Cowichan Shoreline Stewardship Project: 2016 Annual Report

Cowichan Lake & River Stewardship Society

Prepared For

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Submitted to

British Columbia Conservation Foundation

November 2017

Abstract

Starting in 2014, the Cowichan Lake and River Stewardship Society (CLRSS) succeeded in acquiring sufficient funding from multiple sources, to implement the Cowichan Shoreline Stewardship Project (CSSP) for a three-year term pilot project (Phase 1: 2014, 2015, 2016).

Shoreline landowner education is an important element of the project and was continued, including the creation of three new brochures and a native riparian plant husbandry manual. The brochures were made available to landowners and the general public and the manual was created specifically for all riparian restoration project site owners. The *Riparian Area* opinion survey to determine any changes and trends in landowner shoreline protection preferences was also continued in 2016.

In the Spring of 2016, a total of 8 foreshore properties were approved as riparian restoration sites. This bought the total restoration sites to 24 over the three years of Phase 1. The total shoreline restoration from the three years of Phase 1 amounted to 847 linear metres, which was slightly less than the original proposed objective of 1,000 linear metres.

The project's community engagement processes were broadened by creating riparian outdoor education classes for students at Lake Cowichan School and Cowichan Lake Education Centre.

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Acknowledgments

Cowichan Lake and River Stewardship Society (CLRSS) wish to thank the following 2016 funders: Recreational Fisheries Conservation Partnership Program (Fisheries and Oceans Canada), Habitat Conservation Trust Foundation, Pacific Salmon Foundation, Sidney Anglers, Youbou Nature and Habitat Fund (Cowichan Valley Regional District), and Island Savings Community Endowment.

The CLRSS also wishes to acknowledge the contribution of the following organizations for their assistance and advice in contributing to the success of the Cowichan Shoreline Stewardship Project (CSSP): Cowichan Valley Naturalists, Cowichan Community Land Trust, Lake Cowichan Secondary School, BC Conservation Foundation and Mr. Dave Polster of Polster Environmental Services Ltd.

Finally, the CLRSS Manager wishes to thank the Cowichan Lake landowners who participated and/or approved the riparian restoration activities on their properties. Thanks are also extended to the Lake Cowichan First Nation for their cooperation in efforts to restore the lake's shoreline.

Dr. Charles (Chuck) Chestnut (retired Instructor, Malaspina University-College), and Craig Wightman of BCCF, provided editing and report preparation assistance.

Special Dedication (*in memoriam*)

The 2016 CSSP report is dedicated to the memory of Gerald Thom, whose respect for nature and environmental stewardship will endure on Cowichan Lake for years to come. Gerald's energy and positive spirit will always be greatly missed!

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1.0 Introduction

Cowichan Lake is the headwater source of the Cowichan watershed, which includes over two dozen tributary streams, and the Cowichan River (47km in length) which is one of three rivers in BC designated a Canadian Heritage River (Epps 2011). Cowichan Lake has a mean depth of 50m (152m max. depth) and a surface area of 62 km^2, and supplies drinking water to municipal users (Town of Lake Cowichan and Community of Crofton). The Town of Lake Cowichan's economy depends on the lake's diverse natural habitats, summer tourism and a continuing supply of clean water. For this reason, many residents have expressed an ardent desire to preserve and protect the ecosystems that sustain the lake. The Cowichan Lake and River Stewardship Society (CLRSS) has been the "community lead" in implementing strategies directed at preserving healthy lake ecosystems (Law and Brophy 2015).

Increased development of lands bordering Cowichan Lake has changed the area's historical land use, from a landscape dominated by forestry to a more suburban and recreational lifestyle, placing the lake's health in question (Law 2012). In response to perceived impacts to riparian lakeshore habitats, a series of assessments were completed on the biophysical condition of the shoreline. A 2012 (BCCF 2012) report identified that 92% of the 110 km shoreline perimeter of Cowichan Lake is privately owned, and 25% has already experienced a high level of disturbance. Of equal concern was that existing protection regulations had been largely ineffective in controlling or reversing the pace of shoreline development impacts, especially in recent years. Starting in 2014, the CLRSS succeeded in acquiring sufficient funding from multiple sources to implement the Cowichan Shoreline Stewardship Project (CSSP) for a three-year term pilot project (Phase 1).

The objectives of CSSP Phase 1 were as follows:

1. Restore over 1,000 linear meters of shoreline within salmonid (riparian/aquatic) habitat, to reverse the current trend of habitat destruction and provide much needed public demonstration sites.

2. Conduct 300 lakeshore property visits/inspections to educate owners/occupants of the value of natural riparian zones and near-shore aquatic habitats.

3. Form partnerships with private lakefront landowners to encourage the permanent protection of 15 km of shoreline/riparian areas.

4. Engage youth and the broader community members in stewardship efforts to create a 'cultural shift' required to protect shoreline ecological values.

Beginning in July 2014, four local students were hired from Lake Cowichan School to work with the program manager and to gain experience in shoreline restoration practices. In 2016, the program manager continued to focus attention on planning and delivery of shoreline restoration projects. Phase 2 of CSSP is scheduled to commence in the Spring of 2017 under new direction of the British Columbia Conservation Foundation (BCCF), who will take over operational aspects of the project, but still rely on CLRSS for public education outreach.

2.0 Methods

Cowichan Lake is situated in a Pacific Northwest Temperate Rainforest on the Leeward Island Mountains (LIM) ecoregion (Epps 2011), and within a maritime climatic zone. Figure 1 shows the location of Cowichan Lake on south central Vancouver Island. Common weather patterns include warm, dry summers and mild wet winters with 90% of rainfall occurring between October to April. The Town of Lake Cowichan (pop. 2,974) is located at the east end of Cowichan Lake and is 27km west of Duncan, BC. The communities of Youbou (pop. 1,000) and Honeymoon Bay (pop. 600) are located along the northwest and south shores of Cowichan Lake, respectively, and Mesachie Lake (pop. 800) is another small community on the south shore of Cowichan Lake.

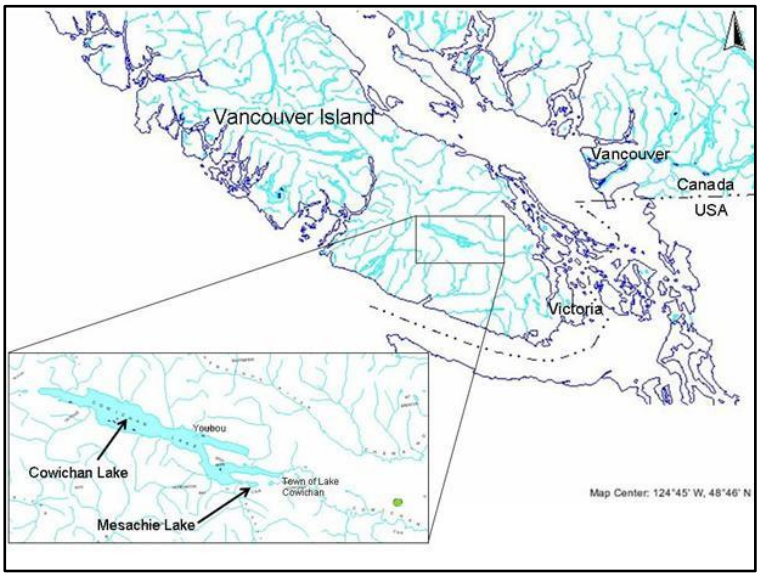

Figure 1. Location of Cowichan Lake on south central Vancouver Island, BC.

