# LEACH LAKE 3-WAY WATER CONTROL UPGRADE

## FINAL PROJECT REPORT – MARCH 2009

**PREPARED BY**

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**FOR**
FISH & WILDLIFE COMPENSATION PROGRAM

**PROJECT PARTNERS**

## EXECUTIVE SUMMARY

Water controls are key structures on the Creston Valley Wildlife Management Area to maintain adequate water levels in the various wetland compartments for the benefit of various species of plants and wildlife. Many of these controls have been in the ground for almost 40 years and have deteriorated to the point that some are jeopardizing the habitat of species at risk such as the endangered northern leopard frog and the red-listed Western grebe.

Leach Lake control 5, a 3-way water control that plays a critical role in managing water levels in units 1 to 4, was replaced in the early fall of 2008. The old galvanized structure was pulled out of the ground and replaced by a pre-fabricated concrete structure; the galvanized outlet culverts were also pulled out and replaced by high density polyethylene (HDPE) pipes. The work was conducted between 27 September and 16 October 2008 and cost approximately $103,000 (including in-kind contributions). Close to $95,000 in grants were acquired from 4 organizations to pay for the project.

## KEYWORDS

Water Control, Leach Lake, Creston, Creston Valley Wildlife Management Area.

## ACKNOWLEDGMENTS

The Creston Valley Wildlife Management Area (CVWMA) would like to thank the Fish & Wildlife Compensation Program (FWCP), Wildlife Habitat Canada (WHC), the Columbia Kootenay Fisheries Renewal Partnership (CKFRP), and Ducks Unlimited Canada (DUC) for their financial contributions that made this project possible. The CVWMA would also to thank - Ken Johnson (DUC) for coordinating the engineering and construction management work, as well as the pre-fabrication of the concrete structure and the ordering of the necessary materials; - Carl Pentilchuck (Pentilchuck Engineering) for his engineering services; - Jim Mercer (J. Mercer Consulting) for his hard work in the field supervising the construction process and ensuring a quality product; - Kevin Hedlund (Hedlund Contracting Ltd.) for providing the gravel and rocks when required and providing reliable construction machinery and operators, and: - Doug Sutcliffe for his help and reliability with the construction work.

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## 1. INTRODUCTION

Active management of water levels on the Creston Valley Wildlife Management Area (CVWMA) has been practiced for over 35 years to prevent ecological succession and preserve the ecological characters of the wetland. Water controls (culverts and gates) have played a crucial role in managing water levels by allowing staff to lower, raise or maintain stable water levels in the various compartments to benefit several species of wildlife and control vegetation. However, many of these control structures were put in the ground in the mid-70s and have exceeded their life expectancy.

In the Leach Lake unit, water control 5 is a critical structure that allows evacuating water from pond 1, 2, 3, and 4 into the Kootenay River. In June of 2007, an engineer inspection revealed that control 5 was in poor condition and recommended that it should be replaced as soon as possible to prevent a catastrophic failure that could result in either not being able to let water out of the Leach Lake unit, which would negatively impact the structure of the existing dykes, or not being able to retain water in the Leach Lake unit, which would directly affect several species of nesting waterfowl, and species at risk such as the western grebe (*Aechmophorus occidentalis*), the northern leopard frog (*Rana pipiens*), the American white pelican (*Pelecanus erythrorhynchos*), and the great blue heron (*Ardea herodias*) which all utilize the Leach Lake units for breeding or other purposes. Proper functioning of control 5 allows CVWMA staff to maintain shallow water in adjacent ponds and provide suitable habitat for one of only 3 known northern leopard frog "populations" in British Columbia. Similarly, control 5 helps providing stable water levels essential to one of only 3 nesting populations of Western Grebe in the province; it also allows lowering water levels to provide shallow water for foraging waterfowl during fall migration.

In the fall of 2008, control 5, a 3-way water control structure, was replaced with a new structure to prevent a catastrophic failure and ensure that CVWMA staff can continue managing water levels effectively to benefit as many species as possible.

## 2. PROJECT LOCATION

Water control 5 is located at the north end of the Leach Lake Unit (Figure 1) between pond 3 and 4 and the Kootenay River (UTM 526695E, 5447832N) - 8 km from Highway 3 through the Leach Lake Unit from the Summit Creek area gate (only access).

