Project Report:
Chaplin Road Wetlands
Oregon Spotted Frog Habitat Expansion 2010

Prepared For:

B.C. Conservation Foundation

Oregon Spotted Frog Recovery Team

South Coast Conservation Program

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TABLE OF CONTENTS

1 Background

Oregon spotted frog (*Rana pretiosa*, A-RAPR) is Canada's most endangered amphibian, with only four known remnant populations, one of which may be extirpated. Agriculture, mining, urban development, pollution, draining or infilling of wetlands and the introduction of predatory invasive species are all contributing to a drastic reduction in available breeding and foraging habitat for Oregon spotted frog (OSF). Oregon spotted frogs are currently restricted to 4 extant populations in British Columbia, with only 3 now breeding and one likely extirpated. The species is experiencing significant declines throughout its range and is now disjunct from populations in Washington.

Drainage of wetlands for agriculture has reduced available habitat throughout the species' historic range. This project intended to expand available habitat for OSF directly adjacent to existing OSF habitat that was created during construction of DFO spawning channels in Maria Slough, one of the four remnant habitats for the frog.

2 Location

This habitat creation project occurred directly adjacent to Chaplin Road, in the District of Kent, Fraser Valley Regional District. The project was completed within the seasonal floodplain of Maria Slough, which flows into the Fraser River approximately 4 km downstream of the project site (*Figure 1*). The north-south channel is on Provincial Crown land, as all works took place below the legal high water mark, and is bordered by private land to the east across the Maria Slough channel and to the west by Federal Department of Agriculture, currently leased to UBC.

3 Pre-project Site Condition

Salmonid enhancement projects (spawning channels) created by DFO exist both upstream and downstream of the site. The upstream project involved a partnership with the Oregon spotted frog recovery team in which a side channel was created as Oregon spotted frog habitat. Oregon spotted frogs were subsequently released into the created habitat and are known to be breeding at this location. This project expanded upon the existing habitat in order to increase available space for the frogs.

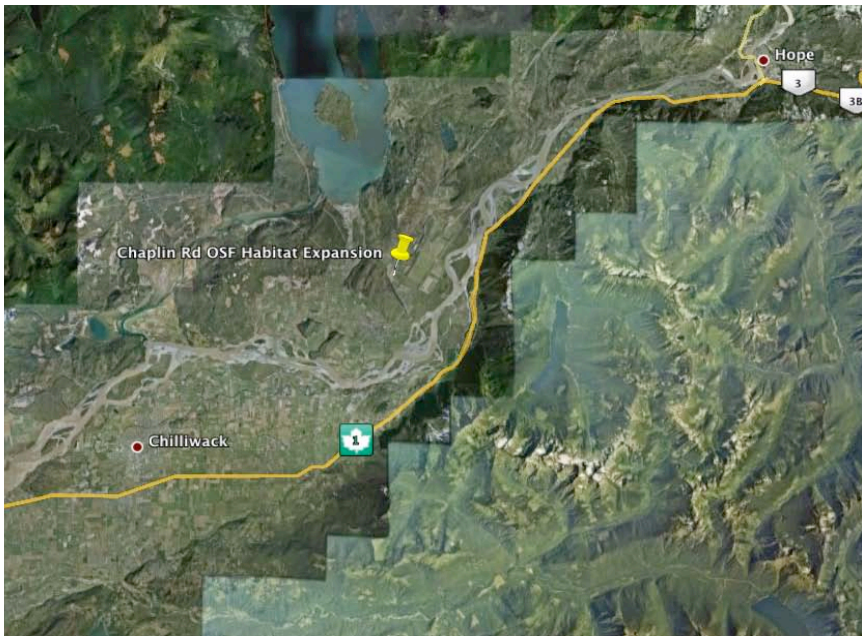

Figure 1. Location of proposed habitat expansion site in the Fraser Valley.

Maria Slough was historically a side-arm of the Fraser River, open to the flows both upstream and downstream. In the 1890s, the upstream connection to the Fraser River was severed by railroad construction. Maria Slough has since existed as a slow backwater channel, fed mostly by Fraser River groundwater and supplemented by Hicks Creek. The Slough therefore follows the Fraser River hydrograph, and is deepest in May and June, during which months there may be 50-100 cm of water above the ground level of the gravel bar. The slough is driest in the fall and in the spring months when the Fraser is low (Figure 2).