CSSP riparian restoration sites are located along the north and south shores of Cowichan Lake within the Towns of Lake Cowichan, Youbou, and Honeymoon Bay and along the upper Cowichan River (Fig. 2). The majority of CSSP sites are on the north shore of Cowichan Lake, where the largest concentration of private properties are located.

Figure 2: Location of CSSP 2014, 2015 and 2016 Sites on Cowichan Lake on Vancouver Island, BC.

The CSSP began in May 2014 and Phase 1 was completed in September 2016. In 2014, CSSP was organized into three sub-projects which would be carried out each year of the 3-year pilot study:

1. Landowner education;
2. Shoreline restoration and demonstration projects; and
3. Community engagement.

Each of these sub-projects required a level of detailed planning and organization, coupled with a field component.

2.1 Landowner Education

Landowner education in 2016 was organized and delivered by CLRSS volunteers and included the development of public education materials, landowner visits, and a riparian area opinion survey.

In 2016, CLRSS volunteers recognized a need to develop new education materials to inform community residents. Three education brochures were developed (Appendix 1). In addition, the project manager developed a Riparian Care Manual for CSSP landowners (Appendix 1).

CLRSS members distributed the brochures to shoreline residents during landowner visits, during CLRSS fundraising events, and at a CLRSS annual river clean-up event.

A team of CLRSS volunteers continued the Riparian Area Opinion Survey project that began in 2014. These visits were an effective communication tool for educating shoreline property owners, and provided an opportunity to record landowner concerns. Volunteers followed a well-defined protocol to ensure all property owners around the lake were contacted at least once during the life of the CSSP project. The landowner visits were done as follows:

I. From Creekside to Youbou. Starting at 9246 Youbou Road, and proceeding west, visiting all developed (shoreline) properties, to 1062 Alder Cres. (last private house on the lake in Youbou).

II. From Meades Creek Road to Town of Lake Cowichan. Starting from 9246 Youbou Road, (includes Sunset Road, Marble Bay, North Shore Road) to the Town of Cowichan Lake municipal boundary on North Shore Road.

III. Town of Lake Cowichan, (From the municipal boundary on North Shore Road, to intersection of South Shore Road, then west to Point Ideal Drive.

IV. From the municipal boundary on South Shore Road, west (includes Forestry Road and Walton Roads) to Gordon Bay Campsite.

The 2016 Riparian Area Opinion Survey was used to capture a “snapshot of owner attitudes and knowledge” regarding riparian area stewardship in Cowichan Lake and River. The survey’s questions were designed to measure changes in landowner knowledge and preferences related to

riparian protection and restoration over the three-year period of Phase 1. In 2016, the volunteers focused on lakeside residences that had not been previously surveyed.

The Riparian Area Opinion Survey is a 10-question survey (Appendix 2) and was organized into three parts:

1. Landowner **awareness** of local government regulations regarding the importance of riparian vegetation for fish and wildlife, water quality and erosion prevention.

2. Landowner **attitudes/preferences** towards different private property development patterns/models (common to Lake Cowichan shorelines).

3. Landowner **demographic data**: sex, age, length of ownership, permanent or part-time resident.

For the attitude and preference questions, a series of 5 photographs (Fig. 3), representing a variety of shoreline residences and "treatments" of vegetation along the shoreline were shown to landowners (Appendix 2). The photos used in the 2016 survey represent five typical riparian conditions that exist in the Cowichan study area.

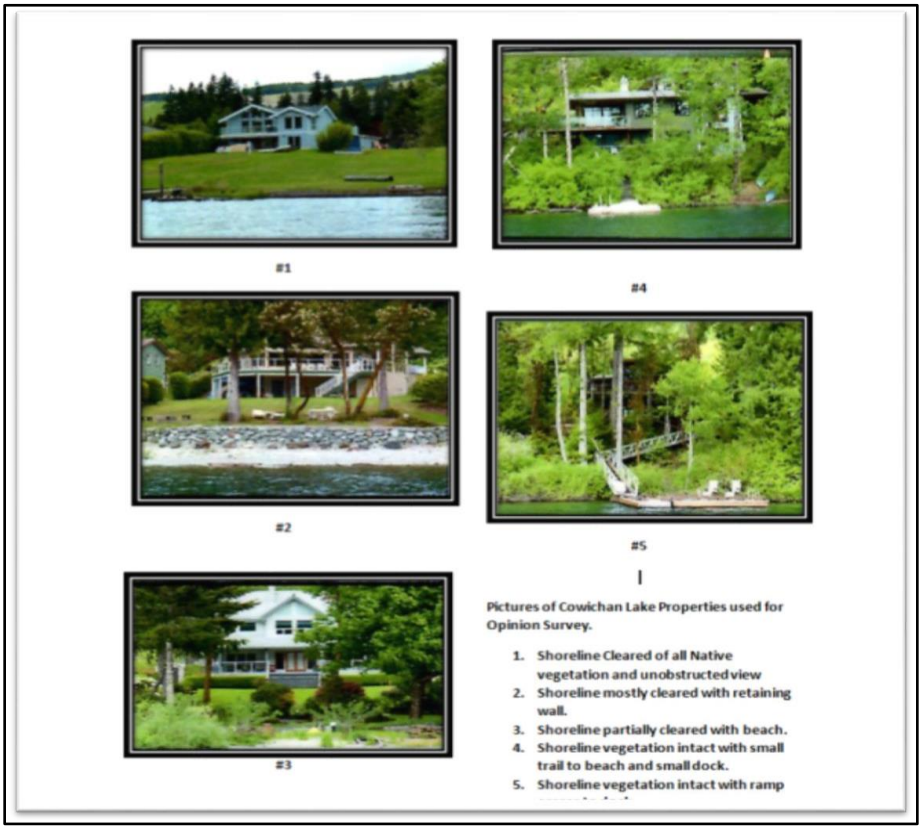

Figure 3. Five photos showing typical riparian situations in the Cowichan Lake study area.

2.2 Shoreline Restoration

2.2.1 Site Selection

Candidate properties for riparian restoration in 2016 were brought to the attention of the project manager as follows:

1. Through expression of interest during the lakeshore landowner visits and interviews;
2. Landowners contacting CLRSS after hearing about the project; and
3. By Cowichan Valley Regional District (CVRD) referral.

A 'team approach' was used to determine which of these sites should be short-listed for implementation. The team usually included the project manager, a CLRSS volunteer, Peter Law (BCCF) and Dave Polster (Polster Environmental Services Ltd, Duncan).

Criteria used to select a potential restoration site included:

- the ecological function of the riparian area
- impact of erosion on the shoreline
- invasive species management
- existing shoreline alterations (natural & anthropogenic)
- surrounding native riparian species
- annual water level fluctuations
- shoreline substrate composition

Some property owners were legally required to perform riparian restoration because of previous contraventions of the Cowichan Valley Regional District's Riparian Area Regulation (RAR) bylaw. In June 2016, a final list of candidate sites was selected. A tour of restoration sites was organized to orient the summer work crew and promote the project to local elected officials.

