that would be expected to use the available fish habitat for spawning, rearing, and/or feeding purposes are yellow perch and northern pike. Regardless, the current study also considered the potential habitat utilization within the creek by white sucker and walleye as they are potentially present in the reservoir.

4.2.1 Yellow Perch

Yellow perch spawn in late spring over submergent and emergent vegetations ⁽⁸⁾, within which the egg strands become entangled ^(3, 9). Yellow perch typically travel upstream into tributaries to spawn rather than travelling downstream. Yellow perch are opportunistic feeders that consume insects, other large invertebrates and fish ^(10, 9).

A cursory examination of Rush Lake Creek, as indicated by the habitat mapping already described, suggested that there was ample spawning habitat for yellow perch. The HSI value for yellow perch (0.4; Table 3) indicated that there is moderately suitable habitat available within the creek. The most limiting variable in the model was the percent of backwater/flooded area. The requirements for calculating dissolved oxygen for the model resulted in not using the lowest DO concentrations and, as such, DO was not the most limiting variable and did not reduce the overall suitability index. However, DO concentrations below 3.1 mg/L are toxic to yellow perch. Therefore the mid-summer conditions would have likely resulted in mortalities of yellow perch had any been present within the channel.

The previous work conducted on Rush Lake Creek also determined that the creek had potential to support yellow perch based on habitat suitability indices produced using a riverine model for the creek and a lacustrine model for the reservoir ⁽¹⁾. The study determined that the HSI value for yellow perch was 0.5 for Rush Lake Creek and 0.2 within the Highfield Reservoir. This implies that the habitat conditions at the time of the previous study were moderate to fair within the creek and that the conditions in the reservoir provided very poor quality habitat for yellow perch. The Jacques Whitford (2003) report suggested that the creek had conditions to

potentially support yellow perch, however water quality parameters were only measured at a single location, immediately downstream of the east outlet. The current study found that DO measured at this location was higher than those values measured 75 m and 250 m further downstream. Had additional measurements been taken during the 2003 study, the results of that study may have also identified the sub-optimal to lethal DO concentrations observed during the current study. Regardless, the conditions observed during the current study suggest that dissolved oxygen concentration in the creek reach lethal levels during mid to late summer and, as such provide poor habitat for yellow perch during the latter half of the open water season.

Access to the channel from upstream (above the dam) is limited to approximately 3-4 days a year on excessively dry springs. Although yellow perch typically travel upstream into tributaries to spawn rather than downstream, it is possible for fish such as yellow perch to be carried with the irrigation water into the creek. However, it is highly unlikely that these fish would survive in the creek throughout the season. Similarly, it is not likely that their spawn would survive, as the fluctuating water levels on irrigation years would result in embryo mortality and the downstream lake (Reed Lake) is likely not suitable for supporting populations of large-bodied fish. Therefore, it is unlikely that yellow perch are able to regularly access this watercourse, nor is it likely that there is a high rate of survival of spawn should they be produced within the channel.

4.2.2 Northern Pike

Northern pike spawn in rivers and streams during early spring just after the ice is off allowing them to move upstream to use shallow waters with vegetation which provides a surface for eggs to adhere ^(4, 9). While newly hatched northern pike feed on zooplankton and aquatic insects, this species is primarily piscivorous, feeding on fish ^(4, 11, 8). Northern pike are often found in less torrent areas of streams over sand and silt-clay substrates ^(11, 8). Additionally, northern pike are tolerant to low dissolved oxygen for extended periods of time ⁽⁴⁾.

An examination of Rush Lake Creek indicated that there was a significant amount of spawning and rearing habitat and some feeding habitat for northern pike. The HSI value for northern pike (0.7; Table 4) indicated that the suitable habitat was moderately high for this species within the creek. Additionally, the fish habitat examined within the old Rush Lake channel was very similar and much of it would support northern pike. While, the existing condition within the Rush Lake

Creek has potential to support northern pike, the low DO is likely a limiting factor. Although northern pike are tolerant to the lower levels of DO, their diet is almost entirely dependant on fish and this creek is not likely able to support a sufficient volume of forage fish to support a population of northern pike. Additionally, fluctuations in water levels immediately following spawning, which are observed as discussed above, are detrimental to embryo development/success⁽⁴⁾.

The previous work conducted on Rush Lake Creek also determined that available habitat had potential to support northern pike based on habitat suitability indices produced for both the creek and reservoir⁽¹⁾. The study determined that the HSI value for northern pike was 0.5 for Rush Lake Creek and 0.8 within the Highfield Reservoir. This implies that the habitat conditions at the time of the previous study were moderate to fair within the creek and that the conditions in the reservoir provided very suitable habitat for northern pike. Areas of backwater/sluggish water, and percent of channel with emergent and submergent vegetation were the two primary variables that were limiting factors for the HSI (similar to the current study). The description of the available habitat provided in the Jacques whitford report identified similar habitat conditions within the 400 m of creek examined during the current study. The suitable physical habitat available for northern pike has increased in recent years within the Rush Lake Creek as calculated by the current HSI. Over the period of time between the two studies, the emergent and submergent vegetation within the channel has become more abundant which likely increased the overall amount of standing water.

4.2.3 Additional Large-Bodied Fish

White sucker spawn primarily in streams during the spring when water temperatures are around 10 degrees C and in riffles over gravel substrate^(8, 9). Walleye typically spawn over rocky substrate (rock cobble) in shallow shoals or tributary rivers and streams shortly after the ice breaks on lakes^(10, 9).

The habitat within Rush Lake Creek is not suitable for use by white sucker and walleye as indicated by the HSI values (0.1; Table 5 and 0.04; Table 6, respectively). The habitat suitability for white sucker and walleye within Rush Lake Creek was not analyzed during the previous study. Neither species is likely to have any success within the creek, nor would they typically use the habitat available within the creek for spawning. Appropriate spawning habitat for these

species was observed within the reservoir along the northeast shore up to and within the small bay located southeast of the dam. White sucker and walleye have been reported to occur in the reservoir which likely supports populations of both of these species for short periods of time; however, low oxygen conditions, particularly during the winter months limit the success of these populations. These species are more likely to travel upstream into tributaries rather than downstream, however it is possible for fish to be carried with the irrigation water into the creek when the east outlet is open for irrigations purposes. As previously discussed, this downstream movement is limited to approximately 3-4 days a year during excessively dry springs.

4.2.4 Forage Fish

The Fathead minnow was the single minnow/forage species observed within Rush Lake creek during both the current study as well as during the previous study on the creek ⁽¹⁾. While a few individuals were captured from two areas within the creek during the spring sampling they were limited to a single small area during the mid-summer sampling. During the mid-summer site visit dissolved oxygen levels dropped to conditions that are considered lethal to most fish species, particularly between 75 m and 300 m downstream of the east outlet. This was likely due to lemna developing on the surface, reducing photosynthesis by submergent vegetation in the standing water area. It appeared that comparatively high DO concentration immediately downstream of the outlet (likely due to the continual trickle of water), provided a refuge for fathead minnow to survive.

No fish were captured or observed anywhere downstream of this location during the mid-summer visit. The presence of fathead minnow does not imply that the creek is viable habitat for other forage fish or large-bodied fish as this species is typically able to survive in conditions that are lethal to most other fish. The fathead minnow is tolerant to low oxygen levels and can be one of the most abundant fish species in waters that may winterkill or become stagnant when cut off from their parent streams or lakes ⁽⁹⁾.

4.3 FISH PASSAGE

The highfield dam is an existing barrier to both upstream and downstream fish passage. There is no constructed fish ladder to provide upstream passage. Downstream passage can only occur when there is discharge through the East Outlet Structure which is limited based on the

way it is operated. Discharge occurs for a short period of time during the spring freshet which is typically 3-4 days a year for approximately 60% of the years. Following the spring freshet water is discharged only when the irrigators need irrigation water. Based on the information obtained during the assessment of fish and fish habitat, KGS Group's opinion is that the fish passage should not be a necessary component of the project for the following reasons;

- No large bodied fish were observed or captured in Rush Lake Creek.
- There is appropriate fish habitat in the reservoir for the large-bodied fish that is of equal or better quality than the downstream habitat such that the fish do not need to migrate downstream for required habitat.
- There are numerous physical barriers to fish passage within the project study area, and pooling water and beaver activity observed further downstream when on route to the water return site location indicated that additional barriers to fish passage are present throughout many reaches of the creek.
- In addition to physical barriers, there may be chemical barriers deterring fish passage along reaches of the creek. Water quality parameters within the creek are likely affected by surface run-off throughout the irrigation zone. Dissolved oxygen measured at the water return site approximately 15 km upstream Reed Lake was dramatically lower than the measurements taken at the downstream of effects station.
- The closest lake downstream of the creek that would provide a source of fish migrating upstream is Reed Lake which is an intermittent high saline lake. This lake is approximately 38 km downstream from the project study area and is known to reach near waterless conditions in dry years.

4.4 OVERVIEW OF PROJECT EFFECTS AND MITIGATION MEASURES

As there were no provincially or federally rare species observed within the project area and as the habitat that may be impacted is limited in both quality and quantity the impacts of the project will be limited. Potential environmental effects of the proposed modifications to Highfield Dam on aquatic biota and habitat are typical of those associated with earth work projects and include the following:

- Potential impact to fish resulting from dewatering of construction area if required,
- Disturbance to fish habitat from construction footprint and activities,
- Loss and disturbance of fish and fish habitat due to contamination from leaks and accidental spills, releases of fuels or other hazardous substances during construction,

- Elevated suspended sediment levels in Rush Lake Creek and Highfield Reservoir from construction activities, and
- Disturbance to aquatic biota/habitat from increased dust/sedimentation during construction activities.

These potential environmental effects can be reduced/avoided using the appropriate mitigation methods. In addition to specific requirements that may be issued by DFO as part of fisheries review and or authorization process, the following is a general overview of typical mitigation measures used for similar projects. More specific mitigation methods may be identified during the environmental assessment when a more detailed project description is available. Mitigation measures for reducing and/or preventing the above listed environmental effects include:

- Conduct a fish salvage operation within any areas required to be dewatered during construction activities,
- Use screened intakes suspended in the water column when dewatering the construction area if required,
- Discharge any water over energy dissipation mats to reduce potential erosion and control sedimentation before water re-entering any water body or watercourse,
- Use silt fencing and turbidity curtains where appropriate during construction and remove any accumulated sediment,
- Conduct work from the banks as much as possible to prevent further disturbance to fish habitat,
- Limit construction activities when possible, in areas with higher valued habitat,
- Adhere to the DFO in-water work restrictions which would be from April 1 to May 31 at Highfield dam (Southern Saskatchewan) based on the presence of spring spawning fish (and no lake sturgeon; Appendix C)
- Prevent leaks, spills, and releases by providing secondary containment for fuel and hazardous material storage,
- Require drip trays for equipment,
- Provide spill clean-up equipment and materials,
- Prepare an emergency spill response plan, and
- Minimise the level of dust generated during construction by using a dust suppressant such as water.

The potential environmental effects and associated mitigative measures and follow-up procedures as listed above are summarized in Table 7.

