

Final Report
Restoring Wildlife Habitat: Salmon River Conservation Area
(FWCP Project # COA-F17-W-1221)



Prepared for: Fish and Wildlife Compensation Program

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Executive Summary

The Salmon River estuary is a significant area of coastal wetland habitat located on a relatively steep and rugged 250km stretch of coastline from Campbell River to the network of estuaries on the Quatsino lowlands of Vancouver Island. This strategic location has made the Salmon River an important stopping point for migrating waterfowl, shorebirds, and passerines and provides significant habitat to several fish and mammal species. Since 1978, in recognition of these exceptional fish and wildlife values, The Nature Trust of British Columbia (TNTBC) and its partners in the Pacific Estuary Conservation Program have been actively securing habitat in the Salmon River Estuary. In 2015, with support from FWCP and others, TNTBC purchased 165 acres near the lower Salmon River as an addition to the Salmon River Estuary Conservation Area. This complements 257 acres secured since 1978. The new property contains a diverse mix of habitats including riparian, wetland, and forest. However, some areas on this new conservation property have been previously impacted by logging and other anthropogenic activities.

The goal of this 1- year project was to restore wetland, riparian and upland habitats at the newly acquired conservation land, and to inventory species at risk. This project was coordinated by the Vancouver Island Conservation Land Management Program (VICLMP) which is an innovative strategic partnership program involving the management of over 100 conservation areas --mostly coastal wetlands and estuaries-- on Vancouver Island, and central and north coasts.

With FWCP support, we achieved the following outcomes from April 2016 to March 2017:

- Completed 3 point count surveys for songbirds in April, May and June 2016
- Completed 3 nocturnal owl surveys in April, May and October 2016
- Collected water quality and trapping data for 2 wetland ponds
- Restored 30,000m² (3 ha) of upland habitat by removing invasive Scotch broom and replanting 700 native trees and shrubs with high wildlife value
- Enhanced 2763.5 m² riparian habitat along the Salmon River by planting 80 native trees
- Improved 55m of linear wetland habitat by planting 28 native wetland plants, removing old debris, regrading steep shorelines, and installing woody structures
- Created new nesting habitat for Western Screech Owls by installing 4 nest boxes

Results from this work improved habitat for breeding, migrating, and overwintering birds, amphibians, mammals and salmon. As identified in the Campbell River Species of Interest Action Plan (October 2011), the following 9 species of conservation concern were recorded (observed, heard, or sign) on the property during our field work: Roosevelt elk, Northern Goshawk, Great Blue Heron, Sooty Grouse, Northern Pygmy-Owl, Western Screech-Owl, Barn Swallow, Band-tailed Pigeon, and Northwestern salamander (egg masses). Several priority species benefited directly from this habitat enhancement project, including Roosevelt elk, Western Screech-Owl, Northern red-legged frog, Western toad, as well as cutthroat, coho and other salmonids.

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1.0 Introduction

The Salmon River estuary is the only significant area of coastal wetland habitat located on a relatively steep and rugged 250km stretch of coastline from Campbell River to the network of estuaries on the Quatsino lowlands of Vancouver Island. This strategic location has made the Salmon River a critical stopping point for migrating waterfowl, shorebirds, and passerines and provides critical habitat to several fish and mammal species. Since 1978, in recognition of these exceptional fish and wildlife values, The Nature Trust of British Columbia (TNTBC) and its partners in the Pacific Estuary Conservation Program have been actively securing habitat in the Salmon River Estuary. In 2015, with support from FWCP and others, TNTBC purchased 165 acres (66.8 ha) near the lower Salmon River as an addition to the Salmon River Estuary Conservation Area. This complements 257 acres secured since 1978. The new property contains a diverse mix of habitats including riparian, wetland, and forest. However, some areas on this new conservation property have been previously impacted from logging and other anthropogenic activities.

The aim of this project was to restore wetland, riparian and upland habitats at this newly acquired conservation land. In addition, our project was designed to address information gaps by collecting inventory data for species at risk or of conservation concern in this area. By restoring riparian and wetland habitat, we addressed the goals in the Campbell Riparian Wetlands Action Plan, as well as several actions identified for priority species in the Campbell Species Action Plan.

This project was coordinated by the Vancouver Island Conservation Land Management Program (VICLMP) which is an innovative strategic partnership program involving the management of over 100 conservation areas --mostly coastal wetlands and estuaries-- on Vancouver Island, and central and north coasts.

2.0 Goals and Objectives

The overall goal of our project was to restore riparian, wetland and upland habitats, and inventory priority species at risk.

The specific objectives of this 1-year project included:

- 1) enhancing 2 artificial ponds for Red-legged frog and other freshwater fish and amphibians
- 2) restoring the riparian zone along the Salmon River
- 3) removing invasive plants and replanting cleared areas with a diverse mix of native trees and shrubs
- 4) implementing a standardized protocol to collect inventory data for owls and songbirds
- 5) enhancing breeding habitat for Western Screech-Owls by installing suitable nest boxes

3.0 Study Area

The Salmon River Conservation Area is located 60km north of the community of Campbell River within the municipal boundaries of the Village of Sayward and the Regional District of Comox Strathcona. The

area is located within the very wet maritime Coastal Western Hemlock biogeoclimatic zone (CWHvm) and overlaps the Georgia Depression and Coast Mountain Eco-Provinces.