2.2.2 Developing Site Plans and Permitting

Restoration site plans and permitting required the following steps each year of CSSP Phase 1:

Step 1. Initial visit to the shoreline property to identify impacts to riparian area and discuss with the landowner their ideas and what could/should be in the plan.

Step 2. Project Manager develops a site restoration plan, identifies objectives, physical conditions of site, area to be restored, native species to be used and invasive plants to be removed (Appendix 3). Plans are drawn to scale, using LIDAR satellite images supplied by the CVRD (if available). Sites on the Cowichan River use cadastral maps supplied by

CVRD. Both types of maps provide property boundary lines, mean high water mark and scale. The draft plans are hand-drawn onto enlarged (blueprint sized) maps, using planting codes and legends.

Step 3. Draft plans are reviewed by Restoration Ecologist, Dave Polster and revised as needed.

S**tep 4.** A second visit with the property owner takes place to discuss the final draft of the riparian restoration plan and confirm the scope of work to be performed.

Step 5. A CSSP Property Riparian Area Restoration Agreement form is signed-off by the project manager and the property owner, which confirms the amount of time to perform restoration, total number of riparian plants to be used and future monitoring needs for the site (Appendix 4).

Step 6. The landowner also signs an authorization form agreeing to the project within the shore zone of their property. This authorization forms part of a package of information submitted to **Front Counter BC** as a ***Notification to do Works in or About a Stream*** under "Section 9" of the *Water Act.* The Notification is a Provincial Permit, allowing work to proceed with specific defined conditions. A DFO Restoration Biologist for the South Island is notified of the project's details in early June.

Step 7. Upon project completion, "as-built" site measurements are recorded on a Site Restoration Field Form (Appendix 5). Site photos are taken before, during and after riparian restoration. The photos form the basis of a longer term "photo-point monitoring" system.

Riparian restoration prescriptions were site-specific and data were collected using a CSSP Riparian Restoration Field Form (Appendix 5). LIDAR orthographic maps with mean annual high-water lines and 200-year flood lines were used to design location of foreshore plantings. The CVRD public mapping site provided legal shoreline property boundaries and TimberWest Forest Corp.'s (the Cowichan Lake bottom and foreshore owner) LIDAR orthographic maps were used for legal foreshore and lake bottom boundaries.

2.2.3 Plant Purchasing and Planting Protocol

Potted plants were purchased from Streamside Native Plants Nursery in Bowser and Green Thumb Nursery in Nanaimo. Botanical/scientific names were used when ordering stock to ensure the desired native species were correctly ordered. The Lake Cowichan School greenhouse was used extensively for storing plants for short periods during the months of July and August. Plant delivery to riparian sites occurred in two ways, including:

- transported direct from the supplying nursery;
- transported from the LCS greenhouse by CSSP rental truck.

Planting protocols for each site were the same as those used in 2014. Planting density and species followed the Ministry of Environment's *Riparian Restoration Guidelines* (Ministry of Environment 2008). *Plants of Coastal British Columbia* (Pojar and MacKinnon 2004) was the primary published reference used to understand the ecology of selected native riparian species. All riparian species used are common to the Cowichan Lake shoreline ecosystem.

Protection of plants from ungulate/beaver browse remained a problem in 2016. There was a consensus that some ungulate browse was "unavoidable," no matter what level of protection was deployed. The general approach followed in 2016 was to protect all the woody stemmed plants by enclosing the entire plant with stucco wire mesh, supported with rebar. No snow fencing or perimeter fencing was used on any sites, as they require regular maintenance.

Live-staking of three riparian species, *Cornus stolonifera* (Red-osier dogwood), *Populus balsamifera* (Black cottonwood), and *Salix scouleriana* (Scouler's willow) was a new technique used in 2016. Sites identified as having erosion issues resulting from lack of root systems were prescribed for live-staking (D. Polster, 2016, pers. comm.). Live-cuttings were collected in TimberWest cut-blocks along Island Highway 18 and "soaked" in the Cowichan River for two days prior to planting. The cuttings were approximately 2 metres in length and "staked" into the ground following methods prescribed by Polster (2003). Public information signs were posted where this staking technique was used (Appendix 6).

2.2.4 Riparian Restoration Site Care and Maintenance

After completion of restoration planting, a degree of care and maintenance was necessary to ensure superior plant survival. Lessons learned from the 2014 drought conditions indicated that soaker hoses were required as part of planting procedures to provide a convenient method of daily watering.

As indicated, a CSSP Riparian Plant Care & Maintenance Manual (Appendix 1) was created for all 2016 property owners, detailing the ecology of the riparian species used, the amount of watering necessary, approximate time for species to "establish" themselves, and how to prune for growth & height. Invasive plant management techniques were also included in the manual.

2.2.5 Plant Survival Monitoring

A quantitative method of assessing riparian plant survival began in the Spring of 2015 and was continued in 2016. Monitoring of the perennial shrubs and conifers was conducted twice annually, first in late October (the beginning of dormancy) and then early May (peak of vegetative growth cycle). Plants were assessed using a standardized monitoring form (Appendix 7). Naturally established riparian areas, in proximity to restoration project sites, were used to monitor success of restoration.

Plant survival and related condition(s) were recorded based on the following criteria:

1. Use of the site-planting plan to identify the location of all plant species installed in each shoreline restoration project.
2. Within each planting polygon, each plant species was counted, and their condition and vigor noted, as was any observed herbivory.
3. Photographic points were located that provided repeated unobstructed views over time.

Photo-point monitoring was implemented in the Spring of 2016, and GPS photo identification markers was established at all CSSP riparian restoration sites.

2.3 Community Engagement

In 2016, the CLRSS board continued to engage the local community as part of the Cowichan Lake Shoreline Strategic Plan developed in 2013 (Atkinson, 2013). To promote ongoing community engagement, several dedicated events, riparian restoration tours and CLRSS meetings were held in the Cowichan Lake area with a goal of "keeping the community informed". A CLRSS sponsored event entitled, "Ivy Removal Party," occurred in July 2016 to engage and inform the public on how to successfully remove hazardous and invasive English ivy from coniferous and deciduous trees in riparian areas. Riparian restoration tours were offered twice annually to Cowichan Lake and River private residents, CVRD planners and parks staff, Cowichan Watershed Board members, Town of Lake Cowichan (TLC) directors, local media, CLRSS board directors and other interested parties. These tours included visits to several CSSP restoration demonstration properties where explanation of restoration activities were provided.

3.0 Results and Discussion

3.1 Landowner Education

Three brochures and a manual were prepared and distributed. The brochures were given to all CSSP property owners and made available to the general public. The manual was given to all 2014, 2015 and 2016 riparian restoration site landowners. A brief description of the brochures and the manual are provided below, and the complete brochures and manual are included in the appendices.

- A brochure entitled: *Cowichan Lake & River Stewardship Society: Dedicated to the Protection and Health of the Cowichan Watershed***.** The brochure summarized the *Cowichan Shoreline Stewardship Project* and other Society activities like the annual river cleanup, fish habitat signage, and water quality monitoring on the lake.