5.0 REFERENCES

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TABLES

TABLE 1
FISH COMMUNITY SURVEY SAMPLE STATION LOCATIONS - RUSH LAKE CREEK, SASKATCHEWAN
HIGHFIELD DAM REHABILITATION PROJECT

Sample Station	Spring Site Visit May 31- June 2, 2010				Summer Site Visit August 10-11, 2010				Location (UTM, NAD 83)
	Minnow Trap [^]		Seine		Minnow Trap [^]		Seine		
	Species	# Captured	Species	# Captured	Species	# Captured	Species	# Captured	
MT1	--	--	DNS	DNS	--	--	DNS	DNS	13 U 330124 5575868
MT2	--	--	DNS	DNS	DNS	DNS	DNS	DNS	13 U 330146 5575828
MT3	FHMN	1	FHMN	1 ^{*2}	FHMN	2	FHMN	7 ^{*2}	13 U 330151 5575816
MT4	--	--	FHMN	1 ^{*2}	FHMN	12	FHMN	10 ^{*2}	13 U 330153 5575811
MT5	--	--	FHMN	1 ^{*2}	--	--	DNS	DNS	13 U 330152 5575811
MT6	--	--	DNS	DNS	DNS	DNS	DNS	DNS	13 U 330143 5575808
MT1B	FHMN	3	FHMN	2 ^{*3}	--	--	--	-- ^{*3}	13 U 330008 5575979
MT2B	--	--	DNS	DNS	--	--	DNS	DNS	13 U 330016 5575972
MT6B	--	--	DNS	DNS	--	--	DNS	DNS	13 U 330047 5575941

Notes:

[^] Minnow traps were set at multiple intervals ranging from 9 - 17 hours

* Represents the number of seine hauls at particular sample station

FHMN = Fathead Minnow

-- = no specimens captured during sampling

DNS = Did not sample

TABLE 2
FIELD WATER QUALITY - RUSH LAKE CREEK, SASKATCHEWAN
HIGHFIELD DAM REHABILITATION PROJECT

Sample Station	WQ Parameters					Location (UTM, NAD 83)	General Description
	Temp. °C	Cond. µs/cm ³	DO %	DO mg/L	pH pH unit		
Spring Site Visit							
DSI	13.28	2436	93.7	9.73	6.70	13 U 339068 5586556	Downstream of Irrigation Zone, flowing water
End	14.86	6664	107.0	10.61	7.07	13 U 329922 5576380	840 m DS, N. of project study area
H14	17.70	6632	139.3	12.98	7.51	13 U 329841 5576273	650 m DS
H12	16.35	6722	132.4	12.65	7.69	13 U 329838 5576184	550 m DS, brackish water
H9	18.99	6807	138.5	12.55	8.00	13 U 329929 5576109	400 m DS, shallow, fine seds, no cover
H6	17.16	7017	104.9	9.87	7.97	13 U 330003 5575986	250 m DS
MT1	17.20	2487	81.0	7.71	7.83	13 U 330124 5575868	75 m DS
MT4	18.17	2484	139.5	13.00	7.84	13 U 330153 5575811	12 m DS of outlet
Mid-summer Site Visit							
DSI	20.01	4994	68.4	6.10	7.17	13 U 339068 5586556	Downstream of Irrigation Zone, flowing water
WRS	19.15	5587	10.1	0.88	6.43	13 U 335786 5586627	Water Return site, stagnant deep channel
H11	26.03	1288	196.9	15.83	7.08	13 U 329849 5576136	490m DS, US of H11, shallow, stagnant
H7	26.61	1479	28.0	2.24	6.75	13 U 329982 5576032	300m DS,
MT2B	23.20	1293	61.6	5.25	6.74	13 U 330016 5575972	230 m DS, Channel choked with pond weed, excess cover of Lemna
MT1	22.75	1145	44.8	3.84	7.19	13 U 330125 5575868	75 m DS, slight flow, shallow, Choked with pond weed, 15-20% cover of lemna
MT4	21.25	1020	100.7	8.94	7.36	13 U 330153 5575811	12 m DS of outlet, standing water with significant cover of lemna

TABLE 3
PERCH HABITAT SUITABILITY INDEX - RUSH LAKE CREEK SASKATCHEWAN
HIGHFIELD DAM REHABILITATION PROJECT

Variable	Description	Value	Suitability Index (SI)	Notes
V2	Percent pool and backwater during summer flow	90	0.4	--
V3	Percent cover	50	1	--
V4	Optimal summer water temperature	23 (average)	1	--
V5	Embryo development temp	9 - 12 °C	1	No data, agree with Jaques Whitford 2003
V6	Minimum Dissolved O2 at two locations chosen for optimal temp	4.55 (average) at 22.75-23.2 °C	0.9	Concentrations below 3.1 mg/L are toxic to perch - SI of 0.2 is more appropriate
V7	Degree days between 4-10 °C	1275	1	--
V8	Stable pH between 6.5 and 8.5	6.74-8.00	1	--
HSI			0.4	HSI of 0.2 (Poor) based on DO toxicity

TABLE 4
NORHTERN PIKE HABITAT SUITABILITY INDEX - RUSH LAKE CREEK SASKATCHEWAN
HIGHFIELD DAM REHABILITATION PROJECT

Variable	Description	Value	Suitabiity Index (SI)	Notes
V1	Ratio of spawning habitat to summer habitat	>70%	1	
V2	Drop in water level during embryo stage.	very little change in water level	1	
V3	Percent instream vegetation	>85%	0.7	
V5	Least suitable pH during spawning (optimal range 5.00-9.00)	7.70 (average in May)	1	
V6	Average Length between last frost of spring and first frost of fall (ptimal range 100 - 200 days)	Approx 189 days (climate normals Env. Can)	0.8	
V7	Max weekly average temperature	23.4 °C	1	
V8	Percent of standing water	>85%	0.9	
V9	Stream Gradient	1 m/km	1	
HSI			0.7	

TABLE 5
WHITE SUCKER HABITAT SUITABILITY INDEX - RUSH LAKE CREEK SASKATCHEWAN
HIGHFIELD DAM REHABILITATION PROJECT

Variable	Description	Value	Suitability Index (SI)	Notes
V2	Stable weekly average pH	7.70 - 7.02 (average spring and summer)	1	
V3	Minimum DO in May - August in areas with most suitable water temperature	8.94	1	Minimum optimum concentration is 4.30 mg/L; summer concentrations are likely toxic
V4/V5	Average mean weekly temperature (July August)	24.0 °C - August	1	
V6	Average Mean weekly temperature (April through July)	17.2 °C - May	0.9	
V7	Average riffle velocity	Estimated at 15 cm /sec	0.7	
V8	Mean riffle depth in Spring	Average approx 25 cm	1	
V9	Percent of instream and overhanging vegetation	> 85%	0.7	
V10	Percent of pools during average summer flow	50%	1	
V12	Spawning substrate (prefer gravel/pebble/ coarse sand)	Silt and fine sand	0.1	Effectively no appropriate spawning substrate in creek
V13	Depth of pools in study reach	120 cm (average)	0.95	
V14	Percent shade	>50%	1	
V15	Stream gradient	1 m/km	0.6	
V16	Mean water velocity in pools annually	Estimated at 10cm/sec	1	
V17	Distance of potential spawning habitat from lentic habitat	> 20 km US of closest major waterbody, impassible	0.4	
HSI			0.1	

TABLE 6
WALLEYE HABITAT SUITABILITY INDEX - RUSH LAKE CREEK SASKATCHEWAN
HIGHFIELD DAM REHABILITATION PROJECT

Variable	Description	Value	Suitability Index (SI)	Notes
V1	Average transparency	0.5 m	0.5	
V2	Relative abundance of small forage fish	Low (< 20 mg/m ³)	0.3	
V3	Percent water with cover and adequate dissolved O ₂ throughout year	>20%	0.2	
V4	Least suitable pH during Year	6.43	1	
V5/V6	Minimum DO summer/fall	2.24 mg/L	0.2	
V7	Minimum DO spring	7.71 mg/L	1	
V8	Mean weekly water temp (summer)	23.97	1	
V9	Mean weekly water temp (Spring)	17.2	0.9	
V10	Mean weekly water temp (spawning)	No data, assume approx 9-12 °C	1	
V11	Degree days between 4 - 10 °C (optimum 750 - 1100)	815	1	
V12	Spawning habitat Index	3%	0.04	
V13	Water Level during spawning	Category B	0.5	Does not fit the available categories as there is no viable spawning habitat
HSI			0.04	

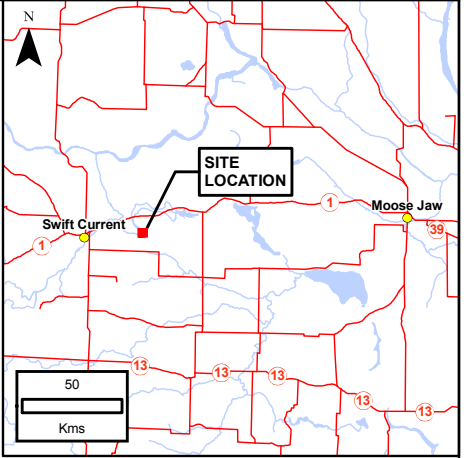
TABLE 7
POTENTIAL ENVIRONMENTAL EFFECTS, MITIGATION AND FOLLOW-UP
HIGHFIELD DAM REHABILITATION PROJECT

Environmental Effect	Mitigation Measures	Follow-up
Aquatic Biota		
Potential impact to fish resulting from dewatering construction area within creek	<ul style="list-style-type: none"> - Conduct fish salvage within section of creek to be dewatered during construction activities - Use of screened intakes suspended in the water column when dewatering construction area - Water drained from construction area should be discharged over dissipation mats - Sediment barriers and turbidity curtains should be used during construction and sediment collected by turbidity curtains will be removed 	<ul style="list-style-type: none"> - Monitoring the enclosed water during the dewatering process to recover any fish discovered that were not relocated during fish salvage - Recording any fish kills that occur during the dewatering process - Periodic inspection of sediment barriers and turbidity curtains
Disturbance to fish habitat from construction footprint and activities	<ul style="list-style-type: none"> - Conduct most of the work from the banks to prevent further disturbance to fish habitat - Limiting activities in areas with higher valued habitat - Adhere to DFO in-water work restrictions (Appendix C) - Use of sediment barriers and turbidity curtains during construction and removal of sediment collected by turbidity curtains 	<ul style="list-style-type: none"> - Periodic inspection of sediment barriers and turbidity curtains
Loss and disturbance of fish and fish habitat due to contamination from leaks and accidental spills, releases of fuels or other hazardous substances during construction	<ul style="list-style-type: none"> - Prevent leaks, spills and releases by providing secondary containment for fuel and hazardous material storage - Require drip trays for equipment - Provide spill clean-up equipment and materials - Prepare emergency spill response plan 	<ul style="list-style-type: none"> - Periodic inspections for leaks, spills and releases - Periodic updates of emergency response plan
Elevated suspended sediment levels in Rush Lake Creek and Highfield Reservoir from construction activities	<ul style="list-style-type: none"> - Use sediment barriers and turbidity curtains during construction - Remove sediment collected by turbidity curtains 	<ul style="list-style-type: none"> - Monitor surface water runoff and suspended sediment levels - Monitor turbidity curtain condition - Periodic inspections for erosion
Disturbance to aquatic biota/habitat from increased dust/sedimentation during construction activities	<ul style="list-style-type: none"> - Using silt fencing when excavating within 10 m of Rush Lake Creek or Highfield reservoir - Minimizing dust levels during construction by using a dust suppressant such as water 	<ul style="list-style-type: none"> - None proposed

FIGURES

Portions of data presented are owned by the Province of Saskatchewan and are produced under the licence agreement with the Province of Saskatchewan 2010 Queen's Printer.