This project focused on the new conservation property acquired in 2015. The new property is located on the west bank of the lower Salmon River, north of Sayward Road (UTM Zone 10U: 292321E, 5582938N). The property is 66.8 ha in size (165 acres). Currently there is no public access and the access road is secured with a locked gate. The property contains a diverse mix of habitats including riparian, wetland, and forest. At the time of acquisition, the property showed signs of previous impacts from logging, land clearing and other anthropogenic activities.

4.0 Methods

4.1 Nocturnal Owl Surveys

Nocturnal owl surveys were conducted on April 27, May 19, and October 11, 2016. Call play-back surveys were targeted in suitable habitat, such as older growth trees in riparian or wetland areas. Surveys began 30 minutes after sunset or when the sky became dark. Six stations were surveyed in April, 4 stations in May and 1 station in October (Figure 1). At each station, the survey was initiated by 2-minutes of passive listening, followed by a series of recorded Western Screech Owl calls. The call was played through an amplifier for 15-20 seconds, in each of 4 cardinal directions (N, S, E, W). After each call, we listened for 1 minute. After all 4 calls were played, we listened for an additional 2 minutes.

When an owl was detected, the playback was stopped and the time recorded. If a Western Screech Owl or Barred Owl was detected, the broadcast was stopped immediately to listen for the remainder of the survey period.

Table 1. Locations of Owl Survey Stops (UTM Zone 10U)

Stop	Northing	Easting	Dates
1	5583133	292127	April 27, May 19, October 11
2	5583214	292190	April 27
3	5583324	292171	April 27, May 19
4	5583479	292150	April 27
5	5583630	292023	April 27, May 19
6	5583232	292289	April 27, May 19

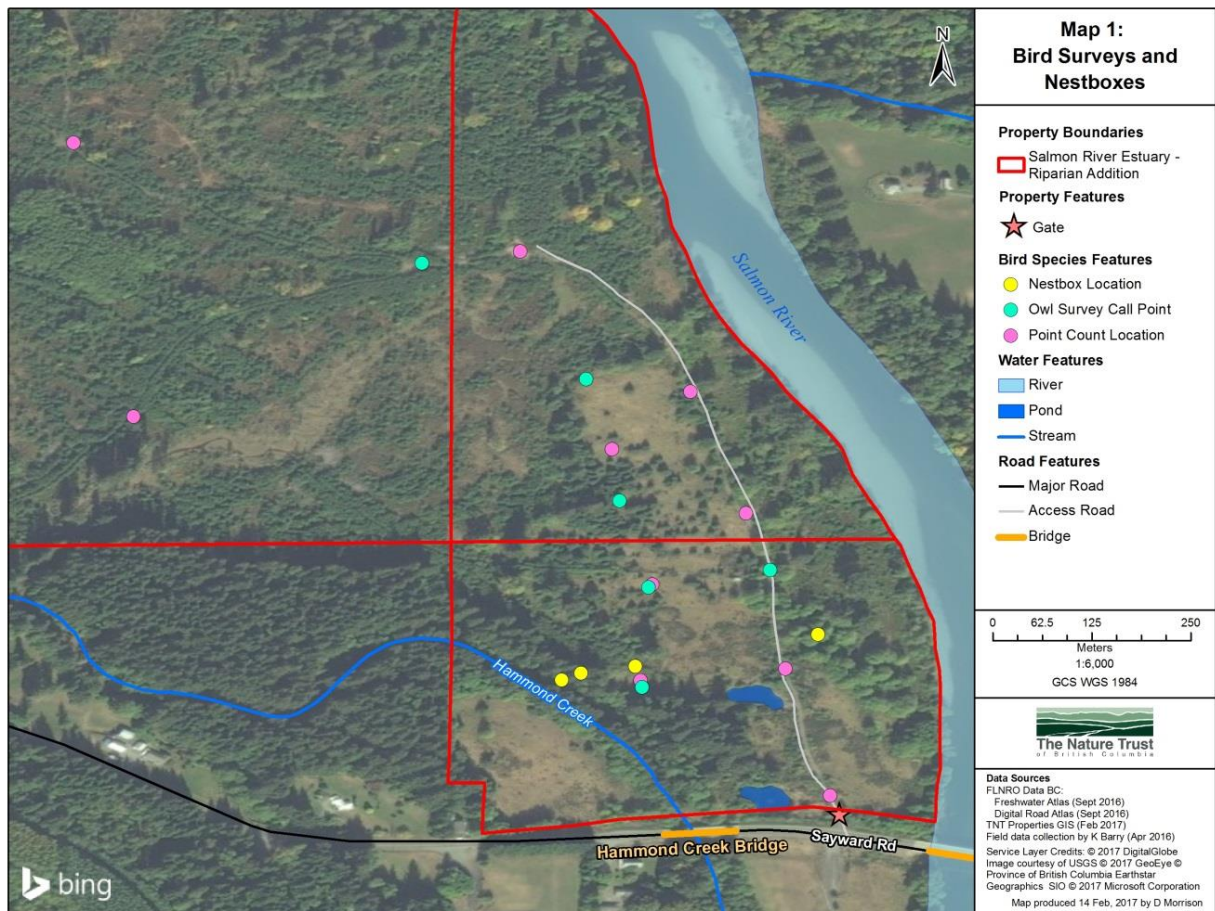


Figure 1. Locations of owl survey stops, point count surveys for songbirds, and Western Screech Owl nest boxes