- CLRSS members developed the *Gerald Thom Environmental Studies Bursary brochure* in 2016. In dedication to the CSSP founder, Gerald Thom, the document details the bursary's objectives and encourages local youth interested in seeking an education in *environmental resource management* to apply each year. As the founder often said, "Youth are our most important resource, and their environmental education is key to the preservation of our local watersheds."

- The *Riparian Insights* brochure informs property owners of the ecological values of riparian vegetation and existing CVRD and Town of Lake Cowichan bylaws.

- The *Riparian Care Manual* for CSSP landowners, explains how to annually care for and maintain new and established riparian plants. A condensed version of the *Riparian Care Manual* was also created for riparian area residents in order to provide pertinent information on specific plant species, and also information on current regulations and bylaws affecting riparian areas.

3.1.2 Landowner Visits

It seems evident that landowners are becoming more aware of issues related to the health of the lake, and specifically, more aware of personal responsibilities concerning removal of natural shoreline vegetation on private properties (Table 1).

Table 1. CSSP Riparian Area Opinion Survey results: Awareness & knowledge of environmental issues at Lake Cowichan.

Issues	2014	2015	2016
Are you concerned about the health of the lake?	(88 Participants) Yes / No **78% / 22%**	(82 Participants) Yes / No **91.5% / 8.5%**	(53 Participants) Yes / No **84.9% / 15.1%**
Are you allowed to remove vegetation and limb trees between your home and the water?	(80 Participants) Yes / No **30% / 70 %**	(79 Participants) Yes / No **20% / 80%**	(47 Participants) Yes / No **10% / 90%**

There appears to be a trend for landowners to support a more natural riparian area associated with their personal lake viewscapes (Table 2).

Table 2. CSSP Riparian Area Opinion Survey results: Preference for shoreline properties based on social considerations.

Social considerations	2014 **(88 Participants)**	2015 **(82 Participants)**	2016 **(53 Participants)**
Which property has the best view?	**35.6% Photo #3**	**35.4% Photo #3 & #4**	**39.6% Photo #4**
Which property would you prefer for privacy?	**38.6% Photo #5**	**44.6% Photo #5**	**39.6% Photo #5**
Which property has the most recreation value?	**42% Photo #3**	**47.5% Photo #3**	**30.2% Photo #3**

Photo #1 *Photo #2* *Photo #3* *Photo #4* *Photo #5*

In terms of environmental conditions, there doesn't seem to be any change in landowners' preference in 2014, 2015 and 2016 based on results shown in Table 3.

Table 3. CSSP Riparian Area Opinion Survey results: Preference for shoreline properties based on environmental considerations.

Environmental conditions	2014 (88 Participants)	2015 (82 Participants)	2016 (53 Participants)
Which property would be best at resisting erosion and protecting water quality?	**58% Photo #5**	**51.9% Photo #5**	**56.6% Photo #5**
Which property provides the best habitat for fish and wildlife?	**55.1% Photo #5**	**76.3% Photo #5**	**69.8% Photo #5**

Photo #1 *Photo #2* *Photo #3* *Photo #4* *Photo #5*

In terms of economic considerations, there is no obvious change in landowner preferences (Table 4).

Table 4. CSSP Riparian Area Opinion Survey results: Preference for shoreline properties based on economic considerations.

Economic Considerations	2014 (88 Participants)	2015 (82 Participants)	2016 (53 Participants)
Which property would require the least maintenance effort and cost?	**42.2% Photo #5**	**48.8% Photo #5**	**52.8% Photo #5**
Which property has the greatest resale value?	**58.3% Photo #3**	**58.5% Photo #3**	**49.1% Photo #3**

Photo #1 *Photo #2* *Photo #3* *Photo #4* *Photo #5*

3.2 Shoreline Restoration

In the Spring of 2016, a total of 8 properties were selected and confirmed for riparian restoration activities. The properties consisted of six private summer homes on the South shore of Cowichan Lake, one residential home located downstream on Cowichan River, and one Town of Lake Cowichan municipal lot located at the outlet of Cowichan Lake (Fig. 4).

Figure 4. Location Map of CSSP 2016 properties where riparian restoration was completed on Cowichan Lake and River (red triangles).

In 2016, 50% of the total restoration effort involved the removal of invasive plant species (Table 5). Invasive species needed to be removed primarily by hand due to most sites being inaccessible to heavy equipment (with one exception), and many of the invasive plant species were mixed with native riparian species, which needed to be protected. In 2014, a total of 11 hours were spent removing invasive plant species. In 2015, the removal of invasive plant species took a total of 44 hours, whereas in 2016 it took 62 hours. This indicates a clear trend of increasing effort to remove invasive species annually at CSSP riparian planting sites.

Table 5. Hand-removed invasive plant species and percent of riparian area covered.

2016 Riparian Restoration Sites	Invasive Plant Species Present	Percent of Area (m²) Requiring Removing Invasive Plants	Methods of Invasive Plant Removal	Time Spent Removing Invasive Plants
10296 Youbou Road, Youbou	Yellow flag-iris, Cotoneaster	60%	Hand-pulling; Mattock axe; Hand-clippers	8 Hours
8032 Greendale Road, Lake Cowichan	Old man's beard clematis, Japanese Knotweed	90%	Hand-pulling; Mattock axe; Hand-clippers	16 Hours
10582 Maple Ridge Road, Youbou	Himalayan blackberry	85%	Small excavator; Hand-pulling; Mattock axe; Hand-clippers	12 Hours
5608 Riverbottom Road West, Sahtlam	Common tansy	10%	Hand-pulling	2 Hours
10558 Willow Road, Youbou	Himalayan blackberry	50%	Hand-pulling; Mattock axe; Hand-clippers	8 Hours
61 South Shore Road, Lake Cowichan	Himalayan blackberry	50%	Hand-pulling; Mattock axe; Hand-clippers	8 Hours
8151 Sa-seenos Crescent, Youbou	Himalayan blackberry	30%	Hand-pulling; Hand-clippers	4 Hours
92 Gordon Road, Lake Cowichan	Himalayan blackberry, Japanese knotweed; Reed canary grass	30%	Hand-pulling; Hand-clippers	4 Hours
Total = 8 Sites		**Average = 50%**		**Total = 62 Hours**

A total of 689 potted plants, and approximately 350 live-stake cuttings of Red osier dogwood (*Cornus stolonifera*), Black cottonwood (*Populus balsamifera*) and willow species (*Salix spp.*), were used for riparian restoration in 2016. The bioengineering method of revegetation using live-stake cuttings was implemented in 2016 because the embedded cuttings act as: (1) soil

reinforcement; (2) barriers to earth movement; (3) moisture wicks; and, (4) hydraulic drains (Polster, 2016). In 2016, 63% of the sites required live-staking due to the aquatic foreshore having steep slopes, extensive erosion, or located on a riverbed where potted plants cannot be installed. Table 6 summarizes the 2016 riparian planting types, amount of area restored, and mean plant densities.

Riparian planting was divided into "foreshore" and "upland" species based on specific plant affinity for wet or dry soil conditions. Of the 689 plants used, 55% were foreshore species and 45% were upland species.