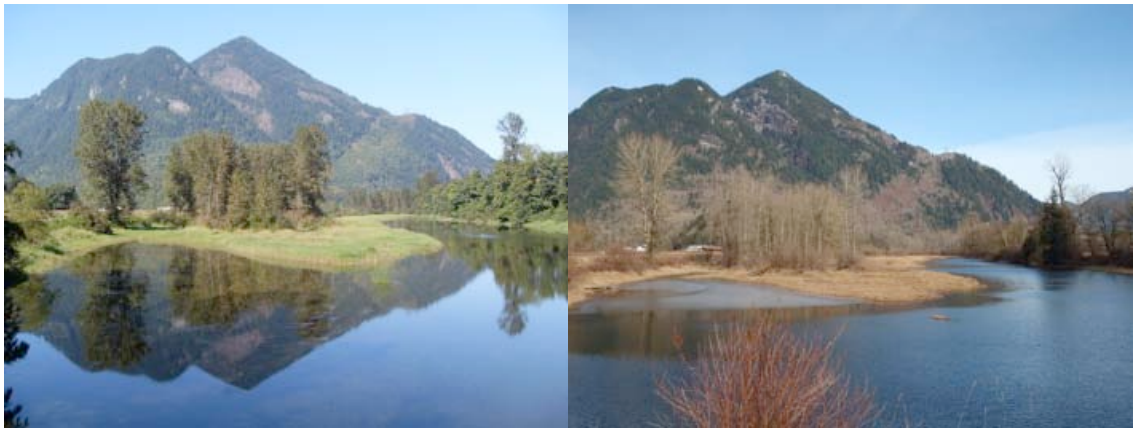

Figure 2. View north from Chaplin road crossing of Maria Slough towards proposed habitat expansion site in September 2008 and February 2009.

The project site is a gravel bar that was deposited prior to Maria Slough's severance from the Fraser, and has been stable for well over 100 years. Unless the slough is re-opened at the upstream end, the gravel bar will remain stable. Vegetation on the site is limited to reed canary grass (*Phalaris arundinacea*) on the low areas, with some hardhack (*Spirea douglasii*) and willow (*Salix* spp.) on higher mounds. Eastwards to the adjoining road are some cottonwood (*Populus balsamifera trichocarpa*) and red alder (*Alnus rubra*); no trees were removed or harmed by this restoration project. Existing topsoil was 15 cm of fine silt and clay. Four shallow extant ponds had been created by historic gravel extraction for local use by the area's inhabitants (Figure 3). These ponds provide significant breeding habitat for red-legged frogs and green frogs. Bullfrogs have not been found in Maria Slough.

Figure 3.Typical existing conditions on site in November 2008. Site is predominately reed canary grass. Photos C and D show an existing pond and an existing invert (dry in November 08) which will become the main channel through the wetland complex.

4 Construction

Gravel was removed from the gravel bar in order to create channels and pools to ensure connectedness between all wet areas during low water.

Construction occurred at low water in October from Oct 28 – 31, 2009, and was completed from October 22 – 26, 2010. In both years construction was delayed from earlier in the month due to heavy rainfall in early October and higher water levels. In both years, excavation occurred at design low-water levels.

One 200 Long Reach excavator was used to excavate pools and place woody debris. Site access was directly off Chaplin Road as shown in Figure 4. Vegetation on this bank was limited to Himalayan blackberry, and has been replanted with native vegetation. Access for motorized vehicles to the restoration site has been discouraged by the excavation of steep cliffs with large woody debris and thich riparian vegetation plantings across the access routes.

The channel, originating at Maria Slough and with a maximum depth of 40 cm at low water, leads through and alongside several pools for a distance of 350 m. The channel rejoins Maria Slough approximately 100 m north of the endpoint of the constructed wetland. The southernmost pools do not reconnect directly with the main body of the slough, in order to enhance the slow-moving warm water characteristics required for Oregon spotted frogs. The new wetland complex is all connected to Maria Slough at high water, but a series of low gravel berms hold various pond water levels perched above low water levels in the Slough.

Pools include shallow pockets on south-facing banks to provide breeding habitat in the spring. Large pool topology is shallow and undulating, with complex bathymetry and depths from 0 – 100 cm. Edge slopes around the pools provide diverse habitat at changing water levels. Four deep areas (approx. 1.4 m) were dug within the largest pools in order to provide overwintering habitat for the frogs. These deeper pools tap into the groundwater of Maria Slough, and will help to maintain dissolved oxygen in the pools during the summer months.