4.2 Songbird Surveys

Point count surveys were conducted during the early morning hours of April 28, May 20, and June 15, 2016. Methods generally followed those used in the North American Breeding Bird Survey. Surveys began within 30 minutes after sunrise and were done in good weather conditions (good visibility, no precipitation, light winds). Ten stations were located throughout the property in various habitat types, spaced at least 200m apart (Figure 1). At each station, all birds seen and heard were identified and counted in a timed 3 minute period within an unlimited radius (i.e., as far as the eye could see and the ear could hear). No playback or other method was used to attract birds. Birds seen between stops or before/after the three minutes were recorded as incidental observations. Signs of breeding evidence were also recorded (e.g. carrying nest material or food for young).

Table 2. Locations of Point Count Stops (UTM Zone 10U)

Stop	Northing	Easting
1	5582946.66 m N	292326.76 m E
2	5583107.93 m N	292297.06 m E
3	5583305.28 m N	292272.83 m E
4	5583460.66 m N	292234.29 m E
5	5583642.71 m N	292103.72 m E
6	5583793.74 m N	291748.63 m E
7	5583446.45 m N	291783.23 m E
8	5583390.12 m N	292168.06 m E
9	5583218.66 m N	292193.58 m E
10	5583097.85 m N	292179.51 m E

4.3 Screech Owl Nest boxes

Screech Owl boxes were made of cedar wood following recommended specifications. Dimensions of the boxes were 12 inches high, by 12 inches wide, with the bottom being 8.25 inches square. The hole was 3 inches in diameter and positioned 9 inches from the bottom and 3 inches from the top of the box.

Four boxes were installed on November 8, 2016. Each box was mounted to a tree using screws. A small amount of wood chips (aspen) was placed in the bottom of each box. Figure 1 shows the locations of the boxes.

4.4 Amphibian and Water Quality Sampling

Two amphibian traps were deployed in each pond at 1800 hours on May 19, 2016. Traps were baited with dry cat food and retrieved on May 20 at 1000. Each trap was tied off on shore to ensure that the trap would not be fully submerged overnight. Captured organisms were identified, counted and released immediately back into the pond, unharmed. No mortalities were observed.

Water quality was measured in both ponds during April and May 2016 using a handheld water quality meter (Consort Multimeter Model 5020). Measurements were obtained from shore in surface water, approximately 20 cm deep, for the following parameters: Conductivity ($\mu\text{s}/\text{cm}$), Temperature ($^{\circ}\text{C}$), and Dissolved Oxygen (ppm).

4.5 Invasive Species Removal and Replanting

Based on visual surveys of the riparian habitat, three restoration areas were identified that lacked trees and were instead dominated by shrubs (Salmonberry). To enhance the riparian zone, improve bank stability, and increase future recruitment of woody debris, we planted 80 native trees (1 gallon size) on June 14-15, 2016. Plants were purchased from Streamside Native Plants in Bowser. Each tree was flagged individually to allow for future monitoring. Planting areas were first cleared with a brush cutter to thin out existing reed canary grass. Bone meal was added to each planting hole. A deer repellent (Plantskyddd) was sprayed on the newly planted trees to reduce browsing by deer and elk.

From September 12-16, 2016 a machine was contracted to remove invasive Scotch Broom from several large open areas. On October 11-13, 2016, the cleared areas were replanted with 700 native species purchased from Streamside Native Plants (1 gallon size). Each plant was flagged individually and bonemeal was added to the planting holes. The plants were pre-treated with Plantskydd repellent before planting.

4.6 Wetland Pond Enhancement

Using a machine, a large pile of yard waste and old debris were removed from the shoreline of Pond 2. The steep banks in Pond 2 were re-contoured to be more gradual and easier to access for fish and wildlife and to allow for growth of wetland plants. Existing shoreline trees and shrubs were left intact as much as possible. To increase habitat complexity for fish and amphibians, 8 woody debris structures were added to Pond 2. To enhance wetland vegetation, 28 native wetland plants were installed by hand along the shoreline in both ponds.

In Pond 1, the shorelines were not re-graded in order to limit disturbance to a possible nest site for Northern Rough-winged Swallow. No woody debris structures were added to Pond 1 as machine access was not possible without disturbing the nest site.