File Name: P:\Projects\2010\10-0217-01\Drawings\GIS\WXDs\Rev0\Fish\10-0217-01_F01_Rev0.mxd
11"x17" PLOT SCALE 1:1

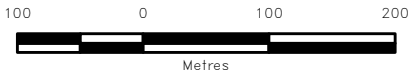


LEGEND:

- Contour
- Fence
- Proposed Spillway Channel
- Road CL
- Road Edge
- Sasktel
- Shoreline
- Slope Edge
- Borrow Area
- Structures
- Project Study Area
- Quarter Section Boundary

NOTES:

- Imagery from Google Earth (2010 Cnes/Spot Image).
- Contour data provided by Agriculture and Agri-Food Canada.



SCALE: 1:6,000 METRIC 11"x17"

All units are metric and in metres unless otherwise specified.
Transverse Mercator Projection, NAD 1983, Zone 13
Elevations are in metres above sea level (MSL)

NO.	YY/MM/DD	DESCRIPTION	BY
0	10/11/19	ISSUED WITH FINAL	SFM

REVISIONS / ISSUE

KGS
GROUP
CONSULTING
ENGINEERS

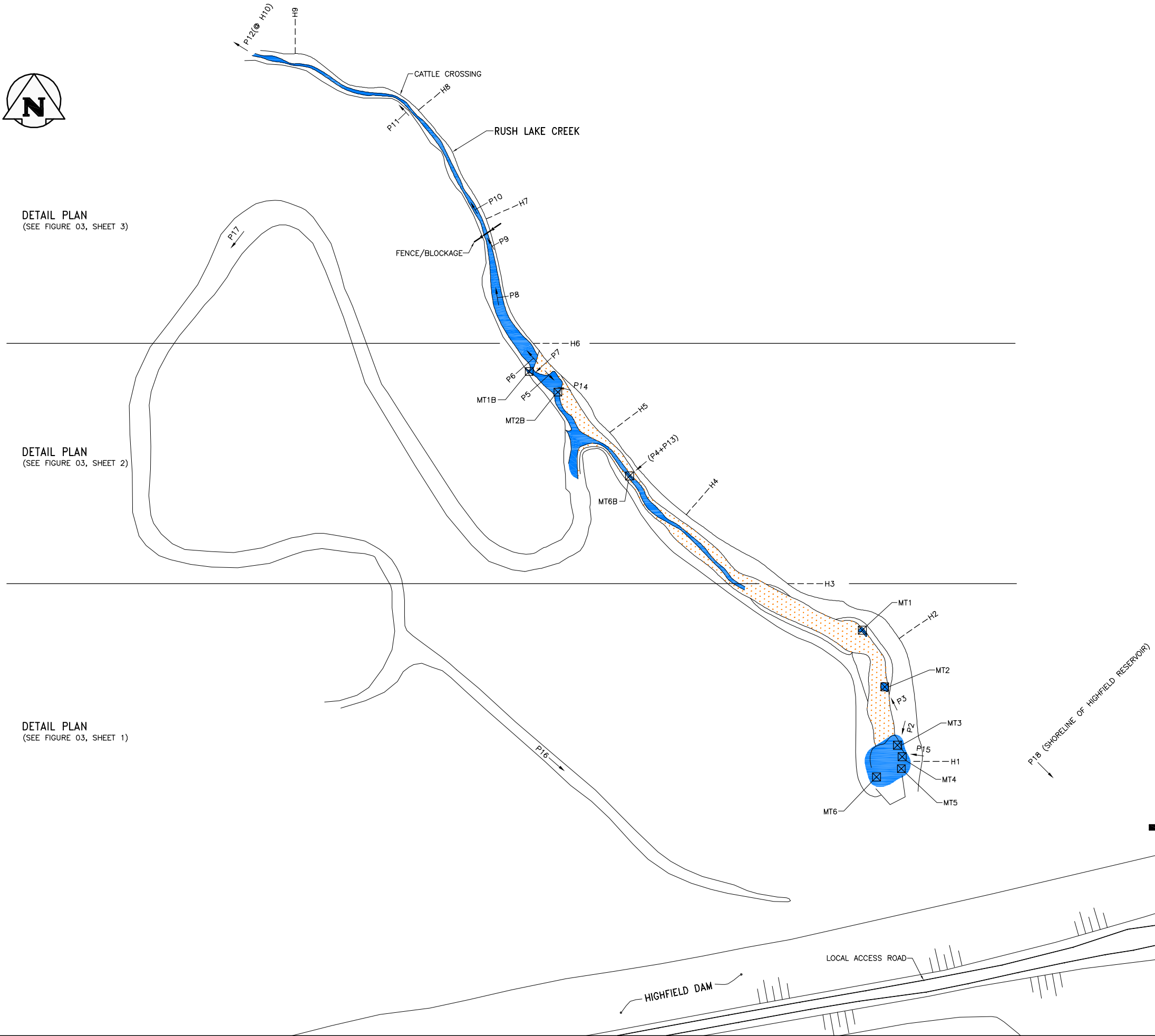
Agriculture and Agri-Food Canada

Agriculture et Agroalimentaire Canada

REHABILITATION OF THE HIGHFIELD DAM PROJECT

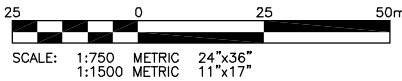
SITE LOCATION PLAN


NOVEMBER 2010 FIGURE 01 REV: 0

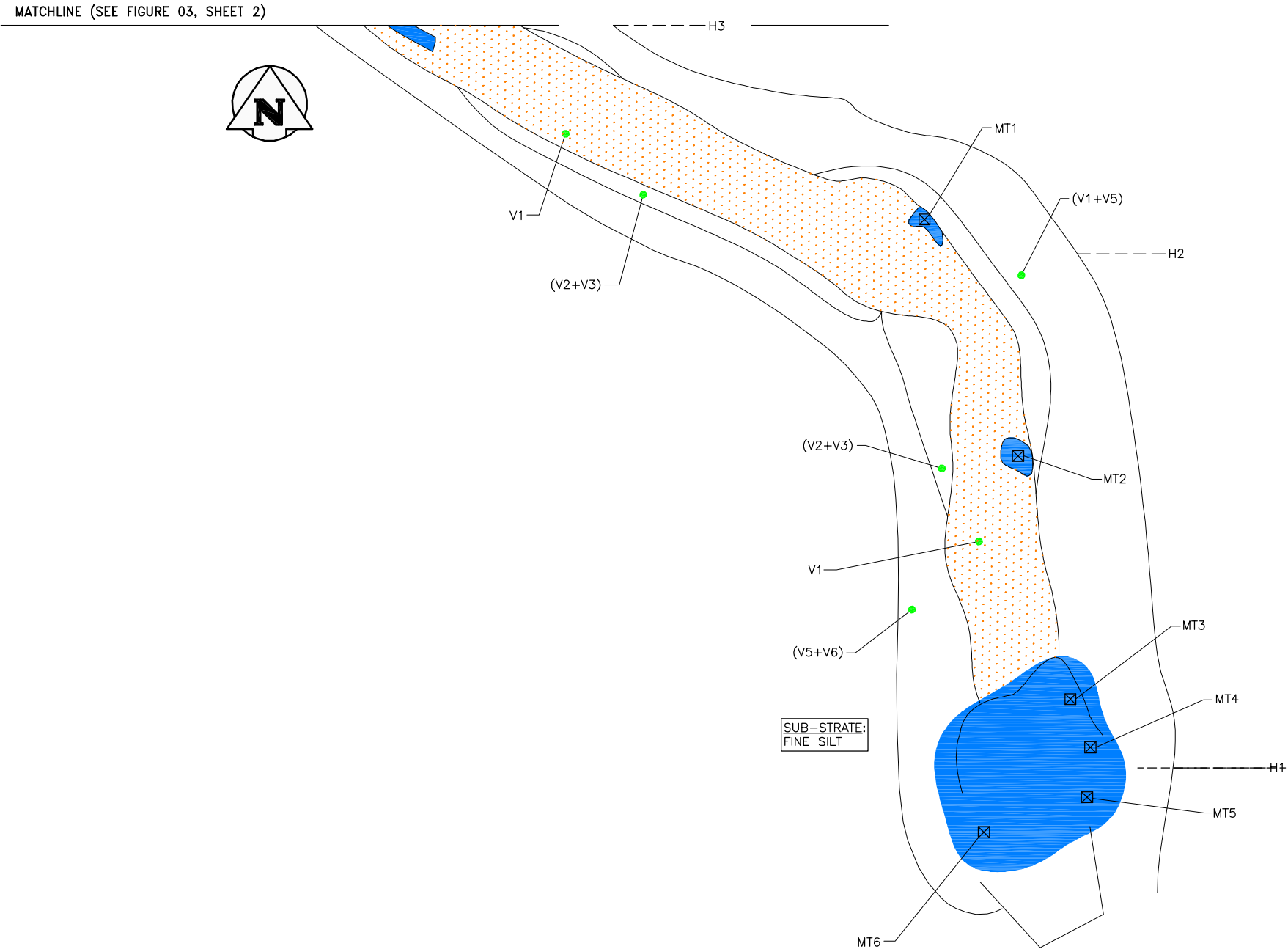


LEGEND:

- H(1-9) HABITAT STATION
- P2 → PHOTO LOCATION
- ☒ MINNOW TRAP
- x-x- FENCE/BLOCKAGE
- WATER



0	10/11/19	ISSUED WITH FINAL REPORT		SO
NO.	YY/MM/DD	DESCRIPTION		BY
REVISIONS / ISSUE				
KGS GROUP CONSULTING ENGINEERS		 Agriculture and AgriFood Canada Agriculture et Agroalimentaire Canada		
REHABILITATION OF THE HIGHFIELD DAM PROJECT				
RUSH LAKE CREEK FISH HABITAT GENERAL PLAN				
NOVEMBER 2010		FIGURE 02		REV: 0