Foreshore riparian plants such as Hardhack (*Spiraea douglasii),* Sweet gale (*Myrica gale),* Red-osier dogwood (*Cornus stolonifera)* and willow species (*Salix. Spp.*) are well-adapted to wet soils and can even be submerged for a period of the year. These were planted below the 164-metre elevation (mean annual high-water mark) on Cowichan Lake's shoreline. Of a total of 2,357m^2 planted in 2016, 79% (1,855m^2) of restoration areas were at the 164 m mean annual high-water level.

Planting densities averaged one plant/0.47 m², based on prescriptions calling for dense plantings at each site. Dense planting methods help to manage invasive species by encouraging successional advancement of native riparian vegetation. Creation of a canopy of woody species (shading the understory growth) can suppress problem weed species such as reed canary grass (*Phalaris arundinacea*), blackberry (*Rubus discolor*) and other shade intolerant invasive species (Polster 2016, pers. comm.).

Table 6. 2016 Riparian habitat restoration statistics on plant totals, area, and planting densities.

CSSP 2016 Riparian Restoration Sites	Riparian Plants Summary				Area Restored (m^2)	Mean Plant Density Plant/m^2	Total Hours to Complete Planting
	Total Potted Plants (100% of Sites)	Live-stake Cuttings (63% of Sites)	Percentage of Foreshore Riparian Species	Percentage of Upland Riparian Species			
10296 Youbou Road, Youbou	161	0	30%	60%	376.5	0.42	32 Hours
8032 Greendale Road, Lake Cowichan	52	100	100%	0%	105	0.49	40 Hours
10582 Maple Ridge Road, Youbou	45	0	40%	60%	162.5	0.27	26 Hours
5608 Riverbottom Road West, Satlam	192	150	40%	60%	1046	0.38	40 Hours
10558 Willow Road, Youbou	95	25	90%	10%	75	0.78	32 Hours
61 South Shore Road, Lake Cowichan	85	50	60%	40%	358	0.23	76 Hours
8151 Sa-seen-os Crescent, Youbou	72	0	75%	25%	173	0.41	40 Hours
92 Gordon Road, Lake Cowichan	75	120	100%	0%	60.5	0.80	16 Hours
Total	**702**	**445**	**386**	**316**	**2,357m^2**		**302 Hrs**
Average	**88**	89	**55%**	**45%**	**295m^2**	**0.47**	**38 Hrs**

Table 7 shows the ranking of various riparian plant species based on the total number of plant species used in 2016. During plant survival monitoring from 2014, 2015 and 2016, Hardhack (*Spirea douglasii*) was found to have zero percent herbivory from ungulates or beavers. Hardhack, along with Sweet gale (*Myrica gale*) and Slough-sedge (*Carex obnupta*), also feature rhizome root systems capable of creating dense root thickets which greatly aid survival.

Table 7. 2016 Top ten riparian species used in riparian area restoration.

RANK	Plant Name (Common)	Plant Name (Scientific)	Preferred Planting Conditions	Foreshore/ Upland Species	Total Number of Plants Used	Number of Sites	Av. Size of Plants (gal)	Restoration Ecology Use
1	Hardhack	*Spirea douglasii*	sun/wet	Foreshore	90	6	2	Provides excellent wildlife cover. Easily survives competition from grasses. Dense thickets have human buffering capability
2	Scouler's Willow	*Salix scouleriana*	sun/wet	Foreshore	70	4	2	Establishes easily with direct sticking of cuttings. Used for bio-engineering and slope stabilization.
3	Kinninkinnick	*Arctostaphylos uva-ursi*	sun/dry	Upland	50	1	1	Drought tolerant ground cover in cleared upland areas
4	Slough sedge	*Carex obnupta*	sun/wet	Foreshore	47	4	1	Spreads quickly through long-stout rhizomes
5	Nootka rose	*Rosa nutkana*	sun/wet	Foreshore/ Upland	47	6	3	soil binding root systems
6	Pacific Ninebark	*Physocarpus capitatus*	sun/moist	Foreshore	42	4	5	Root system is excellent for stabilizing stream banks.
7	Oceanspray	*Holodiscus discolor*	sun/dry	Upland	41	4	3	Drought tolerant;
8	Sweet gale	*Myrica gale*	sun/wet	Foreshore	21	2	2	Can grow partially submerged year-round below 164m; roots system excellent cover for juvenile salmonids
9	Black Twinberry	*Lonicera involucrata*	moist/partial shade	Foreshore	26	3	3	Rapidly developing root system. Provides excellent wildlife forage and cover
10	Snowberry	*Symphoricarpos albus*	sun/dry	Upland	18	4	3	drought tolerant; rapidly spreading root system has excellent soil binding characteristics

Drought tolerant upland riparian species such as Nootka rose (*Rosa nutkana*) and Oceanspray (*Holodiscus discolor*) were planted 1-3m above the 164m mean annual high-water line, and in areas of foreshore with steeper slopes where water runoff is greatest. From May to September 2016, Cowichan Lake levels steadily declined (Fig. 5), and average air temperature was 26.7º Celsius (Fig. 6) for July and August (Government of Canada 2017). This introduced local weather stressors on the new riparian plants.

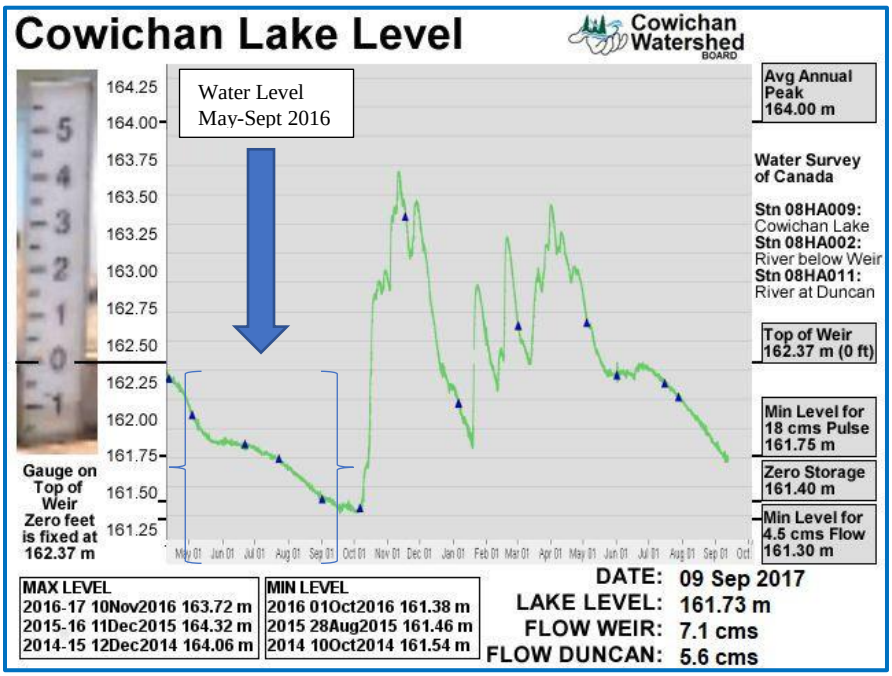

Figure 5. Cowichan Lake water levels during CSSP planting May to September 2016 (Cowichan Watershed Board, 2016)