5.0 Results and Outcomes

Results from this restoration project improved habitat for breeding, migrating, and overwintering birds, as well as amphibians, mammals and salmon. Several significant positive outcomes were achieved to improve fish and wildlife habitat, namely: 1) increased quality and quantity of riparian and wetland habitat to offset impacts from hydroelectric activities in the Campbell watershed, and 2) acquisition of information to fulfill data gaps to inform FWCP restoration objectives.

In summary, we achieved the following outcomes from April 2016 to March 2017. Further details can be found in subsequent sections.

- Completed 3 point count surveys for songbirds in April, May and June 2016
- Completed 3 nocturnal owl surveys in April, May and October 2016
- Collected water quality and trapping data for 2 wetland ponds
- Restored 30,000m² (3 ha) of upland habitat by removing invasive Scotch broom and replanting 700 native trees and shrubs with high wildlife value
- Enhanced 2763.5 m² riparian habitat along the Salmon River by planting 80 native trees
- Improved 55m of linear wetland habitat by planting 28 native wetland plants, removing old debris, regrading steep shorelines, and installing woody structures
- Created new nesting habitat for Western Screech Owls by installing 4 nest boxes

5.1 Nocturnal Owl Surveys

Three (3) nocturnal owl surveys were completed in April, May and October. In addition, all other incidental observations of any owls were recorded outside of these survey times. Three owl species

were observed on or near this conservation property by sight or sound: Barred Owl, Western Screech Owl, and Northern Pygmy Owl.

Barred Owls were detected on several occasions, most often by sound but one individual Barred Owl was observed during an owl survey on April 27, 2016 at 2210 hours. Only one Western Screech Owl was detected during our project. On May 19, 2016 at 2200 hours, several surveyors heard a faint but distinctive Western Screech Owl call twice during an owl survey. A Northern Pygmy Owl was observed incidentally on October 12, 2016 during the daytime. It called for several minutes and it was clearly sighted by several of our crew during replanting work.

Table 3. Results of Nocturnal Owl Surveys

Species	Date	Approximate Time	Notes
Barred Owl	April 27, 2016	2220	Flew in
Barred Owl	May 19, 2016	2305	Distant call
Western Screech Owl	May 19, 2016	2155	Faint call heard twice

5.2 Songbird Surveys

Three (3) point count surveys for breeding birds were completed during April, May and June 2016. In total, 66 bird species were observed, and 62 species were actively using the habitat for foraging, nesting, migration, or cover. Bird banding in partnership with Vancouver Island University in April-May 2016 confirmed 15 species of passerine birds breed on the property. Other observed priority bird species seen on or heard near the property included Great Blue Heron, Sooty Grouse, Northern Goshawk, Northern Pygmy-Owl, Barn Swallow, and Band-tailed Pigeon.

Table 4. Results of Point Count Bird Surveys - April 28, 2016 (Start time: 0630, End time: 0905)

Stop #	Species	Count
1	Purple Finch	1
1	Ruby-crowned Kinglet	1
1	Brown Cowbird	1
1	Red Crossbill	14
1	American Robin	3
1	Sooty Grouse	1
1	Canada Goose	1
1	Orange-crowned Warbler	1
2	Orange-crowned Warbler	2
2	Purple Finch	1
2	Ruby crowned Kinglet	1
2	Red Crossbill	5
2	American Robin	2
2	Song Sparrow	1
2	Eurasian Collared Dove	1
2	Canada Goose	2

2	Red-breasted Sapsucker	1
2	Northern Flicker	1
3	American Robin	1
3	Chestnut-backed Chickadee	1
3	Orange-crowned Warbler	1
3	Rufus Hummingbird	1
3	Song Sparrow	1
3	Varied Thrush	2
3	Red Crossbill	5
3	Black-throated Gray Warbler	1
4	Varied Thrush	1
4	Black-throated Gray Warbler	1
4	Song Sparrow	1
4	Lincoln's Sparrow	1
4	American Robin	3
4	Orange-crowned Warbler	1
5	Bald Eagle	1
5	Orange-crowned Warbler	1
5	Rufus Hummingbird	1
5	Varied Thrush	2
5	Red Crossbill	1
5	American Robin	3
5	Song Sparrow	1
5	Northern Flicker	1
5	Ruffed Grouse	1
6	Northern Flicker	2
6	Pacific Wren	2
6	Bald Eagle	1
6	Ruffed Grouse	1
6	MacGillivray's Warbler	1
6	American Robin	1
6	Varied Thrush	1
7	Song Sparrow	2
7	MacGillivray's Warbler	1
7	Pileated Woodpecker	1
7	Orange-crowned Warbler	1
7	American Robin	4
7	Common Raven	1
7	Ruffed Grouse	1
8	Ruby crowned Kinglet	1
8	Common Raven	2
8	Rufus Hummingbird	1
8	Spotted Towhee	1
8	Orange-crowned Warbler	1
8	Golden-crowned Kinglet	1
8	American Goldfinch	1