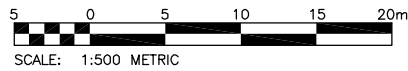



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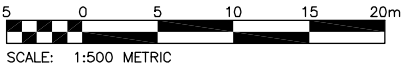
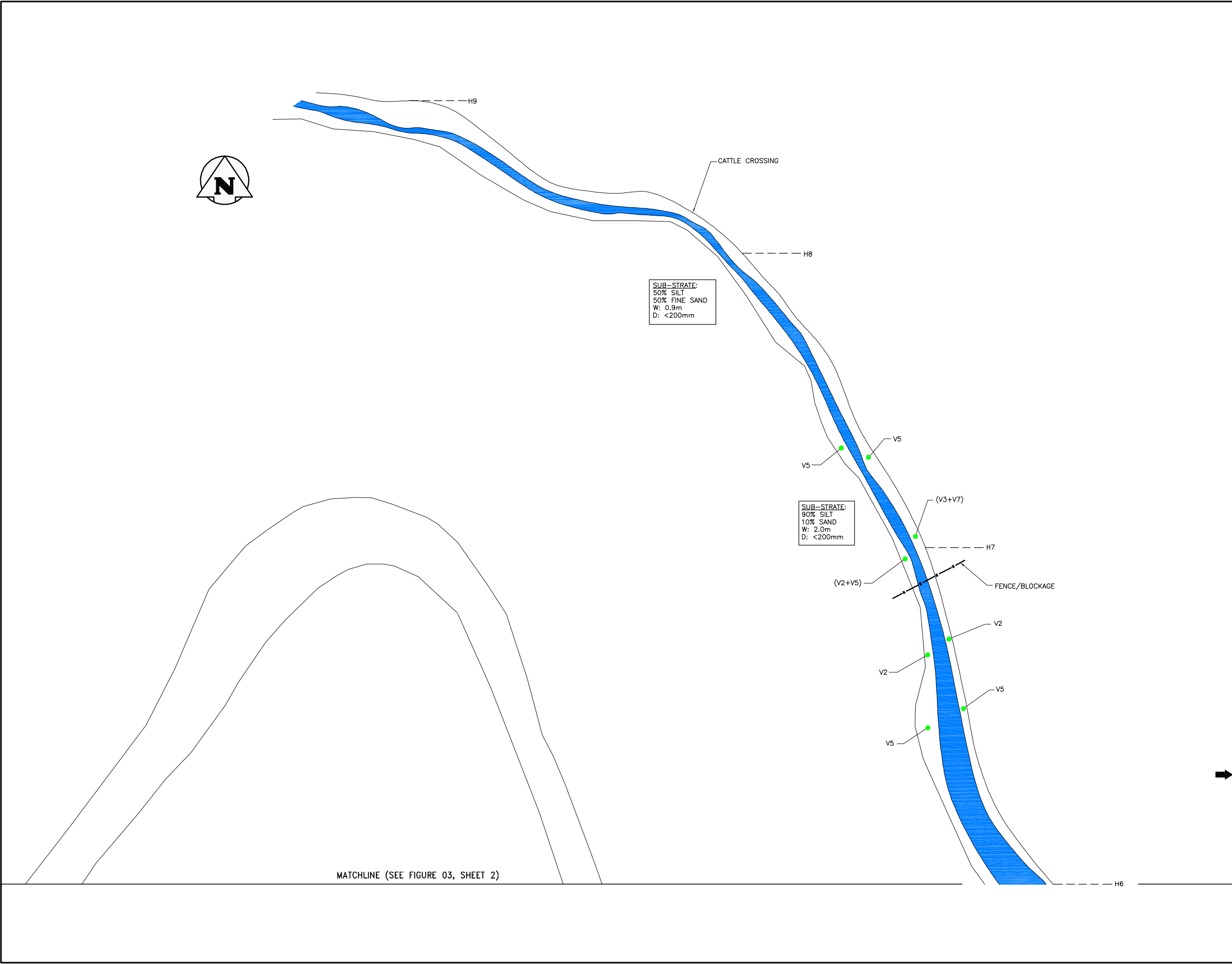
- H(1-9) HABITAT STATION
- ☒ MT MINNOW TRAP
- VEGETATION TYPE
- x—x— FENCE/BLOCKAGE
- WATER


PRIMARY VEGETATION:

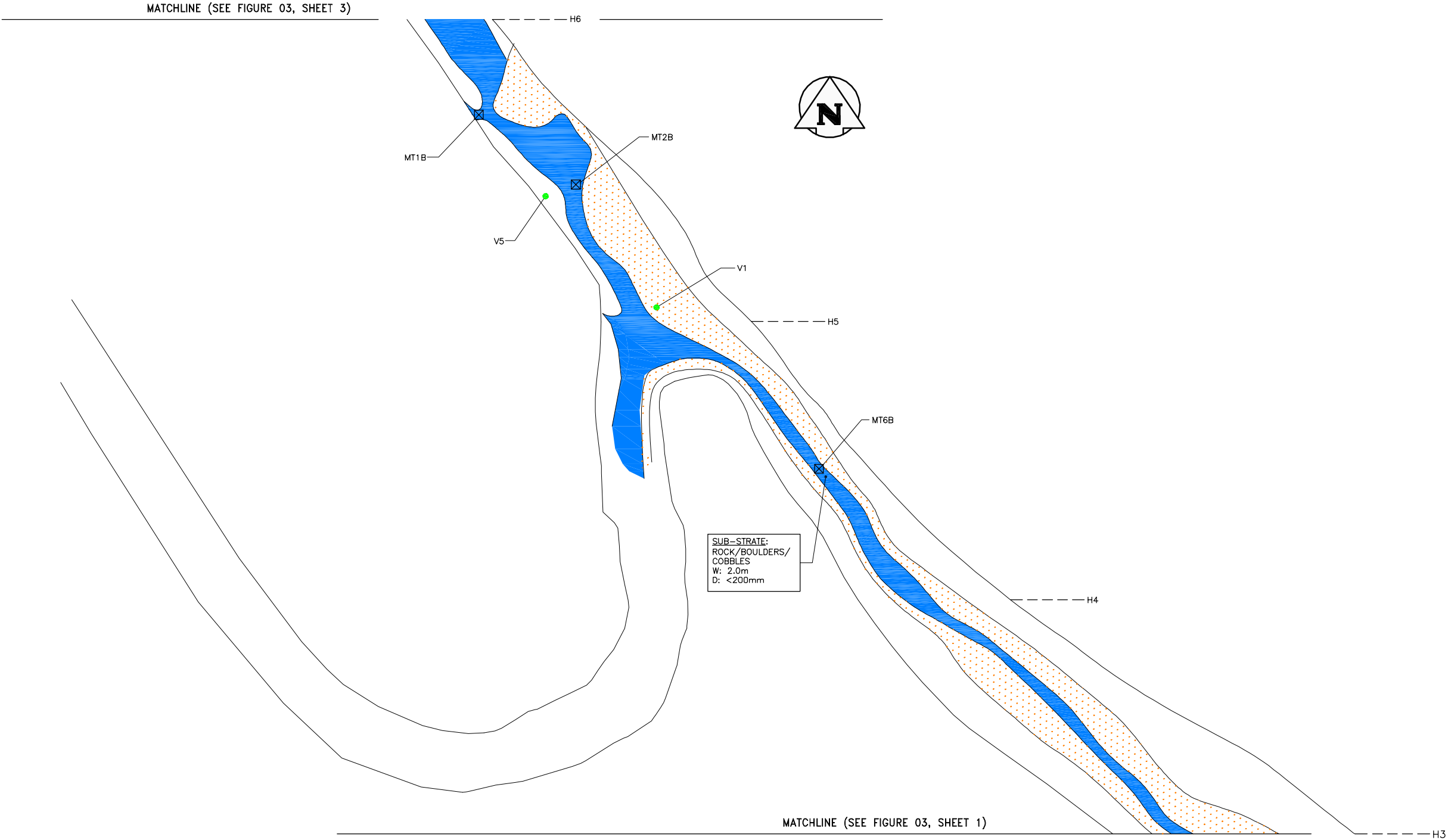
- V1 BROADLEAF CATTAIL
- V2 RUSHES
- V3 SEDGE
- V4 CRESTED WHEAT GRASS
- V5 SNOWBERRY
- V6 WESTERN BLUEGRASS
- V7 GRASS SP.



0	10/11/19	ISSUED WITH FINAL REPORT		SO
NO.	YY/MM/DD	DESCRIPTION		BY
REVISIONS / ISSUE				
KGS GROUP CONSULTING ENGINEERS		 Agriculture and Agri-Food Canada Agriculture et Agroalimentaire Canada		
REHABILITATION OF THE HIGHFIELD DAM PROJECT				
RUSH LAKE CREEK FISH HABITAT DETAIL PLAN (SHEET 1 OF 3)				
NOVEMBER 2010		FIGURE 03		REV: 0



0	10/11/19	ISSUED WITH FINAL REPORT		SO
NO.	YY/MM/DD	DESCRIPTION		BY
REVISIONS / ISSUE				
KGS GROUP CONSULTING ENGINEERS		 Agriculture and AgriFood Canada Agriculture et Agroalimentaire Canada		
REHABILITATION OF THE HIGHFIELD DAM PROJECT				
RUSH LAKE CREEK FISH HABITAT DETAIL PLAN (SHEET 3 OF 3)				
NOVEMBER 2010		FIGURE 03		REV: 0

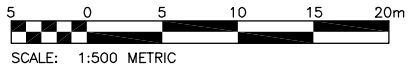




LEGEND:

- H(1-9) HABITAT STATION
- ☒ MT MINNOW TRAP
- VEGETATION TYPE
- x—x— FENCE/BLOCKAGE
- WATER

PRIMARY VEGETATION:

- V1 BROADLEAF CATTAIL
- V2 RUSHES
- V3 SEDGE
- V4 CRESTED WHEAT GRASS
- V5 SNOWBERRY
- V6 WESTERN BLUEGRASS
- V7 GRASS SP.



➡	0	10/11/19	ISSUED WITH FINAL REPORT		SO
	NO.	YY/MM/DD	DESCRIPTION		BY
REVISIONS / ISSUE					
			 Agriculture and AgriFood Canada Agriculture et Agroalimentaire Canada		
REHABILITATION OF THE HIGHFIELD DAM PROJECT					
RUSH LAKE CREEK FISH HABITAT DETAIL PLAN (SHEET 2 OF 3)					
NOVEMBER 2010			FIGURE 03		REV: 0

APPENDICES

APPENDIX A

SASKATCHEWAN MINISTRY OF THE ENVIRONMENT SPECIAL COLLECTION PERMIT (10-11)



SPECIAL COLLECTION PERMIT

Permission is hereby granted to Steve Offman of KGS Group or his authorized representative(s) to collect and keep, for scientific purposes, fishes and aquatic invertebrates from within the waters of Saskatchewan under authority of *The Fisheries Act (Saskatchewan)*, 1994.

This Permit is valid from April 1, 2010 to March 31, 2011.

This permission does not apply to the waters of Prince Albert National Park.

This does not serve as a permit for research related to species at risk pursuant to the *Species at Risk Act* or *Fisheries Act*. Permit holders should contact the Department of Fisheries and Oceans regarding prohibitions and conditions, which may be in effect for their study area or species.

All collection gear (for biological samples) left unattended shall be visibly labeled with a sign marked with the Agency name and the phrase "Scientific Collection".

No collection gear (for biological samples) shall be left unattended in excess of 24 hours.

No shortjaw cisco (*Coregonus zenithicus*) may be retained.

The Permit Holder shall, when working in an area, advise the local conservation officer of their activities.

The Permit Holder shall, upon completion of all collection activities undertaken in connection with this permit, provide a report to the issuing Fishery Officer stating the name and number of each species taken and the waters from which said species were taken.

Ron Hlasny, Fishery Officer
Fish and Wildlife Branch
Ministry of Environment

Permit Holder

APPENDIX B
SITE PHOTOGRAPHIC LOG



PHOTO 1. Image of fathead minnow captured in minnow trap 3 on August 11, 2010.



PHOTO 2. South view of East outlet structure and pooling area immediately downstream (Photo taken at NAD 83 13 U 330148 5575824).



PHOTO 3. Downstream view of Rush Lake Creek taken approximately 30 m downstream of the east outlet on Highfield Dam (Photo taken at NAD 83 13 U 330148 5575824).



PHOTO 4. Small (2 m) patch of rock cobble and boulder approximately 180 m downstream of the east outlet structure (location of MT6B), Rush Lake Creek (Photo taken at NAD 83 13 U 330047 5575940).



PHOTO 5. Upstream view of pool area between MT1B and MT2B taken from just upstream of MT1B, Rush Lake Creek (Photo taken at NAD 83 13 U 330009 5575981).



PHOTO 6. Downstream view taken from location of MT1B (Photo taken at NAD 83 13 U 330009 5575981).