Topsoil recovered from the excavation site was returned to these deep areas to provide sediment and reduce the water depth of these deep areas. Sediment deposition over time will reduce overall depth, but the design depths are expected to prevent reed canary grass from colonizing the new ponds. Large wood (mostly stumps) was placed in the channel and ponds in order to break the current at locations that may have high flows, provide anchoring sites for substrate deposition, and to provide cover for amphibians and fish. Wood was anchored by burying logs into the gravel.

In addition, the habitat contains shallow, exposed breeding and nursery habitat, shallow connected pocket-pools, and disconnected ponds intended as ephemeral high-water habitats.

Figure 4. Overview map of wetland construction completed in October 2010.

5 Impact Mitigation

5.1 Timing of Work

The project was completed after the in-stream window, as water levels in this system recede through the fall and winter months. Works were undertaken in October 2009 and October 2010. All work was dry except for the opening of the constructed channel at its north end to Maria Slough and existing ponds, which were connected by lightly smearing existing structures with the excavator bucket to lower ground levels by 1-2 inches, thus allowing for connection without significant spillover between ponds.

5.2 Sediment control

All work was dry except for the opening of the constructed channel to existing watercourses. Snow fencing was erected to provide a visual barrier for excavators 15 m from spawning habitat. The construction site was very clean, as much of the substrate was gravel, and all sediment was kept within the project footprint; no spoil was placed as to allow runoff into the main stem of Maria Slough. Topsoil harvested from the construction site was spread over exposed gravel and in the excavated pools to encourage vegetal growth in naïve ponds.

5.3 Amphibian Impact Mitigation

Maria Slough provides habitat for several species of native and non-native amphibians. Oregon spotted frogs are known to exist directly adjacent to the habitat expansion site, and one adult has been seen in the southernmost pool of the gravel bar in 2007 (D. Knopp, personal communication). They were not found to be breeding in the pools during egg mass surveys in spring 2009.

Red-legged frogs are known to breed in the isolated pools and adjacent to Maria Slough. In order to minimize disturbance to existing habitat, pond expansions did not deepen or extract gravel from existing pools. In order to minimize impacts to existing emergent vegetation and riparian structure, no excavation took place in or at the edges of existing pools. Instead, poolside vegetation was flattened at short intervals and topsoil pressed downwards to create shallow connections between existing and excavated pools.

In 2009, silt fencing was erected around the construction site prior to systematic searches of the construction site for three days prior to construction. Existing pools were trapped for three nights prior to excavation, to a total of 90 trap nights. Ten northwestern salamanders, two red-legged frogs, and ten green frog tadpoles were caught in the traps and moved to habitat directly adjacent to the construction site. Four Pacific chorus frogs were found during the systematic

search of the construction site prior to construction. One red-legged frog was found at the construction site (jumping into new pools) during construction. All native frogs were removed from the construction site and placed in appropriate habitat directly adjacent to the construction site, separated by the silt fencing.

In 2010, the site was searched for amphibians prior to construction for 1 day, and silt fencing was erected around the construction site and surveyed daily to 'free' amphibians from the project site. Trapping was not conducted, as no extant pools were impacted during construction. No amphibians were found during systematic surveys or along the fenceline throughout the project.

5.4 Fish Impact Mitigation

Maria Slough is off-channel habitat for the Fraser River, providing habitat for many of the freshwater and anadromous species that use the Fraser River system. The sheltered areas around the bar and its surface during freshet provide excellent rearing habitat for a many of the salmonids, and non game fish. Existing pools on the gravel bar currently trap fish in the dry season and potentially create sinks by stranding fish. Three-spine stickleback have been observed on the gravel bar during high water in May 2009, and un-identified fish have been seen trapped in existing pools in November 2008.

The project is expected to improve fish habitat in Maria Slough by the provision of shallow rearing habitat for juvenile salmonids and small non-game fish. It will also reduce the likelihood of stranding fish in the existing pools by providing improved connectivity to the mainstem and improve summer oxygen levels in the ponds.