8	Black-throated Gray Warbler	1
8	American Robin	3
8	Purple Finch	1
9	Black-throated Gray Warbler	2
9	American Robin	3
9	Song Sparrow	2
9	Orange-crowned Warbler	2
9	Spotted Towhee	1
9	Belted Kingfisher	1
9	Ruby crowned Kinglet	1
9	Yellow Warblers	1
9	Purple Finch	2
9	Red-winged Blackbird	2
10	Ruby crowned Kinglet	1
10	Black-throated Gray Warbler	1
10	Pacific Wren	1
10	American Robin	2
10	Orange-crowned Warbler	1
10	Yellow-rumped Warbler	1
10	Song Sparrow	1
10	Purple Finch	1

Table 5. Results of Point Count Bird Surveys - May 20, 2016 (Start time: 0645, End time: 0845)

Stop #	Species	Count
1	Ruby crowned Kinglet	2
1	Warbling Vireo	1
1	Purple Finch	1
1	European Starling	1
1	American Robin	3
1	Yellow-rumped Warbler	1
1	Swainson's Thrush	1
1	Belted Kingfisher	1
1	Golden-crowned Kinglet	1
1	Canada Goose	2
1	Mallard	1
2	American Robin	3
2	Yellow-rumped Warbler	2
2	Hammond's Flycatcher	1
2	Warbling Vireo	2
2	Song Sparrow	1
2	Eurasian Collared Dove	2
2	Belted Kingfisher	1
2	MacGillivray's Warbler	1

3	American Robin	3
3	Warbling Vireo	1
3	Cedar Waxwing	3
3	MacGillivray's Warbler	3
3	Black-throated Gray Warbler	1
3	Mallard	1
3	Golden-crowned Kinglet	1
4	Ruby-crowned Kinglet	1
4	Warbling Vireo	1
4	Swainson's Thrush	1
4	Song Sparrow	1
4	American Robin	3
4	Golden-crowned Kinglet	1
4	Yellow Warbler	1
4	Rufus Hummingbird	1
5	American Robin	7
5	Yellow Warbler	2
5	Spotted Towhee	1
5	Common Raven	1
5	Northern Flicker	1
5	MacGillivray's Warbler	1
5	Ruffed Grouse	1
6	Swainson's Thrush	2
6	American Robin	2
6	Ruffed Grouse	1
6	Pacific Wren	2
6	Warbling Vireo	2
6	Wilson's Warbler	1
6	Yellow Warbler	1
7	American Robin	4
7	Ruffed Grouse	1
7	Swainson's Thrush	1
7	Spotted Towhee	2
7	Orange-crowned Warbler	1
7	Warbling Vireo	1
8	American Robin	2
8	Cedar Waxwing	1
8	Swainson's Thrush	2
8	Yellow-rumped Warbler	1
8	Spotted Towhee	1
8	Orange-crowned Warbler	1
8	Song Sparrow	1
8	Warbling Vireo	1
9	American Robin	4
9	Orange-crowned Warbler	1
9	Yellow Warbler	1

9	Ruby-crowned Kinglet	1
9	Spotted Towhee	2
9	Cedar Waxwing	2
9	Pacific-sloped Flycatcher	1
10	Pacific-sloped Flycatcher	1
10	American Robin	3
10	Golden-crowned Kinglet	2
10	Yellow Warbler	2
10	Black-throated Gray Warbler	1
10	Ruby-crowned Kinglet	1

Table 6. Results of Point Count Bird Surveys – June 15, 2016 (Start time: 0800, End time: 0925)

Stop #	Species	Count
1	American Goldfinch	1
1	Purple Finch	1
1	Swainson's Thrush	1
1	American Robin	6
1	MacGillivray's Warbler	1
1	Orange-crowned Warbler	2
1	Black-throated Gray Warbler	1
1	European Starling	1
1	Pacific-sloped Flycatcher	1
2	American Robin	4
2	Swainson's Thrush	1
2	Cedar Waxwing	1
2	American Goldfinch	1
2	Song Sparrow	1
2	Yellow Warbler	2
2	Warbling Vireo	1
3	Swainson's Thrush	1
3	Ruby-crowned Kinglet	1
3	Hammond Fycatcher	2
3	American Robin	4
3	Rufus Hummingbird	2
3	Warbling Vireo	3
3	Yellow Warbler	1
4	Orange-crowned Warbler	1
4	Warbling Vireo	1
4	American Goldfinch	1
4	American Robin	2
4	Swainson's Thrush	2
4	Cedar Waxwing	1
5	Warbling Vireo	1

5	Orange-crowned Warbler	1
5	Swainson's Thrush	1
5	Turkey Vulture	1
5	American Robin	1
5	Spotted Towhee	1
5	Band-tailed Pigeon	2
6	Yellow Warbler	2
6	Warbling Vireo	2
6	Black-headed Grosbeak	2
6	American Robin	3
6	Swainson's Thrush	1
7	Orange-crowned Warbler	2
7	Pacific Wren	1
7	Song Sparrow	1
7	Black-headed Grosbeak	1
7	Warbling Vireo	1
7	Swainson's Thrush	1
7	American Robin	1
7	American Goldfinch	1
8	American Robin	2
8	Orange-crowned Warbler	2
8	Yellow Warbler	1
8	Song Sparrow	1
8	Band-tailed Pigeon	2
8	Cedar Waxwing	3
8	Swainson's Thrush	1
9	Swainson's Thrush	2
9	Cedar Waxwing	8
9	Black-headed Grosbeak	1
9	Brown Cowbird	2
9	Orange-crowned Warbler	1
9	Warbling Vireo	1
9	American Robin	1
9	Purple Finch	1
10	Cedar Waxwing	2
10	Swainson's Thrush	2
10	Black-throated Gray Warbler	2
10	American Robin	2
10	American Goldfinch	2
10	Yellow Warbler	1
10	Purple Finch	1
10	Yellow-rumped Warbler	1