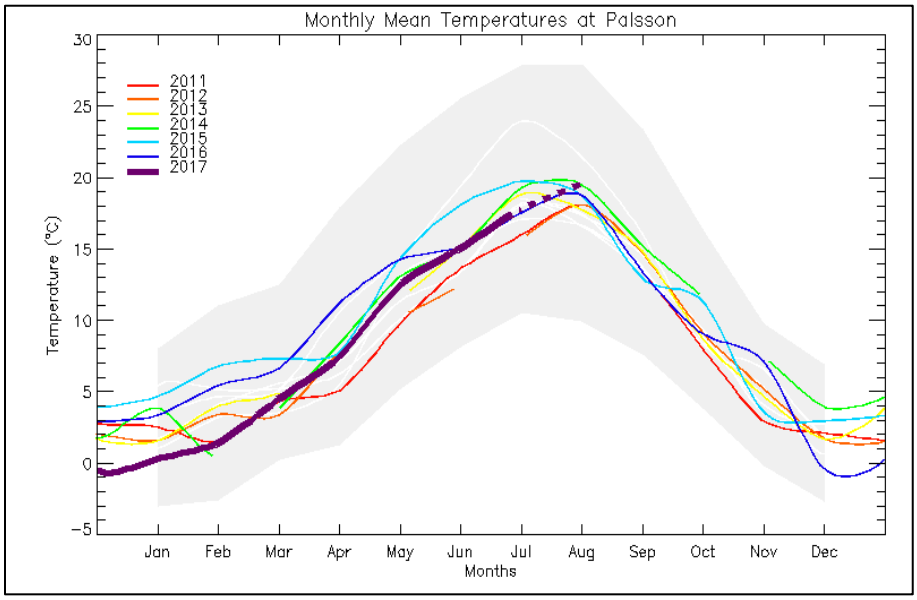

Figure 6. Monthly average air temperatures recorded at Palsson Elementary School in Lake Cowichan (2011-2017; Government of Canada 2017).

CSSP sites restored in 2016 with gravel shorelines had an average of 10% native riparian coverage below the mean annual high-water mark. Efforts to introduce foreshore plants capable of withstanding lake inundation should prove successful in stabilizing the shore and creating habitat for rearing salmonids (Law 2012). An example of a CSSP site (Fig. 7) shows the progression from an invasive species-dominated site in 2014, to a predominantly native riparian species site planted in 2015, and its current status in 2016 showing the growth of the native riparian species which are now contributing to shoreline stabilization and habitat diversity.

Figure 7. Selected riparian restoration site showing the progression from invasive species to native riparian vegetation in 2014, 2015 and 2016.

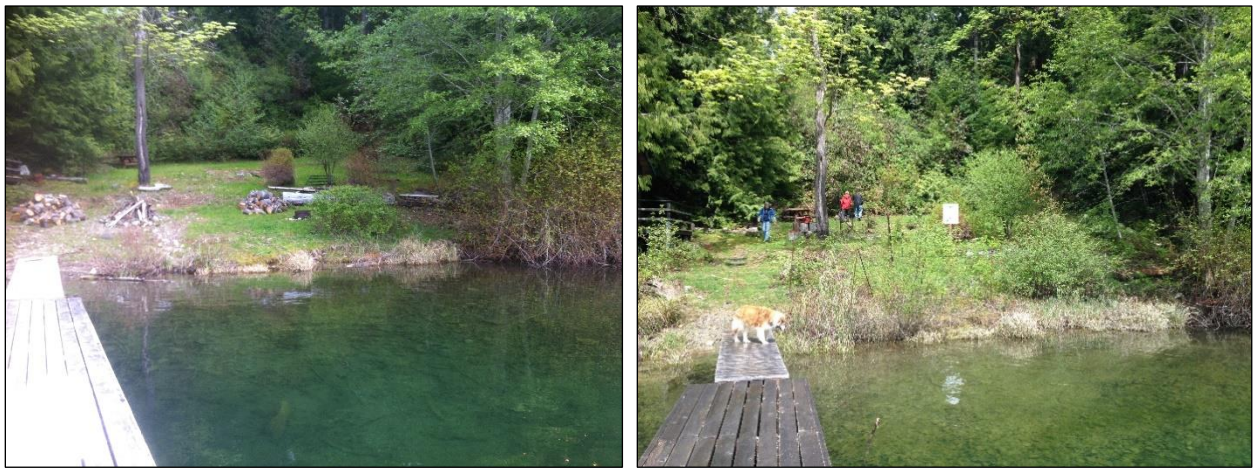

Figure 8. Before (2014) and after (2017) Riparian Restoration Site photos.

Figure 8 shows a riparian restoration site in 2014 and again in 2017. From May to July 2017, plant survival monitoring was conducted at all 2014, 2015 and 2016 sites (grand total of 24 sites). Monitoring results for just the 2016 sites showed that riparian plant survival was 88% (Fig. 9). Including results from the 2014 and 2015 sites showed an increasing trend in plant survival from 2014 to 2016 (Fig. 10). This survival increase is likely due to incorporating mandatory fencing and watering systems into riparian restoration plans starting in 2015.

Individual stucco wire fences were used to protect all species of plants found to experience high animal browse. Plants that were found to have zero percent browse in 2014 and 2015, such has Hardhack (*Spirea douglasii*), were not caged in 2016. Use of soaker hose watering systems increased plant survival by providing potted plants with a deep soak 2-3 times per week. This allowed for potted root systems to obtain enough moisture to cope with environmental stressors of heat and drought until steady fall rains and lower temperatures returned.

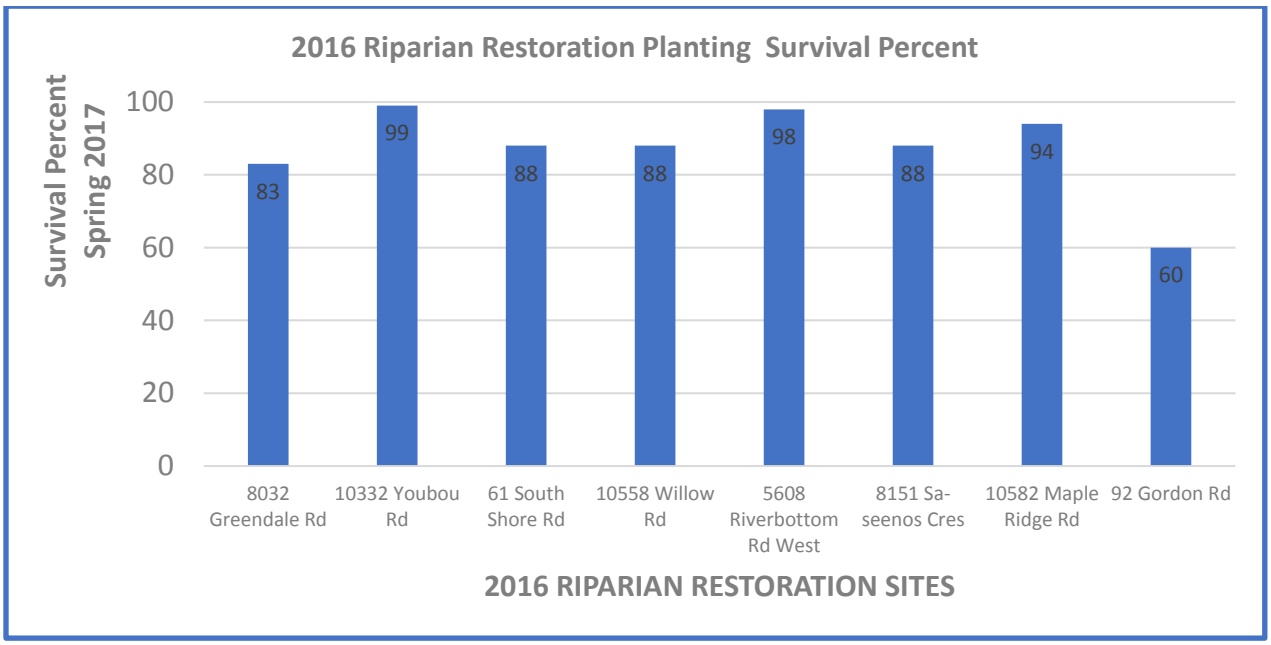

Figure 9. Riparian plant survival monitoring results for 2016 Riparian Restoration Sites (monitored in May – July 2017).