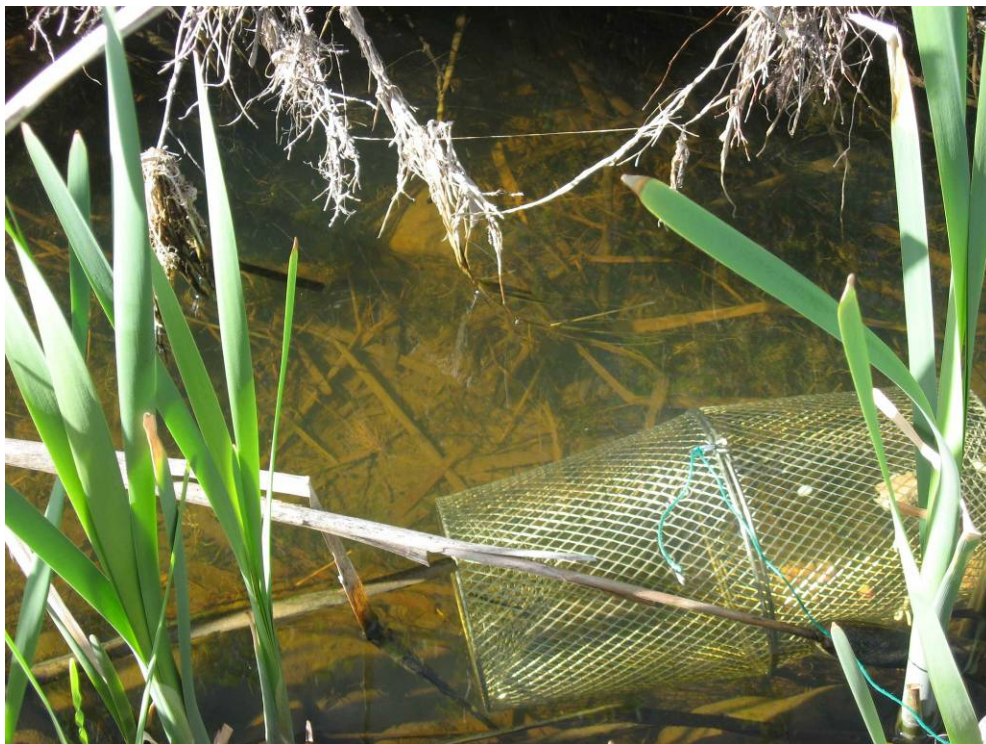


PHOTO 7. Image of Minnow trap 1B and surrounding channel characteristics (Photo taken at NAD 83 13 U 330009 5575981).



PHOTO 8. Class 2 flat between habitat station H6 and H7, Rush Lake Creek (Photo taken at NAD 83 13 U 329993 5576003).



PHOTO 9. Image of fish passage barrier approximately 10 upstream of habitat station H7, Rush Lake Creek (Photo taken at NAD 83 13 U 329980 5576022).



PHOTO 10. Downstream view of channel from approximately 15 m downstream of habitat station H7), Rush Lake Creek (Photo taken at NAD 83 13 U 329982 5576035).



PHOTO 11. Cattle crossing area between habitat station H8 and H9, Rush Lake Creek (Photo taken at NAD 83 13 U 329960 5576077).



PHOTO 12. Image of barrier to fish passage and water flow at habitat station H10, Rush Lake Creek (Photo taken at NAD 83 13 U 329879 5576133).



PHOTO 13. Image of pond weed choking creek during mid-summer site visit at location of Minnow trap 6B (Photo taken at NAD 83 13 U 330047 5575940).

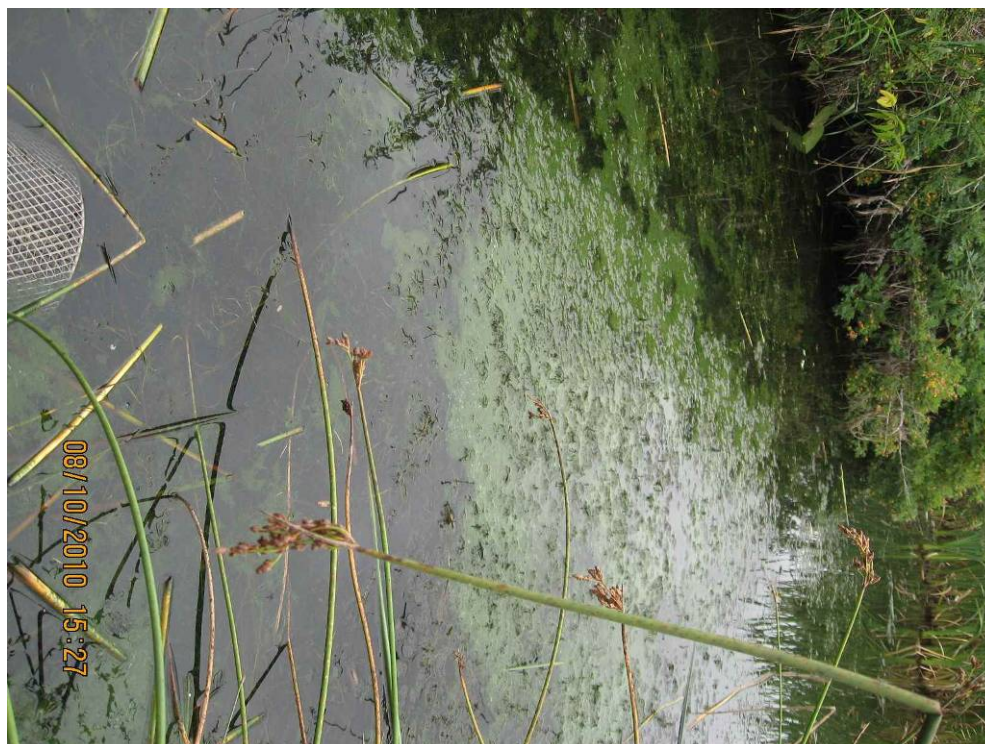


PHOTO 14. Image thick mat of lemna at pond area between minnow trap locations MT1B and MT2B during mid-summer site visit (Photo taken at NAD 83 13 U 330016 5575974).



PHOTO 15. Image moderate covering of lemna on downstream end of pool immediately downstream of the east outlet during mid-summer visit (Photo taken at NAD 83 13 U 330152 5575815).



PHOTO 16. Image of cattails (northern pike habitat) within the old Rush Lake Creek channel approximately 540 m upstream of the confluence with the existing Rush Lake Creek Channel (Photo taken at NAD 83 13 U 329997 5575837).



PHOTO 17. View of slope and vegetation within the old Rush Lake Creek channel approximately 250 m upstream of the confluence with the existing Rush Lake Creek Channel (Photo taken at NAD 83 13 U 329888 5576002).



PHOTO 18. Image of rock cobble/sand/gravel substrate along the northeast shore of Highfield Reservoir and the mouth of the small bay located southeast of the dam (Photo taken at NAD 83 13 U 330550 5575053).

APPENDIX C

FISHERIES AND OCEANS CANADA SASKATCHEWAN OPERATIONAL STATEMENT – TIMING WINDOWS

TIMING WINDOWS

Fisheries and Oceans Canada
Saskatchewan Operational Statement

Version 3.0

SASKATCHEWAN IN-WATER CLOSED CONSTRUCTION TIMING WINDOWS

Restricted activity timing windows have been identified for Saskatchewan lakes, rivers and streams to protect fish during spawning and incubation periods when spawning fish, eggs and fry are vulnerable to disturbance or sediment. During these periods, no in-water or shoreline work is allowed except under site- or project-specific review and with the implementation of protective measures. Restricted activity periods are determined on a case by case basis according to the species of fish in the water body, whether those fish spawn in the spring or fall/winter, and whether the water body is located in Northern, Central, or Southern Saskatchewan.

Timing windows are just one of many measures used to protect fish and fish habitat when carrying out a work or undertaking in or around water. Be sure to follow all of the measures outlined in the Operational Statements to avoid negative impacts to fish habitat.

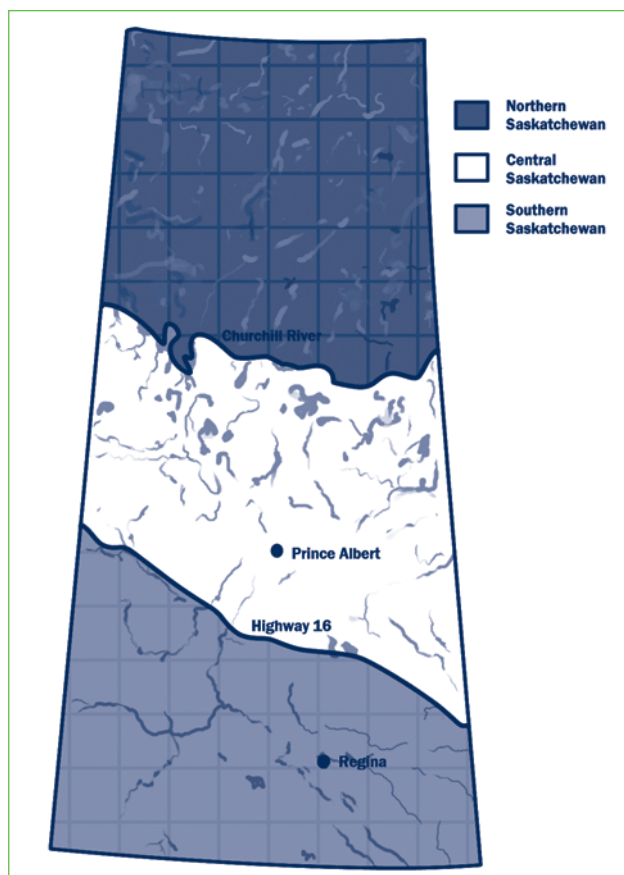


Figure 1:
Northern, Central, and Southern Saskatchewan boundaries
for in-water closed construction timing windows.
(Note: Central Region includes the Churchill River).

How To Determine Timing Windows

1. Determine the fish species living in the water body where you wish to do work. Consult Saskatchewan Environment or your local Fisheries and Oceans Canada (DFO) office.
2. Determine if the fish living in the water body spawn in the spring or fall/winter according to Table 1. There may be one or both spawning types in any given water body. In Saskatchewan, essentially all lakes and streams contain one or more of the spring spawning fish listed, however far fewer contain fall/winter spawning fish.
3. Determine if the water body is located in Northern, Central, or Southern Saskatchewan according to Figure 1.
4. Use Table 2 to determine the in-water work timing restrictions according to the location of a water body (Northern, Central or Southern) and the type of fish found within (spring or fall spawners). During these periods, no in-water work (below the ordinary high water mark) is to occur without site- or project-specific review by DFO.

Table 1:
Common spring and fall/winter spawning fish.

Spring Spawning Fish		Fall/Winter Spawning Fish
Arctic Grayling	Rainbow Trout	Brook Trout
Bullhead	Sauger	Brown Trout
Goldeye	Smallmouth Bass	Burbot (winter)
Lake Sturgeon	Suckers	Cisco (Tullibee)
Mooneye	Walleye	Lake Trout
Northern Pike	Yellow Perch	Whitefish

Table 2:
Timing windows when no in-water work is to occur in order to protect spawning fish and developing eggs and fry.