5.3 Screech Owl Nest Boxes

Four nest boxes were installed in the conservation property on November 8, 2016. Details of nest box installations are provided in Table 7.

Table 7. Owl Box Installations

Box Number	Location UTM (10U)	Box Height from ground	Tree Species/Height	Aspect	Habitat type
SR-1	292132E, 5583109N	2m	Sitka Spruce, >40m	East	Large trees, dense shade
SR-2	292116E, 5583101N	2m	Sitka Spruce, >40m	East	Large trees, dense shade
SR-3	292176E, 5583116N	2m	Bigleaf Maple, > 40m	Southeast	Large tree, facing open area
SR-4	292325E, 5583150N	2m	Red Alder, 25m	West	Medium tree, light shade

5.4 Amphibian and Water Quality Sampling

Water quality in Pond 2 was suitable for fish and amphibians. Several amphibian egg masses were observed in Pond 2 during early spring, most likely Northwestern Salamander. Water quality in Pond 1 had higher than expected conductivity, possibly due to some brackish water influence. Therefore water quality in Pond 1 may be less suitable for fish and amphibians.

No amphibians were caught in traps deployed in either Pond 1 or Pond 2 during May 2016. However it's possible the breeding season occurred earlier. No amphibians, adults or tadpoles, were observed in the ponds in April, May or June. Pacific tree frogs (Chorus frog) were heard in May (breeding calls) and again in October (croak calls).

Additional amphibian surveys and sampling are recommended in future years to confirm the identification of the amphibian egg masses observed in Pond 2 in March 2016.

Table 8. Water Quality Measurements in Ponds

	Conductivity ($\mu\text{s}/\text{cm}$)	Temperature ($^{\circ}\text{C}$)	Dissolved Oxygen (ppm)
Pond 1			
April 28	1440	15.8	13.4
May 20	2300	16.5	1.37
Pond 2			
April 28	287	14.9	13.3-14.5
May 20	496	17.1	1.4

Table 9. Capture Results from Traps, May 20, 2016

Trap #	Pond 1	Pond 2
1	2 water scorpion 2 whirlygig beetles	1 water scorpion 4 stickleback 2 giant water bugs (egg case on trap)
2	1 small water scorpion 2 whirlygig beetles 1 damselfly nymph 1 dragonfly nymph	1 water scorpion 2 giant water bugs

5.5 Invasive Species Removal and Replanting

The riparian zone adjacent to the Salmon River was enhanced by planting 80 native trees (Figure 2). In total, we planted 20 Sitka spruce, 10 Hooker's willow, 10 Western hemlock, 10 Western red cedar, 10 Bigleaf maple, and 20 Red alder in the riparian zone. Monitoring throughout the summer months indicated that plants had good survival, although some maples showed signs of drought stress. Some browsing was evident on some trees.

Approximately 3 ha of upland habitat was restored by removing invasive Scotch Broom (Figure 2). Cleared areas were replanted with 700 native trees and shrubs having high wildlife value for food, nesting and cover. The following species were planted: 200 Sitka spruce, 100 Western hemlock, 50 Red cedar, 50 Scouler's willow, 50 Red elderberry, 50 Pacific crabapple, 50 Salmonberry, 50 Thimbleberry, 50 Nootka rose, 50 Twinberry.