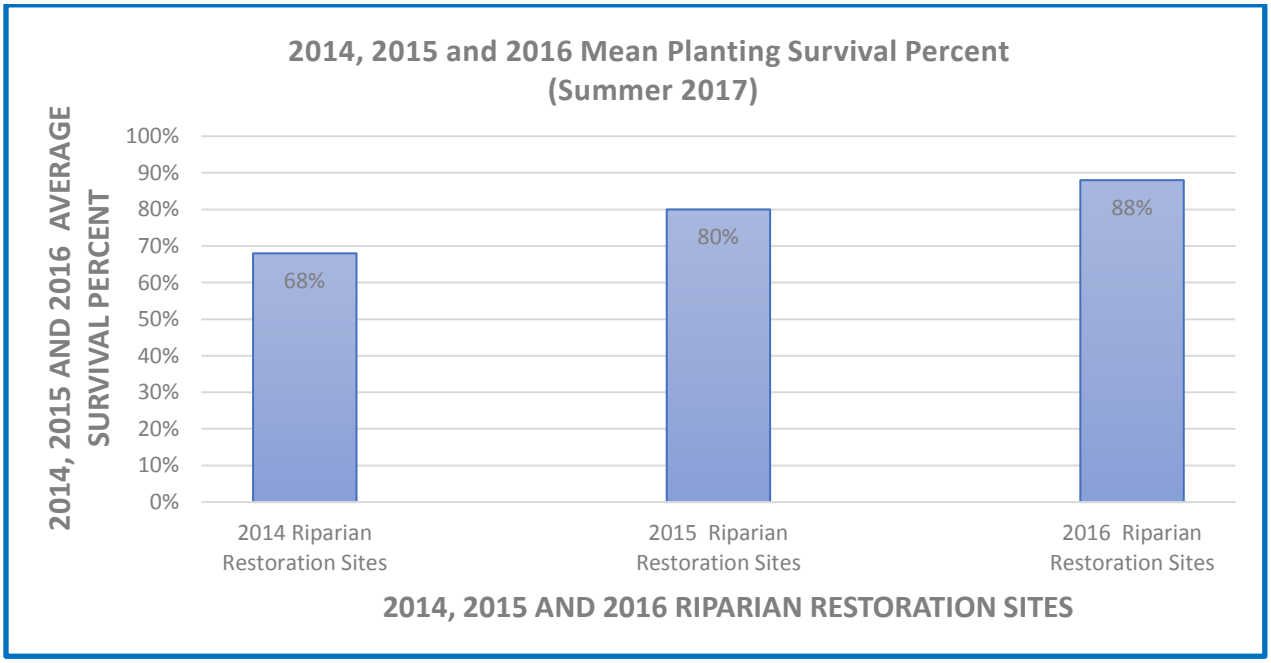

Figure 10. Riparian plant survival monitoring results for 2014, 2015 and 2016 Riparian Restoration Sites.

Wildlife browsing on newly installed riparian plants indicate a preference for certain species by ungulates and beavers (Fig. 11). Browsed plants (both in cages and not) were counted by species and compared to planting totals for 2014, 2015 and 2016. This generated an approximate percentage of browse per riparian species by ungulates and beavers. Compared to the 2015 browse preference results, where Pacific Crabapple was the most preferred plant species by both ungulates and beavers, Scouler's willow was the most preferred species by all herbivores in 2016. Deer and elk most preferred Red osier dogwood and Douglas maple in 2016, while beavers preferred Sweet gale and Scouler's willow. These observations were recorded in the spring of 2017.

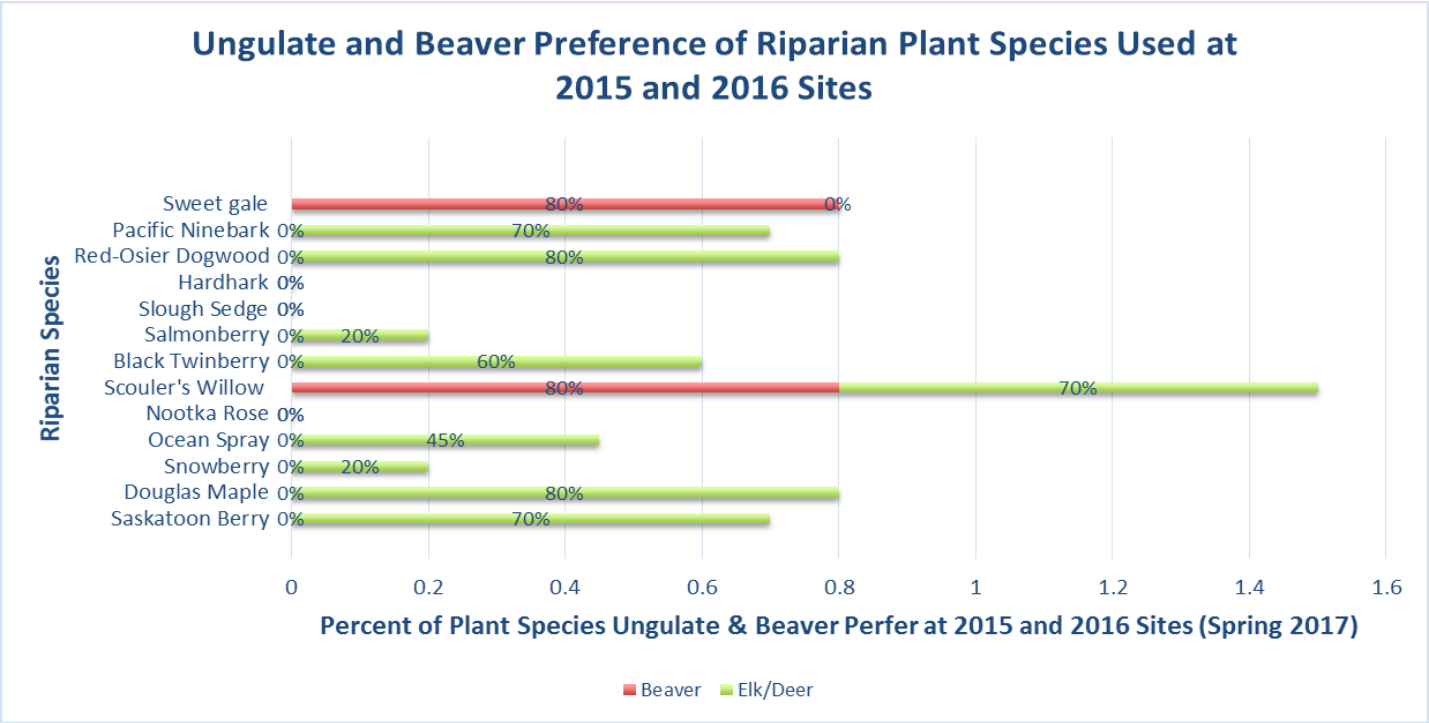

Figure 11. Herbivore browse preference for riparian plant species from 2014, 2015 and 2016 Riparian Restoration Sites.