Location	Spring Spawning Fish		Fall/Winter and Spring Spawning Fish	
	No Lake Sturgeon	Lake Sturgeon present	No Lake Trout	Lake Trout present
Northern Saskatchewan	May 1 – July 15	May 1 – July 31	October 1 – July 15	Sept. 1 – July 15
Central Saskatchewan	April 16 – June 30	April 16 – July 15	October 1 – June 30	Sept. 15 – June 30
Southern Saskatchewan	April 1 – May 31	April 1 – July 15	October 1 – May 31	Not Applicable

FISHERIES AND OCEANS CANADA OFFICES IN SASKATCHEWAN

Prince Albert Office

Fisheries and Oceans Canada
125 – 32nd Street West
Prince Albert, SK S6V 8E2
Tel.: (306) 953-8777
Fax: (306) 953-8792

Regina Office

Fisheries and Oceans Canada
1804 Victoria Avenue East
Regina, SK S4N 7K3
Tel.: (306) 780-8725
Fax: (306) 780-8722

Aussi disponible en français

http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/index_f.asp

APPENDIX D

SASKATCHEWAN CONSERVATION DATA CENTRE SPECIES AT RISK IN SASKATCHEWAN

Species at Risk in Saskatchewan

This list is updated twice per year following COSEWIC Species Assessment Meetings, generally in the spring and the fall.

The federal *Species at Risk Act* establishes Schedule 1 as the official federal list of wildlife species at risk.

The provincial *Wildlife Act, 1998* lists at-risk species in Saskatchewan. These are identified below with an asterisk (*).

Taxonomic Group	Common Name	Scientific name	COSEWIC Status	Last COSEWIC Assessment	SARA status	Schedule	SK CDC Rank	SK Status
Amphibian	Great Plains Toad	<i>Bufo cognatus</i>	Special Concern	April 2010	Special Concern	Schedule 1	S3	
Amphibian	Northern Leopard Frog	<i>Rana pipiens</i>	Special Concern	April 2009	Special Concern	Schedule 1	S3	
Arthropod	Dakota Skipper	<i>Hesperia dacotae</i>	Threatened	November 2003	Threatened	Schedule 1	S1	
Arthropod	Dusky Dune Moth	<i>Copablepharon longipenne</i>	Endangered	November 2007	Endangered	Schedule 1	SNR	
Arthropod	Gold-edged Gem	<i>Schinia avemensis</i>	Endangered	April 2006	Endangered	Schedule 1	SNR	
Arthropod	Monarch Butterfly	<i>Danaus plexippus</i>	Special Concern	April 2010	Special Concern	Schedule 1	S3B	
Arthropod	Mormon Metalmark	<i>Apodemia mormo</i>	Threatened	May 2003	Threatened	Schedule 1	S1	
Arthropod	Pale Yellow Dune Moth	<i>Copablepharon grande</i>	Special Concern	November 2007	Special Concern	Schedule 1	SNR	
Arthropod	Verna's Flower Moth	<i>Schinia verna</i>	Threatened	May 2005	Threatened	Schedule 1	SH	
Bird	Bobolink	<i>Dolichonyx oryzivorus</i>	Threatened	April 2010	No Status	No Schedule ¹	S5B	
Bird	Burrowing Owl*	<i>Athene cunicularia</i>	Endangered	April 2006	Endangered	Schedule 1	S2B	Endangered
Bird	Canada Warbler	<i>Wilsonia canadensis</i>	Threatened	April 2008	Threatened	Schedule 1	S5B	
Bird	Chestnut-collared Longspur	<i>Calcarius ornatus</i>	Threatened	November 2009	No Status	No Schedule ¹	S5B	
Bird	Chimney Swift	<i>Chaetura pelagica</i>	Threatened	April 2007	Threatened	Schedule 1	S3B	
Bird	Common Nighthawk	<i>Chordeiles minor</i>	Threatened	April 2007	Threatened	Schedule 1	S4S5B, S4S5M	
Bird	Eskimo Curlew*	<i>Numenius borealis</i>	Endangered	November 2009	Endangered	Schedule 1	SHM	Extirpated
Bird	Ferruginous Hawk	<i>Buteo regalis</i>	Threatened	April 2008	Threatened	Schedule 1	S4B, S4M	
Bird	Greater Prairie-chicken*	<i>Tympanuchus cupido pinnatus</i>	Extirpated	November 2009	Extirpated	Schedule 1	SX	Extirpated
Bird	Greater Sage-grouse*	<i>Centrocercus urophasianus urophasianus</i>	Endangered	April 2008	Endangered	Schedule 1	S1B, S1N	Endangered
Bird	Horned Grebe	<i>Podiceps auritus</i>	Special Concern	April 2009	No Status	No Schedule ¹	S5B	
Bird	Loggerhead Shrike	<i>Lanius ludovicianus excubitorides</i>	Threatened	May 2004	Threatened	Schedule 1	S4B	
Bird	Long-billed Curlew	<i>Numenius americanus</i>	Special Concern	November 2002	Special Concern	Schedule 1	S4B, S4M	
Bird	McCowan's Longspur	<i>Calcarius mccownii</i>	Special Concern	April 2006	Special Concern	Schedule 1	S3S4B	
Bird	Mountain Plover	<i>Charadrius montanus</i>	Endangered	November 2009	Endangered	Schedule 1	S1B	
Bird	Olive-sided Flycatcher	<i>Contopus cooperi</i>	Threatened	November 2007	Threatened	Schedule 1	S4	
Bird	Passenger Pigeon	<i>Ectopistes migratorius</i>	Extinct					
Bird	Peregrine Falcon	<i>Falco peregrinus anatum</i>	Non-active	April 2007	Threatened	Schedule 1	S1B, S4M, S2N	
Bird	Peregrine Falcon	<i>Falco peregrinus anatum/tundrius</i>	Special Concern	April 2007	No Status	No Schedule ¹		
Bird	Piping Plover*	<i>Charadrius melodus circumcinctus</i>	Endangered	May 2001	Endangered	Schedule 1	S3B	Endangered
Bird	Red Knot	<i>Calidris canutus rufa</i>	Endangered	April 2007	No Status	No Schedule ¹	S2M	
Bird	Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	Threatened	April 2007	Threatened	Schedule 1	S1B, S1M	
Bird	Rusty Blackbird	<i>Euphagus carolinus</i>	Special Concern	April 2006	Special Concern	Schedule 1	S4B	
Bird	Sage Thrasher	<i>Oreoscoptes montanus</i>	Endangered	November 2000	Endangered	Schedule 1	S1B	
Bird	Short-eared Owl	<i>Asio flammeus</i>	Special Concern	April 2008	Special Concern	Schedule 3	S3B, S2N	
Bird	Sprague's Pipit	<i>Anthus spragueii</i>	Threatened	April 2010	Threatened	Schedule 1	S4B	
Bird	Whip-poor-will	<i>Caprimulgus vociferus</i>	Threatened	April 2009	Threatened	Schedule 1	S3B	
Bird	Whooping Crane*	<i>Grus americana</i>	Endangered	April 2010	Endangered	Schedule 1	SXB, S1M	Endangered
Bird	Yellow Rail	<i>Coturnicops noveboracensis</i>	Special Concern	November 2009	Special Concern	Schedule 1	S3B, S2M	
Fish	Bigmouth Buffalo	<i>Ictiobus cyprinellus</i>	Non-active	April 2009	Special Concern	Schedule 3	S3	
Fish	Bigmouth Buffalo	<i>Ictiobus cyprinellus</i> (Saskatchewan-Nelson River pop'ns)	Special Concern		No Status	No Schedule ¹	S3	
Fish	Chesnut Lamprey	<i>Ichthyomyzon castaneus</i>	Special Concern	April 1991	Special Concern	Schedule 3	S3S4	
Fish	Lake Sturgeon	<i>Acipenser fulvescens</i> (Saskatchewan River pop'ns)	Endangered	November 2006	No Status	No Schedule ¹	S2B	

Fish	Lake Sturgeon	<i>Acipenser fulvescens</i> (Red-Assiniboine Rivers - Lake Winnipeg pop'ns)	Endangered	November 2006	No Status	No Schedule ¹	S2B	
Fish	Lake Sturgeon	<i>Acipenser fulvescens</i> (Western Hudson Bay pop'ns)	Endangered	November 2006	No Status	No Schedule ¹	S2B	
Fish	Shortjaw Cisco	<i>Coregonus zenithicus</i>	Threatened	May 2003	Threatened	Schedule 2	S1	
Mammal	Black-footed Ferret*	<i>Mustela nigripes</i>	Extirpated	April 2009	Extirpated [†]	Schedule 1	SNA	Extirpated
Mammal	Black-tailed Prairie Dog	<i>Cynomys ludovicianus</i>	Special Concern	November 2000	Special Concern	Schedule 1	S2	
Mammal	Ord's Kangaroo Rat	<i>Dipodomys ordii</i>	Endangered	April 2006	Endangered	Schedule 1	S2	
Mammal	Plains Bison	<i>Bison bison bison</i>	Threatened	May 2004	No Status	No Schedule ¹	S3	
Mammal	Plains Grizzly Bear*	<i>Ursos arctos</i>	Extirpated	May 2002	Extirpated	Schedule 1	SX	Extirpated
Mammal	Swift Fox*	<i>Vulpes velox</i>	Threatened	November 2009	Endangered	Schedule 1	S1	Endangered
Mammal	Wolverine	<i>Gulo gulo</i>	Special Concern	May 2003	No Status	No Schedule ¹	S3S4	
Mammal	Woodland Caribou	<i>Rangifer tarandus caribou</i> (Boreal pop'n)	Threatened	May 2002	Threatened	Schedule 1	S3	
Moss	Alkaline Wing-nerved Moss	<i>Pterygoneurum kozlovii</i>	Threatened	November 2004	Threatened	Schedule 1	S1	
Reptile	Eastern Yellow-bellied Racer	<i>Coluber constrictor flaviventris</i>	Threatened	November 2004	Threatened	Schedule 1	S3	
Reptile	Greater Short-horned Lizard	<i>Phrynosoma hernandesi</i>	Endangered	April 2007	Endangered	Schedule 1	S2S3	
Reptile	Snapping Turtle	<i>Chelydra serpentina</i>	Special Concern	November 2008	Special Concern	Schedule 1	S3	
Vascular Plant	Athabasca Thrift	<i>Armeria maritima interior</i>	Special Concern	May 2002	Special Concern	Schedule 1	SNR	
Vascular Plant	Buffalograss	<i>Buchloe dactyloides</i>	Threatened	November 2001	Threatened	Schedule 1	S1	
Vascular Plant	Dwarf Woolly-heads ²	<i>Psilocarphus brevissimus</i>	Special Concern	April 2006	Special Concern	Schedule 1	S1S2	
Vascular Plant	Felt-leaf Willow	<i>Salix silicicola</i>	Special Concern	May 2000	Special Concern	Schedule 1	S2S3	
Vascular Plant	Floccose Tansy	<i>Tanacetum huronense</i> var. <i>floccosum</i>	Special Concern	May 2000	Special Concern	Schedule 1	SNR	
Vascular Plant	Hairy Prairie-clover*	<i>Dalea villosa</i> var. <i>villosa</i>	Threatened	May 2000	Threatened	Schedule 1	S1	Endangered
Vascular Plant	Large-headed Woolly Yarrow	<i>Achillea millefolium</i> var. <i>megacephalum</i>	Special Concern	May 2000	Special Concern	Schedule 1	S1	
Vascular Plant	MacKenzie Hairgrass	<i>Deschampsia mackenziana</i>	Special Concern	November 2001	Special Concern	Schedule 1	S2	
Vascular Plant	Sand-dune Short-capsuled Willow	<i>Salix brachycarpa</i> var. <i>psammophila</i>	Special Concern	May 2000	Special Concern	Schedule 1	S2S3	
Vascular Plant	Slender Mouse-ear-cress*	<i>Halimolobos virgata</i>	Threatened	May 2000	Threatened	Schedule 1	S1	
Vascular Plant	Small White Lady's-slipper*	<i>Cypripedium candidum</i>	Endangered	May 2000	Endangered	Schedule 1	S1	Extirpated
Vascular Plant	Small-flowered Sand Verbena*	<i>Tripterocalyx micranthus</i>	Endangered	November 2002	Endangered	Schedule 1	S1	
Vascular Plant	Smooth Goosefoot	<i>Chenopodium subglabrum</i>	Threatened	April 2006	Threatened	Schedule 1	S2	
Vascular Plant	Tiny Cryptanthe*	<i>Cryptantha minima</i>	Endangered	May 2000	Endangered	Schedule 1	S1	Endangered
Vascular Plant	Turnor's Willow	<i>Salix turnorii</i>	Special Concern	May 2000	Special Concern	Schedule 1	S2	
Vascular Plant	Western Spiderwort*	<i>Tradescantia occidentalis</i>	Threatened	November 2002	Threatened	Schedule 1	S1	Endangered

¹ under consideration for addition to Schedule 1

² Synonym used in Saskatchewan is *Psilocarphus elatior*, Tall Woolly-heads.