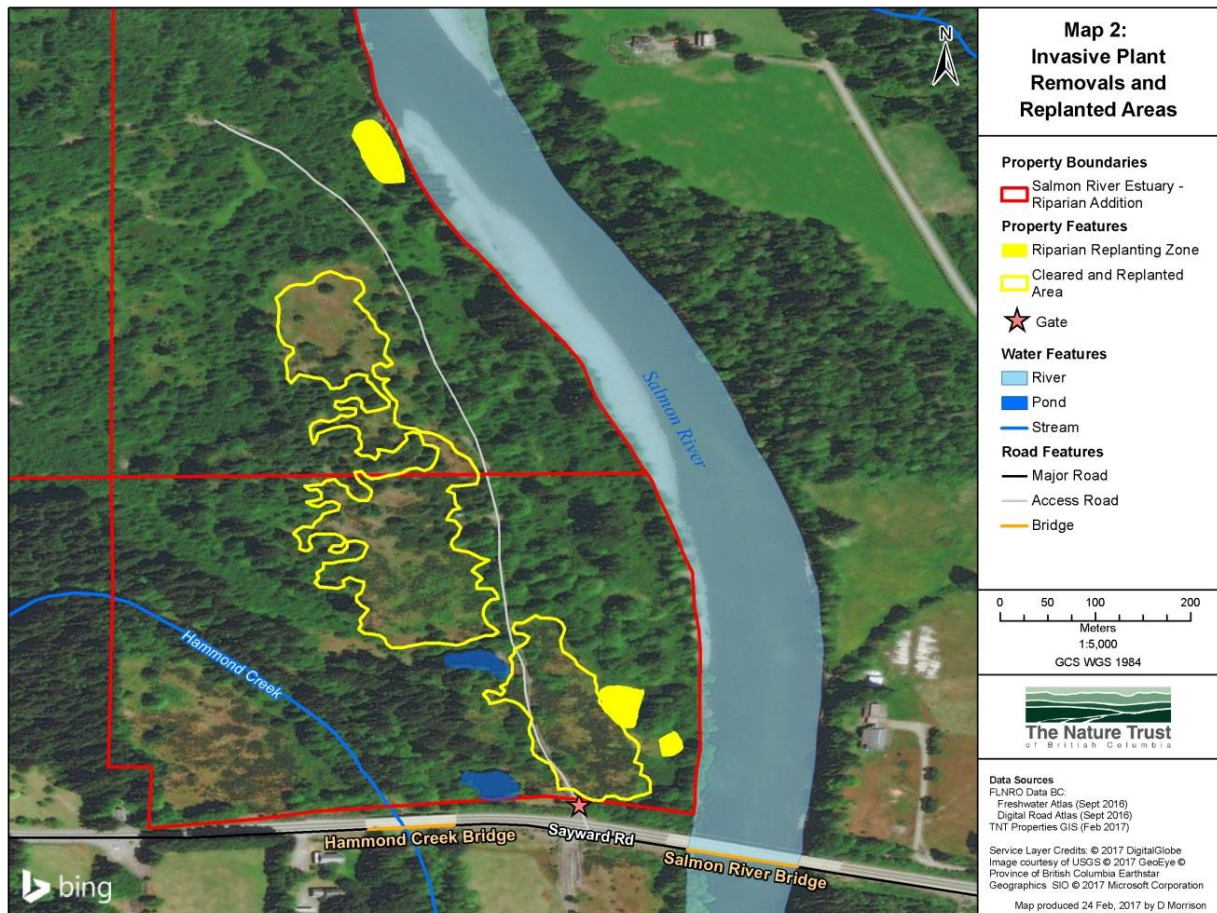


Figure 2. Locations of riparian plantings, invasive plant removals and replanted upland areas

5.6 Wetland Pond Enhancement

Water quality in Pond 1 had higher than expected conductivity; therefore we focused our restoration efforts on Pond 2 where water quality was more suitable for amphibians. In May, a pair of Northern Rough-winged Swallows was observed to actively investigate a hole in an exposed sandy bank at Pond 1. We decided not to re-grade this shoreline in order to maintain the potential nest site intact.

In Pond 2, approximately 55m of linear shoreline was re-contoured. In addition, 8 woody debris structures were installed to increase habitat complexity (Figure 3).

To enhance wetland vegetation and increase substrate available for amphibians to deposit eggs, we planted 28 native wetland plants. In total, 10 plants were added to the shoreline in Pond 1 and 18 plants were added to Pond 2. Species planted included Cattail, Slough sedge, Small-flowered bulrush, Dagger-leaved rush, and Buckbean.