In 2009, trapping in the pre-existing pools trapped 157 three-spine stickleback, 25 red-side shiners and 7 northern pike minnows. All were moved to suitable habitat directly adjacent to the construction site. In 2010, trapping was not conducted, as no extant pools were impacted during construction.

6 Wetland Maturation

As excavations are taking place on a gravel bar, natural maturation would be a very slow process. Topsoil was harvested from excavated surfaces and added to pools in order to provide soft substrate for burrowing and to enhance the growth of instream vegetation. Native riparian plants were planted in March 2010 and November 2010 at disturbed sites with sufficient topsoil above expected the yearly high waters Table 1. In November 2010, native wetland seeds collected from nearby habitats were spread in two ponds in order to assess wetland maturation speed. Cattails and hardhack seeds, collected locally, have been spread over the disturbed ground. Locally collected emergent native vegetation

seed was spread over wetted areas in February 2011. Emergent native vegetation plugs were planted in April 2011, as the late spring prevented planting in March.

Table 1. Trees, shrubs and emergent vegetation planted in and around Chaplin Rd. constructed wetland in 2010 and 2011.

Trees and shrubs		**Feb-10**	**Nov-10**	**Apr-11**
Acer macrophyllum	Bigleaf maple	10	10	
Acer circinatum	Vine maple	10	30	
Alunus rubra	Red alder		5	
Betula paperifera	Paper birch		5	
Crataegus douglasii	Black Hawthorn	65	40	
Cornus sericera	Red-osier dogwood	90	60	
Lonicera involucrata	Black twinberry		10	
Malus fusca	Pacific crabapple	55	40	
Osmaronia cerasiformis	Indian plum		10	
Physocarpus capitatus	Pacific ninebark	0	50	
Ribes sanguineum	Red-flowering currant		25	
Rosa nutka	Nutka rose		25	
Rosa woodsii	Woods rose		25	
Rubus parviflorus	Thimbleberry	5	20	
Rubus spectabilis	Salmonberry	50	20	
Salix lusiandra	Pacific willow	50	50	
Salix Hookeriana	Hooker's Willow		50	
Salix scouleriana	Scoulers willow	0	50	
Sambucus racemosa	Red elderberry		25	
Spiraea douglasii	Hardhack	100	100	
Symphoricarpus albus	Snowberry	20	50	
Thuja plicata	Western red cedar	20	10	
Tsuga heterophylla	Western hemlock		5	
Wetland Emergents				
Carex kelloggii	Kellogg's sedge			100
Carex obnupta	Slough sedge			275
Carex stipata	Sawbeak sedge			275
Carex sitchensis	Sitka sedge			200
Carex mertensii	Mertin's sedge			100
Eleocharis palustris	Spike rush			500
Glyceria elata	Tall mannagrass			200
Juncus effusus	Common rush			500
Scirpus acutus	Hard-stem bullrush			120
Scirpus microcarpus	Small-flowering bullrush			150
Typha latifolia	Cattail			75
TOTAL		**475**	**715**	**2495**

7 Post-construction Monitoring and Introductions

Floral maturation and water levels have been monitored regularly since completion. Water level loggers and thermal loggers have been installed in the constructed wetlands, and will collect data continuously until 2015. These data will be compared with thermal and water level data from other Oregon spotted frog habitats to ensure that the habitat is functioning as expected.

On April 20, 2011, captive-bred Oregon spotted frog tadpoles and metamorphs were introduced to the constructed wetland. In addition to Recovery Team members, graduate students, local volunteers and youth participated in the release of the frogs (Figure 5).

Figure 5. Philip, Alex and Mark Schwichtenberg releasing metamorphs with Darren Smy from the Vancouver Aquarium. Photo - Amanda Kissel.

8 Participants

This project was completed by Balance Ecological and Pearson Ecological on behalf of the Ministry of Environment, Oregon spotted frog Recovery Team, South Coast Conservation Program, B.C. Conservation Foundation and Fraser Valley Conservancy. Funds were provided by the Government of Canada Habitat Stewardship Program for Species-at-Risk. In-kind contributions were provided by Holberg Farms (accommodations for biologists, volunteers and operators), Pearson Ecological (equipment and fencing), Jill Miners (site preparation volunteer), the Grieshaber-Otto and Schwichtenberg families (volunteers), Fraser-Harrison smartgrowth (volunteers) and Fraser Valley Watersheds Coalition (planting organization and volunteers).