[†] reintroduction in progress

* identified as a provincial wild species at risk under *The Wildlife Act, 1998*

For more information on Saskatchewan species ranked by the Conservation Data Centre (SK CDC) go to: <http://www.biodiversity.sk.ca>

For more information on the *Committee on the Status of Endangered Wildlife in Canada* (COSEWIC) and its recommendations for listing, go to: <http://www.cosewic.gc.ca>

For more information on the *Species at Risk Act* (SARA) and its registry of protected species go to: <http://www.sararegistry.gc.ca>

Prepared by Jeanette Pepper, Species at Risk Ecologist, Ministry of Environment, Fish and Wildlife Branch, June 2010

APPENDIX E

SASKATCHEWAN ACTIVITY RESTRICTION GUIDELINES FOR SENSITIVE SPECIES

Saskatchewan Activity Restriction Guidelines for sensitive species in natural
habitats (see Table 1 on this website)
September 2003

- These guidelines are to assist proponents during the planning of proposed projects. If your project will include any activity falling within the listed setback distances, you are advised to contact the appropriate Saskatchewan Environment EcoRegion office early in the planning stage to ensure all work will be completed in a manner that will minimize impact. Discussing your project in advance with Saskatchewan Environment will reduce the chance your project will be delayed during the construction phase due to concerns with potential impacts on rare or endangered species.
- Activity Restriction Guidelines have been provided by the SKCDC for most species identified in Table 1 for nearly a decade through data requests and other directed queries.
- The SKCDC was asked to review their existing activity restriction guidelines due to changes in federal legislation regarding species at risk. (*The Species At Risk Act* (SARA) was proclaimed in June 2003 by the federal government.) The intent of this review was to update and integrate Saskatchewan's guidelines with those used by Environment Canada for species at risk.
- For most species of provincial concern, the set back distances and times have not changed from existing guidelines that we currently distribute. There should be minimal confusion with the disturbance categories as each species has the same set back distances for medium and high disturbance categories.
- The procedure for distributing these guidelines will not change. To clarify, for any given data request submitted to the SKCDC, guidelines are only provided for species of known occurrence in the area of new development.
- The guidelines have been posted on the internet to facilitate public access.
- See the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) website <http://www.cosewic.gc.ca/index.htm> for a complete listing of species at risk in Canada. These species are listed under SARA.
- For Environment Canada's industry guidelines see <http://www.pnr-rpn.ec.gc.ca/nature/petroleum/dg00s00.en.html>
 - Scobie and Faminow developed these guidelines for Environment Canada through consultation with more than 100 leading experts as well as industry representatives.
- The scope of human activities in the environment is a continuum and cannot be easily classified. Three categories of disturbance have been adopted by Environment Canada. However, these are guidelines only and should be treated as such.

- These Activity Restriction Guidelines reflect current knowledge of each species. Changes to the guidelines may occur as information becomes available. Please contribute your knowledge.

Reports and rare species occurrences can be submitted to:

<http://www.biodiversity.sk.ca/submit.htm>

or

Saskatchewan Conservation Data Centre,
Rm. 436, 3211 Albert St.,
Regina, Saskatchewan, S4S 5W6

AMPHIBIANS

- Federal guidelines were adopted for Great Plains Toad and Northern Leopard Frog which are listed under SARA.
- Current set back distances used by Grasslands EcoRegion for wetlands, water bodies and watercourses adopted (0-90m) for species of provincial concern (Canadian Toad and Plains Spadefoot (toad)).

REPTILES

- The existing guidelines stated 200 m for development activities so there was no change. A major issue for snakes is road mortality. Previous reports indicate that the mean distance of movement by hognose snakes is 200 m (Wright and Didiuk 1998).

BIRDS

- The setback distances are not only to address auditory disturbances but also permanent alteration in habitat.
- For Piping Plover, the high water mark is used, as it is typically the same as the outer edge of suitable habitat. This is a globally rare species, G3, therefore permanent habitat loss is of major concern.
- Changed Golden Eagle guidelines to meet Grasslands EcoRegion setbacks.
- No change was made from the existing restriction guidelines for colonial nesting birds and Osprey.
- Sage Grouse are critically imperiled in Saskatchewan. (Setback distances have already been increased to 1000 m on lands managed by PFRA.)

- Nesting habitat of bird species that use the same nest site year after year (i.e., Loggerhead Shrike, Ferruginous Hawk and colonial nesting birds) should not be destroyed at any time.

MAMMALS

- Ord's Kangaroo Rat inhabits highly sensitive active dune areas. This species is listed under SARA therefore federal guidelines were adopted.
- Swift Fox were extirpated from Saskatchewan and is still found in very low numbers. This species is listed under SARA therefore federal guidelines were adopted.

PLANTS

- Plants make up the bulk of the species of concern and the one-size-fits-all approach is an attempt to simplify matters.
- The 0 m setback distance is for foot traffic only (FTO), ATV and other small vehicles would fall under a higher disturbance category.

Literature Cited

Scobie, D. and C. Faminow. 2000. Development of standardized guidelines for petroleum industry activities that affect COSEWIC Prairie and Northern Region Vertebrate Species at Risk. Prepared for: Environment Canada, Prairie and Northern Region, Edmonton, Alberta.

Wright, J. and A. Didiuk. 1998. Status of the Plains Hognose Snake (*Heterodon nasicus nasicus*) in Alberta. Alberta Environmental Protection, Fisheries and Wildlife Management Division, and Alberta Conservation Association, Alberta Wildlife Status Report No. 15, Edmonton, AB. 26 pp.

Table 1. Saskatchewan Activity Restriction Guidelines for sensitive species in natural habitats

These guidelines are to assist proponents during the planning of proposed projects. If your project will include any activity falling within the listed setback distances, you are advised to contact the appropriate Saskatchewan Environment EcoRegion office early in the planning stage to ensure all work will be completed in a manner that will minimize impact. Discussing your project in advance with Saskatchewan Environment will reduce the chance your project will be delayed during the construction phase due to concerns with potential impacts on rare or endangered species.					
Species* (species in capital letters are provincially and/or federally listed)	Key Wildlife Areas	Restricted Activity Dates	Recommended Setback Distances by Disturbance Category		
			Low (e.g., foot traffic, small vehicles (<1 ton), ATVs, operating oil or gas wells, pipelines)	Medium (e.g., trucks>1 ton (gravel, oil, grain), tractors (including farm tractors), pipeline construction (diameters <1 foot), operating compressor station or battery)	High (e.g., road construction, roads, drilling rigs, mines and quarries, construction of compressor station or battery, forest harvest, large-diameter pipeline construction, seismic exploration, blasting, rock crushing, asphalt batching, gravel pit)
AMPHIBIANS					
GREAT PLAINS TOAD	Ponds Used for Breeding, Living, or Hibernating	Year Round	10 m	400 m	500m
NORTHERN LEOPARD FROG	Ponds Used for Breeding, Living, or Hibernating	Apr. 1- Oct. 31	10 m	200 m	500 m
Canadian Toad Plains Spadefoot (Toad)	Ponds Used for Breeding, Living, or Hibernating	Year Round	0 m	90 m	90 m
REPTILES					
Prairie Rattlesnake Western Hognose Snake Smooth Green Snake	Hibernacula	Apr. 1- Sept. 30	50 m	200 m	200 m
		Oct. 1- Mar. 31	0 m	200 m	200 m
EASTERN YELLOW-BELLIED RACER	Hibernacula	Year round	100 m	200 m	1000 m
SHORT-HORNED LIZARD	Eroded Slopes (blue-shale outcrops)	Mar.15- Nov. 15	50 m	200 m	200 m
Snapping Turtle	Nesting Site	Mar. 15- June 30	0 m	400 m	400 m
BIRDS					
LOGGERHEAD SHRIKE	Nest Site	May 1- Aug. 15	50 m	250 m	400 m
RED-HEADED WOODPECKER	Nest Site	Apr. 15- June 30	0 m	100 m	100 m

YELLOW RAIL	Nest Site	May 1- July 15	100 m	150 m	350 m
PEREGRINE FALCON	Nest Site	Apr. 1- Aug. 15	300 m	500 m	1000 m
BURROWING OWL	Nest Site	Apr. 1- July 15	200 m	300 m	500 m
		July 16- Oct. 15	100 m	200 m	500 m
		Oct. 16- Mar. 31	10 m	200 m	500 m
PIPING PLOVER	High Water Mark	May 1- July 31	200 m	400 m	600 m
		Aug. 1- Sept. 30	100 m	200 m	600 m
FERRUGINOUS HAWK Prairie Falcon Bald Eagle	Nest Site	Mar. 15- July 15	500 m	750 m	1000 m
Golden Eagle	Nest Site	Feb. 15- July 15	500 m	1000 m	1000 m
SHORT-EARED OWL	Nest Site	Mar. 25- Aug. 1	100 m	300 m	500 m
SPRAGUE'S PIPIT	Nest Site	Apr. 21- Aug. 31	50 m	200 m	250 m
LONG-BILLED CURLEW	Nest Site	Apr. 15- July 15	100 m	200 m	200 m
SAGE GROUSE	Lek	Mar. 1- July 15	500 m	1000 m	1000 m
		July 16- Feb. 29	100 m	1000 m	1000 m
	Nest Site	April 15- June 15	200 m	300 m	500 m
Gulls/Terns (e.g., Caspian Tern) (Excluding Ring-billed and California Gulls)	Nesting Colony	May 1- July 15	200m	400 m	400 m
Colonial Nesting Birds (e.g., herons, pelicans, cormorants)	Nesting Colony	Apr. 1-July 31	500 m	1000 m	1000 m
Colonial Nesting Grebes (e.g., Western, Clark's and Eared Grebes)	Nesting Colony	May 15- July 15	100 m	200 m	200 m
Osprey	Nest Site	May 1- Aug. 15	500 m	1000 m	1000 m
Cooper's Hawk	Nest Site	Apr. 1- July 31	200 m	400 m	400 m
MOUNTAIN PLOVER Snowy Plover	Nest Site	May 1- July 31	200 m	400 m	500 m

Barred Owl Hawk Owl Great Gray Owl Western and Eastern Screech-Owls	Nest Site	Mar. 1- July 15	100 m	400 m	400 m
American Bittern	Nest Site	May 1- July 31	200 m	400 m	400 m
SAGE THRASHER	Nest Site	May 15- June 30	100 m	200 m	200 m
Trumpeter Swan	Nest Site	Apr. 1- July 31	500 m	1000 m	1000 m
Sharp-tailed Grouse	Lek	Mar. 15- May 15	200 m	400 m	400 m
MAMMALS					
SWIFT FOX	Den	Feb. 15- Aug. 31	500 m	500 m	2000 m
		Sept. 1- Feb. 14	100 m	500 m	2000 m
BLACK-TAILED PRAIRIE DOG	Colony	Year round	0 m	250 m	500 m
ORD'S KANGAROO RAT	Den	Year round	50 m	250 m	500 m

PLANTS

These are the general Activity Restriction Guidelines for federally and provincially listed plants. Contact the Saskatchewan Conservation Data Centre Botanist for mitigation considerations for these and other S1-S3 species. **FOOT TRAFFIC ONLY (FTO)** is permitted for the Low disturbance category. Small vehicles (<1 ton), ATVs, operating oil or gas wells, pipelines fall under Medium disturbance along with the other examples listed for animals. Examples of High level disturbance are the same as indicated for animals.