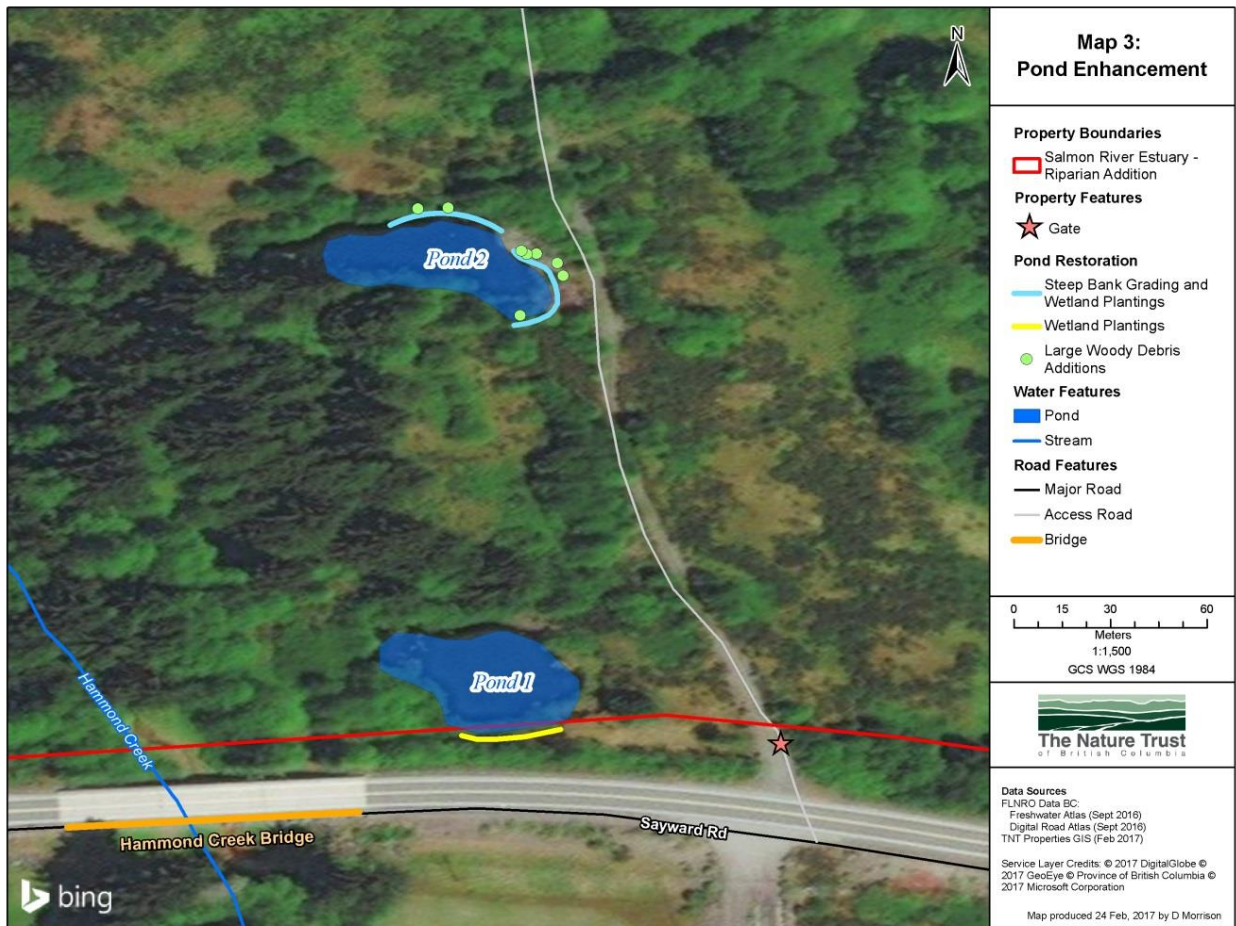


Figure 3. Locations of wetland pond enhancement in Pond 1 and Pond 2

5.7 Other Wildlife Observations

During all site visits, incidental observations of other wildlife were documented (Table 10). Numerous signs of Black Bear were seen in April and May as they fed on abundant salmonberries on the property. Signs of Roosevelt Elk (scat and rubbed trees) and Black-tailed Deer (scat) were observed during both summer and fall. Several unidentified bats were seen flying in the evenings during April and May.

Table 10. Incidental Wildlife Observations, April- November 2016

Species	Number Observed	Details	Date
Stickleback	2	Caught in Pond 2	May
Northwestern Salamander*	n/a	Egg masses in Pond 2, need to confirm	March-April
Pacific Chorus Frog (Tree Frog)	2-3	Heard only	May (breeding), October (croaking)
Sooty Grouse*	7	Heard booming call, location difficult to determine, possibly from distant hills	April-May
Northern Goshawk*	1	Seen flying high overhead	October
Great Blue Heron*	5	Seen flying	Sept-October
Northern Pygmy Owl*	1	Seen & heard, calling repeatedly	October
Bald Eagle*	11	Seen & heard	April, Sept-October
Barn Swallow*	2	Seen & heard	May-June
Western Screech Owl*	1	Heard faint call, location/distance difficult to determine	May
Band-tailed Pigeon*	4	Seen	June
Roosevelt Elk*	n/a	Scat and rubbed trees	June, October-November
Black-tailed Deer	n/a	Scat	June-October
Black Bear	n/a	Numerous scat	April-May
Bat (unidentified)	2	Seen flying during evening hours	April-May

*Species of conservation concern (Campbell River Species of Interest Action Plan, October 2011).

6.0 Recommendations

Following the success of this restoration project, the following actions are recommended. Since the property is under the management of the Vancouver Island Conservation Land Management program, ongoing maintenance and effectiveness monitoring will be conducted as part of the annual staff work plan.

Specific recommendations:

- Conduct at least an annual site visit with seasonal field crews.
- Monitor survival of planted material and replace dead plants as much as possible.
- Conduct follow-up amphibian surveys in the 2 ponds.
- Monitor and remove small broom shoots and other invasive plants that may begin to sprout in the cleared areas.
- Check Screech Owl nest boxes annually and clean out after the breeding season, in the late summer or early fall. Repair nest boxes as needed.

- Monitor bank revegetation at the ponds and determine if other bioengineering methods may be needed.
- Conduct follow-up Screech Owl surveys.

7.0 Acknowledgments

We gratefully acknowledge the financial support of the Fish and Wildlife Compensation Program for its contribution to this project. We thank Dr. Eric Demers from Vancouver Island University for conducting bird banding work in collaboration with us.

8.0 References

Fish and Wildlife Compensation Program, 2011. Campbell River Watershed Species of Interest Action Plan: Final Report. October 2011. 26pp.