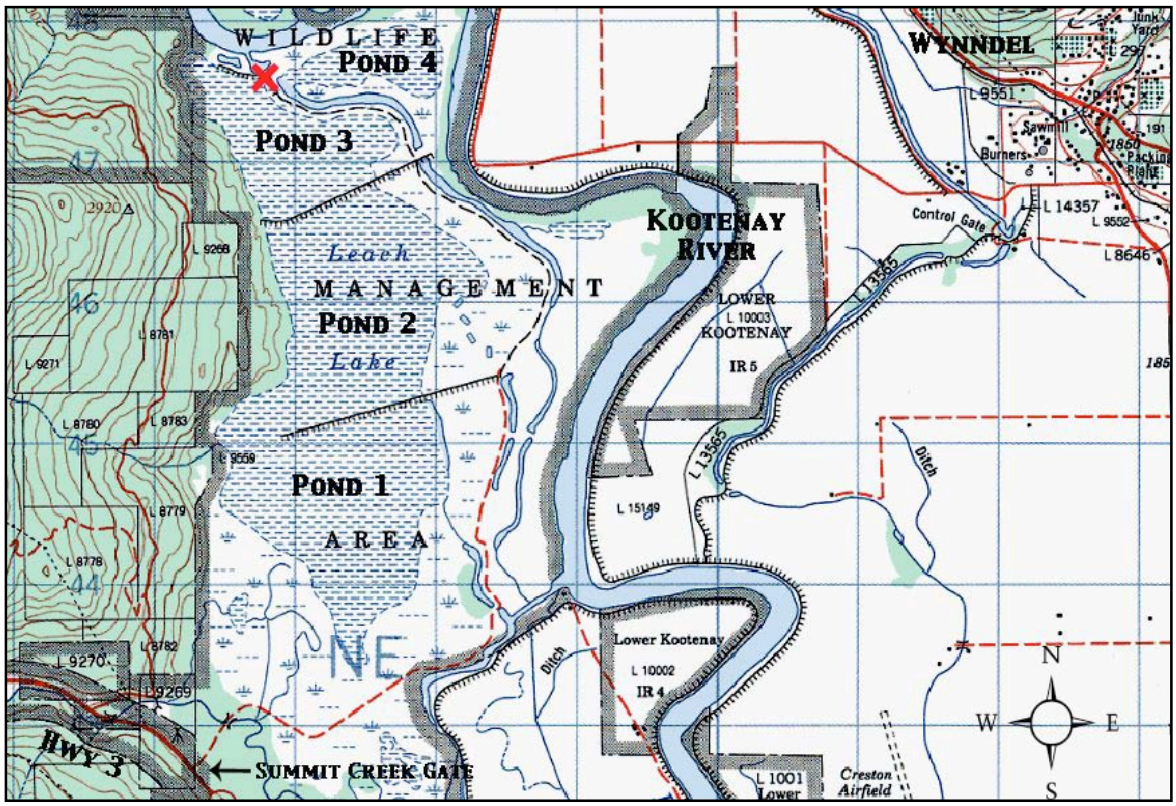


**Figure 1 Location of water control 5 (X).**

## 3. ACTIVITIES CONDUCTED

Work began on 27 September 2008 when the new pre-fabricated concrete water control and high density polyethylene (HDPE) pipes were delivered and moved to the project location (Figure 2).

**Figure 2 Water control parts (left) being unloaded at the project location (right).**

On 30 September 2008, an excavator was brought onto the site and earth dams were built, in front of each culvert outlet, to secure the work site from water fluctuations (Figure 3). A larger and stronger earth dam was built on the Kootenay River side to hold back water level fluctuations throughout the work period. A silt fence was built to reduce siltation in the river (Figure 4). Excess water within the work site was pumped out every morning using a 3-in trash pump.

In order to avoid negative impacts on amphibians that might have been present within or near the work site, a biologist conducted visual searches of the work site shorelines before daily work began and amphibians encountered were moved to a safe area. Water levels in adjacent ponds were also maintained at an appropriate level to accommodate amphibians throughout the duration of the project.

**Figure 3 Earth dams built in front of outlets to pond 3 (right) and pond 4 (left).**

On 1 October 2008, the old water control structures were dug out and removed from their existing location (Figure 5).

The new concrete control box was put in the ground on 2 October 2008 and a second section was added to it on the same day (Figure 6).

**Figure 4 Earth dam on Kootenay River side and silt fence.**

**Figure 5 Old perforated half-round stop log structures (left and center) and 3-way control (right) before and during removal.**

**Figure 6 Main concrete control structure being put in the ground (left) and second section added (right).**

On 3 October 2008, part of the outlet to the Kootenay River was added to the control structure; two 6-m sections of pipe were put together and a seepage collar was built onto the pipe to

prevent water from seeping along it. The sections of pipe were buried and the ground was compacted with a jumping jack (Figure 7).

**Figure 7 Seepage collar on pipe (top left) and worker compacting the ground with a jumping jack (right).**

On 6, 7, and 8 October 2008, the outlets from the main control to the Kootenay River, pond 3 and pond 4 were put together and buried into the ground and two more concrete sections were added to the main control structure (Figure 8).

**Figure 8 Outlets to pond 3 (left) and pond 4 (right) being put in the ground and buried on 7 and 8 October 2008.**

Three slide gates were anchored to the control structure on 9 October 2008. Some modifications to the gate stems were necessary as the stems were a bit too long and would have extended out of the control structure lid. The stems were shortened by 30 cm. The lid was also put in place on that same day to conclude the construction of the water control structure.

**Figure 9 Photos showing the length of stem that was removed (left) on all 3 gates, and slide gate being lowered (center) and anchored to the concrete structure (right).**

Clean up and finishing up work started on 10 October 2008 and the project was completed by 16 October 2008 when the excavator was moved out. During that period, riprap was placed on the dyke slopes around the 3 outlets to prevent erosion, and the earth dams and silt fence were removed (Figure 10). Banks were sloped and smoothed out; a lockable cover was installed on the lid hole; and 2 new staff gauges were installed near the outlets of pond 3 and pond 4. Finally, the work area was seeded over with a reclamation mix on 21 November 2008 to reduce weed invasion in the coming spring.