SAND VERBENA	Population	Year round	0 m FTO	25 m	50 m
TINY CRYPTANTHE	Population	Year round	0 m FTO	25 m	50 m
WESTERN SPIDERWORT	Population	Year round	0 m FTO	25 m	50 m
SLENDER MOUSE-EAR- CRESS	Population	Year round	0 m FTO	25 m	50 m
HAIRY PRAIRIE- CLOVER	Population	Year round	0 m FTO	25 m	50 m
POWELL'S SALTBUSH	Population	Year round	0 m FTO	25 m	50 m
UPLAND EVENING PRIMROSE	Population	Year round	0 m FTO	25 m	50 m
PLAINS GRAPE- FERN	Population	Year round	0 m FTO	25 m	50 m
BUFFALOGRASS	Population	Year round	0 m FTO	25 m	50 m
STALKED MOONWORT	Population	Year round	0 m FTO	25 m	50 m

GASTONY'S CLIFFBRAKE	Population	Year round	0 m FTO	25 m	50 m
PECULIAR MOONWORT	Population	Year round	0 m FTO	25 m	50 m
PALE MOONWORT	Population	Year round	0 m FTO	25 m	50 m
ATHABASCA THRIFT	Population	Year round	0 m FTO	25 m	50 m
BEAKED ANNUAL SKELETON WEED	Population	Year round	0 m FTO	25 m	50 m
BUR RAGWEED	Population	Year round	0 m FTO	25 m	50 m
FELT-LEAF WILLOW	Population	Year round	0 m FTO	25 m	50 m
FLOCCOSE TANSY	Population	Year round	0 m FTO	25 m	50 m
IMPOVERISHED PINWEED	Population	Year round	0 m FTO	25 m	50 m
LARGE-HEADED WOOLY YARROW	Population	Year round	0 m FTO	25 m	50 m
MACKENZIE HAIR-GRASS	Population	Year round	0 m FTO	25 m	50 m
PRICKLY MILK- VETCH	Population	Year round	0 m FTO	25 m	50 m
SAND CHICKWEED	Population	Year round	0 m FTO	25 m	50 m
SMALL LUPINE	Population	Year round	0 m FTO	25 m	50 m
TYRRELL'S WILLOW	Population	Year round	0 m FTO	25 m	50 m
TURNOR'S WILLOW	Population	Year round	0 m FTO	25 m	50 m
SMOOTH ARID GOOSEFOOT	Population	Year round	0 m FTO	25 m	50 m
SHORT- CAPSULED SAND-DUNE WILLOW	Population	Year round	0 m FTO	25 m	50 m
TALL WOOLY- HEADS	Population	Year round	0 m FTO	25 m	50 m
SAND-LOVING BARRENGROUND WILLOW	Population	Year round	0 m FTO	25 m	50 m

FISH

Proponents should be aware of the following listed fish species and the waters in which they live. Contact the Department of Fisheries and Oceans http://www.dfo-mpo.gc.ca/home-accueil_e.htm if your project is in or near these waters.

BIGMOUTH BUFFALO	The Qu'Appelle basin; including the waters of Buffalo Pound, Last Mountain, Pasqua, Echo, Mission, Katepwa (The Fishing Lakes), Crooked and Round Lakes.
LAKE STURGEON	The waters of the North Saskatchewan, South Saskatchewan and Saskatchewan Rivers (including large connected waters such as the Torch river) and the waters of the Churchill River below the confluence of the Reindeer River.
CHESTNUT LAMPREY	The waters of the Qu'Appelle River below the outlet of Round Lake and the upper Assiniboine basin including the Whitesand and Shell Rivers.

SHORTJAW CISCO	The waters of Reindeer Lake, Lake Athabasca, Black, Giles and Wapata Lakes.
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*Species in capital letters are listed or pending listing under Saskatchewan's *The Wildlife Act* or are listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and under the federal *Species at Risk Act* (SARA).

See the [INTERIM LIST](#) for further details on Saskatchewan's provincial list.

<http://www.biodiversity.sk.ca/FTP.htm>

See the following website for species listed by COSEWIC.

http://www.cosewic.gc.ca/eng/sct5/index_e.cfm

Species not capitalized are ranked S1-S3 by the SKCDC or require special consideration during the breeding period. See 'Guide to Rank Definitions' at <http://www.biodiversity.sk.ca/FTP.htm>.

For most projects near water, you must obtain work permits as required under provincial legislation. Also, the federal *Fisheries Act* provides for the protection of fish habitat. Under the *Fisheries Act*, no one may carry out any work or undertaking that results in the harmful alteration, disruption or destruction ("HADD") of fish habitat, unless this HADD has been authorized by the Minister of Fisheries and Oceans Canada. The Act also states that no one is permitted to deposit a deleterious (harmful) substance into water containing fish.

In some instances, additional approvals may be required. For example, some docks may need to be approved by the Canadian Coast Guard (Fisheries and Oceans Canada) due to navigation requirements.

When working near water, contact:

Regional Office of SE (list):

<http://www.se.gov.sk.ca/environment/assessment/oilandgas/contacts.PDF>

DFO Offices: Prince Albert – 306-953-8777

Regina – 306-780-8725

September 2003

APPENDIX F

FISHERIES AND OCEANS CANADA SASKATCHEWAN OPERATIONAL STATEMENT – TIMING WINDOWS

TIMING WINDOWS

Fisheries and Oceans Canada
Saskatchewan Operational Statement

Version 3.0

SASKATCHEWAN IN-WATER CLOSED CONSTRUCTION TIMING WINDOWS

Restricted activity timing windows have been identified for Saskatchewan lakes, rivers and streams to protect fish during spawning and incubation periods when spawning fish, eggs and fry are vulnerable to disturbance or sediment. During these periods, no in-water or shoreline work is allowed except under site- or project-specific review and with the implementation of protective measures. Restricted activity periods are determined on a case by case basis according to the species of fish in the water body, whether those fish spawn in the spring or fall/winter, and whether the water body is located in Northern, Central, or Southern Saskatchewan.

Timing windows are just one of many measures used to protect fish and fish habitat when carrying out a work or undertaking in or around water. Be sure to follow all of the measures outlined in the Operational Statements to avoid negative impacts to fish habitat.

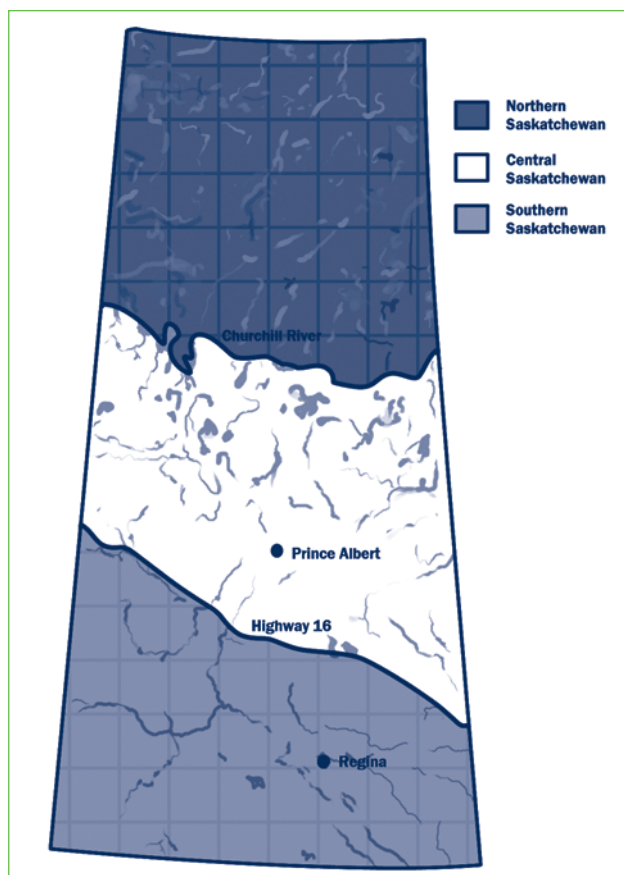


Figure 1:
Northern, Central, and Southern Saskatchewan boundaries
for in-water closed construction timing windows.
(Note: Central Region includes the Churchill River).

How To Determine Timing Windows

1. Determine the fish species living in the water body where you wish to do work. Consult Saskatchewan Environment or your local Fisheries and Oceans Canada (DFO) office.
2. Determine if the fish living in the water body spawn in the spring or fall/winter according to Table 1. There may be one or both spawning types in any given water body. In Saskatchewan, essentially all lakes and streams contain one or more of the spring spawning fish listed, however far fewer contain fall/winter spawning fish.
3. Determine if the water body is located in Northern, Central, or Southern Saskatchewan according to Figure 1.
4. Use Table 2 to determine the in-water work timing restrictions according to the location of a water body (Northern, Central or Southern) and the type of fish found within (spring or fall spawners). During these periods, no in-water work (below the ordinary high water mark) is to occur without site- or project-specific review by DFO.

Table 1:
Common spring and fall/winter spawning fish.

Spring Spawning Fish		Fall/Winter Spawning Fish
Arctic Grayling	Rainbow Trout	Brook Trout
Bullhead	Sauger	Brown Trout
Goldeye	Smallmouth Bass	Burbot (winter)
Lake Sturgeon	Suckers	Cisco (Tullibee)
Mooneye	Walleye	Lake Trout
Northern Pike	Yellow Perch	Whitefish

Table 2:
Timing windows when no in-water work is to occur in order to protect spawning fish and developing eggs and fry.

Location	Spring Spawning Fish		Fall/Winter and Spring Spawning Fish	
	No Lake Sturgeon	Lake Sturgeon present	No Lake Trout	Lake Trout present
Northern Saskatchewan	May 1 – July 15	May 1 – July 31	October 1 – July 15	Sept. 1 – July 15
Central Saskatchewan	April 16 – June 30	April 16 – July 15	October 1 – June 30	Sept. 15 – June 30
Southern Saskatchewan	April 1 – May 31	April 1 – July 15	October 1 – May 31	Not Applicable

FISHERIES AND OCEANS CANADA OFFICES IN SASKATCHEWAN

Prince Albert Office

Fisheries and Oceans Canada
125 – 32nd Street West
Prince Albert, SK S6V 8E2
Tel.: (306) 953-8777
Fax: (306) 953-8792

Regina Office

Fisheries and Oceans Canada
1804 Victoria Avenue East
Regina, SK S4N 7K3
Tel.: (306) 780-8725
Fax: (306) 780-8722

Aussi disponible en français

http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/index_f.asp