**Figure 10 Riprap around the outlet to the Kootenay River (left) and earth dam on Kootenay River side being removed.**

**Figure 11 A lockable cover was put on the control structure (left) and a new staff gauge near the outlet to pond 3 was installed (right).**

## 4. DISCUSSION

The project was completed with few challenges in great part due to the experience of the construction manager. The main challenge was encountered before the work began when some concerns were voiced over the level of the Kootenay River possibly being too high to build an earth dam. However, the weather "cooperated" and the level of the river actually decreased during the construction work eliminating the concerns. A second challenge was encountered with the stems being too long but was quickly resolved by cutting and welding the stems back together.

The project was completed within the initial budget, however, some of the costs of materials were grossly overestimated and the costs of labour underestimated. The in-kind contributions were also higher than anticipated. These differences can partly be explained by the fact that the budget was reviewed after the funding application was submitted as it became obvious that more money would be necessary to carry out the project. Furthermore, the engineer cost estimate was not available when the funding applications were submitted to the various funding organizations. The timing of construction was delayed slightly as some of the materials, including the slide gates, were not available until 29 September 2008. However, the delay did not impact on the construction work and the project was completed successfully.

The 3-way control was tested in the fall of 2008 and functioned properly as anticipated. It will be used more extensively before the freshet of 2009 to let out excess water accumulated over the winter of 2008-2009. The materials used in the construction should increase the life expectancy of the water control structure over the old structure (Figure 12) – by at least two fold (or 50+ years).

**Figure 12 Old galvanized water control with old slide gates and new concrete water control with new slide gates.**

## 5. FINANCIAL SUMMARY

| EXPENDITURES | | | | COSTS $ | |
|---|---|---|---|---|---|
| | | | | ESTIMATED | FINAL |
| Engineering Services – consultant (design & drafting) | | | | 3,000.00 | 5,600.10 |
| Construction Management | | | | 3,000.00 | 8,165.13 |
| Mobilization & Demobilization | | | | 2,500.00 | * |
| Fab./Supply Conc. Gatewell complete – pipe stubs | | | | 19,000.00 | 20,858.25 |
| Supply – Dia 750 – Boss 2000 Pipe – Bell & Spigot | | | | 15,000.00 | 9,124.61 |
| Supply – Armtec 20-10C Standard Slidegates c/w stem ext. (3) | | | | 16,500.00 | 10,954.53 |
| Excavate, remove/dispose old structure & prepare trench | | | | 3,000.00 | 31,417.38 |
| Install Structure, Pipe & backfill including clean up | | | | 4,000.00 | |
| Supply & place riprap c/w minor amount of bedding gravel | | | | 3,000.00 | |
| Miscellaneous – stoplogs, diaphragm & seed including seeding | | | | 1,000.00 | 2,103.03 |
| Travel, accommodations, mileage – construction manager | | | | 1,600.00 | 4,026.42 |
| Travel, accommodations, mileage – Engineer final inspection | | | | 3,400.00 | 2,431.31 |
| | | | | | |
| | | | **TOTAL A** | 75,000.00 | 94,680.76 |
| | | | | | |
| **CASH CONTRIBUTIONS** | | | | | |
| **Organizations** | | | | **ANTICIPATED** | **FINAL** |
| | Fish & Wildlife Compensation Program | | | 25,000.00 | 25,000.00 |
| | Wildlife Habitat Canada | | | 25,000.00 | 25,000.00 |
| | Columbia Basin Trust | | | 20,000.00 | 20,000.00 |
| | Ducks Unlimited Canada | | | 25,000.00 | 24,680.76 |
| | | | | | |
| | | | **TOTAL B** | **95,000.00** | **94,680.76** |
| | | | | | |
| **APPLICANTS AND/OR PARTNERS CONTRIBUTIONS IN KIND** | | | | | |
| | | | | **ANTICIPATED** | **FINAL** |
| Labour - CVWMA | | | | 3,152.00 | 4,600.00 |
| Ducks Unlimited Canada | | | | | 3,000.00 |
| Donated Equipment – CVWMA: Trash pump – 3 in. | | | | 274.15 | 352.48 |
| Donated Equipment – CVWMA: Intake Hose – 3 in. | | | | 25.75 | 33.11 |
| Donated Equipment – CVWMA: Discharge Hose – 3 in. | | | | 18.80 | 18.80 |
| Donated Equipment – CVWMA: Electrical Generator 2500 watts | | | | 129.30 | 129.30 |
| Signage – CVWMA | | | | | 53.76 |
| | | | | | |
| | | | **TOTAL C** | **3,600.00** | **8,187.45** |
| | | | | | |
| | | **TOTAL COSTS (A+C)** | | **$78,600.00** | **$102,868.21** |

* Mobilization & Demobilization costs could not be separated and were included in the $31,417.38.