3.3 Community Engagement

In May and June 2016, CSSP staff engaged with youth at Lake Cowichan School (LCS) by conducting a native riparian plant identification and propagating lesson (Fig. 12). The lesson was taught to grades 4/5 and Biology 11 students, and consisted of three components: (1) 20-minute PowerPoint presentation on aquatic riparian areas and their ecological significance; (2) A field trip to Saywell Park (Town of Lake Cowichan) for a 30-minue riparian plant identification lesson and practical demonstration on harvesting willow and red osier dogwood cuttings; and, (3) Transferring and planting the cuttings in the LCS greenhouse.

Figure 12. LCS Grade 4/5 class attending CSSP Riparian Outdoor Education class (taken at LCS greenhouse and Saywell Park 2016).

CSSP staff also engaged grades 6 and 7 children from Cowichan Valley District Schools at the Cowichan Lake Education Centre (CLEC) for outdoor education programs in Spring 2016 (Fig. 13). A total of 70 youths divided into groups of 20-30 students who participated in a CSSP *Riparian Plants Species Treasure Hunt* for one hour. Each student was given a worksheet (Appendix 8) which required them to locate and identify riparian plant species and sketch them onto a worksheet. Lastly, the worksheet asked about the ecological importance of each riparian species.

Figure 13. Lake Cowichan School (LCS) Grades 6/7 at the Cowichan Lake Education Center (CLEC) for Riparian Outdoor Education (Taken at CLEC 2016).

On June 4, 2016, CSSP staff conducted a *Riparian Restoration Site Tour* for CSSP project funders, CLRSS members, CVRD area planners, CVRD area directors, Town of Lake Cowichan council members, Town of Lake Cowichan media (Gazette News), environmental professionals, CSSP property participants, local area residents and other interested parties.

The tour included visits to five properties selected from the 2014, 2015 and 2016 restoration sites that demonstrated a range of riparian prescriptions, planting techniques and types of foreshore conditions warranting restoration (e.g., eroding shorelines, foreshores cleared of riparian vegetation, invasive species presence). The Cowichan Gazette subsequently published an article emphasizing the importance of maintaining riparian habitats and the negative consequences of clearing riparian vegetation on the large lake environment.

4.0 Recommendations

1. Increase media coverage/exposure.
   To raise public awareness of the need for riparian protection, increasing media exposure is essential. CSSP should contact local media such as Shaw Cable, Cowichan Valley Citizen, Victoria Times-Colonist and CHEK-NEWS for on-site interviews about the CSSP.

2. Continue riparian outdoor education at LCS and Cowichan Valley District Schools.
   Offering riparian area education to youth of Cowichan Lake and the Cowichan Valley will impart valuable knowledge on the value of healthy riparian habitats that is currently not offered in the public-school system.

3. Introduce emergent and submergent aquatic plants at some lake sites.
   Given recurring low summer water levels, consideration should be given to planting of native aquatic macrophyte species at some lake sites. In addition to providing fish habitat benefits, these plants can help to stabilize the nearshore zone against forces of wave-borne erosion.

4. Encourage property owners to prune planted riparian vegetation to increase root strength and resilience.
   The CSSP *Native Plant Maintenance Manual* provides guidance on properly pruning riparian plant species. The manual's instructions can be followed with a local workshop that will educate shoreline owners on care and maintenance of their riparian species, as well as on invasive species management techniques.

5.0 References

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6.0 Appendices

Appendix 1: Landowner Education Materials and CSSP Riparian Plant Care and Maintenance Manual

Cowichan Lake & River Stewardship Society Brochure

Safe Boating Practices

The Cowichan Lake and River Stewardship Society has a mandate to promote respectful and safe boating practices on our lake and river. We have produced a "Welcome Boater" brochure that is distributed to marinas and to boat ramps. A printable version is available at our website www.cowichan-lake-stewards.ca.

Water Quality Monitoring

Regular monitoring provides baseline data which will be used to detect change over time. The information is shared with the Province and the BC Lake Stewardship Society to compare our lake with others in the province. Of 110 monitored lakes in BC we are currently ranked second for clarity. For more information on BC lakes visit; www.bclss.org/

Committees

There are several committees in the CLRSS focusing on various aspects of our work. To learn more or volunteer, please see our website www.cowichan-lake-stewards.ca.

Water Traffic Committee
Education Committee
Membership Committee
Retail Sales Committee
Annual River Clean-up Committee
Executive/Finance Committee
Water Monitoring Committee
Cowichan Shoreline Stewardship Committee

Cowichan Lake and River Stewardship Society
PO Box #907
Lake Cowichan, BC
V0R 2G0

For current information visit our webpage
www.cowichan-lake-stewards.ca

email enquiries
webmaster@cowichan-lake-stewards.ca

President Leroy Van Wieren
Phone 250-709-7308
email: lvanw@shaw.ca

Cowichan Lake & River Stewardship Society
Dedicated to the Protection and Health of the Cowichan Watershed

Cowichan Shoreline Stewardship Project

The Cowichan Lake and River Stewardship Society has set the goal of protecting 35% and restoring 3% of the Cowichan Lake shoreline by 2020. This process was started in the spring of 2014 when we received funding from several donors and all levels of government to begin the Shoreline Stewardship Project. By September we had completed restoration on seven lakefront properties by removing invasive plants and planting over 2,500 native riparian plants in their place. We hired a crew of four secondary school students and a VIU Environmental Studies student to supervise the restorations.

Work was done in July at Paradise Village RV Park where our students and 34 volunteers planted 556 riparian plants. We then moved on to the Lake Cowichan First Nation lands where we planted 853 plants over 2 days. As well, in July and August the student team completed significant restorations at five private lakeshore residences. Funding is secured for the next two years and the Cowichan Shoreline Stewardship Program will be expanding to include new properties for 2015 and beyond. We hope to continue the CSSP indefinitely.

Riparian property visits were continued this summer and we have now talked with the owners of 143 riparian properties around the lake and upper river since we started the visits in 2012. During these visits, CLRSS members discuss riparian issues with a view to helping the property owners understand the importance of intact and functioning riparian ecosystems. Our riparian brochures are left with the property owners and many of them have asked to be a part of the CSSP. We included a survey in 2014 that is designed to gauge riparian awareness and values in our community.

Saywell Park Restoration

In fall 2013 the CLRSS completed the Saywell Park riparian restoration by removing invasive plants and planting over 1,000 native riparian plants in their place. Interpretive signs were installed. This project serves as a demonstration of the value of riparian restoration being done in the Shoreline Stewardship Project.

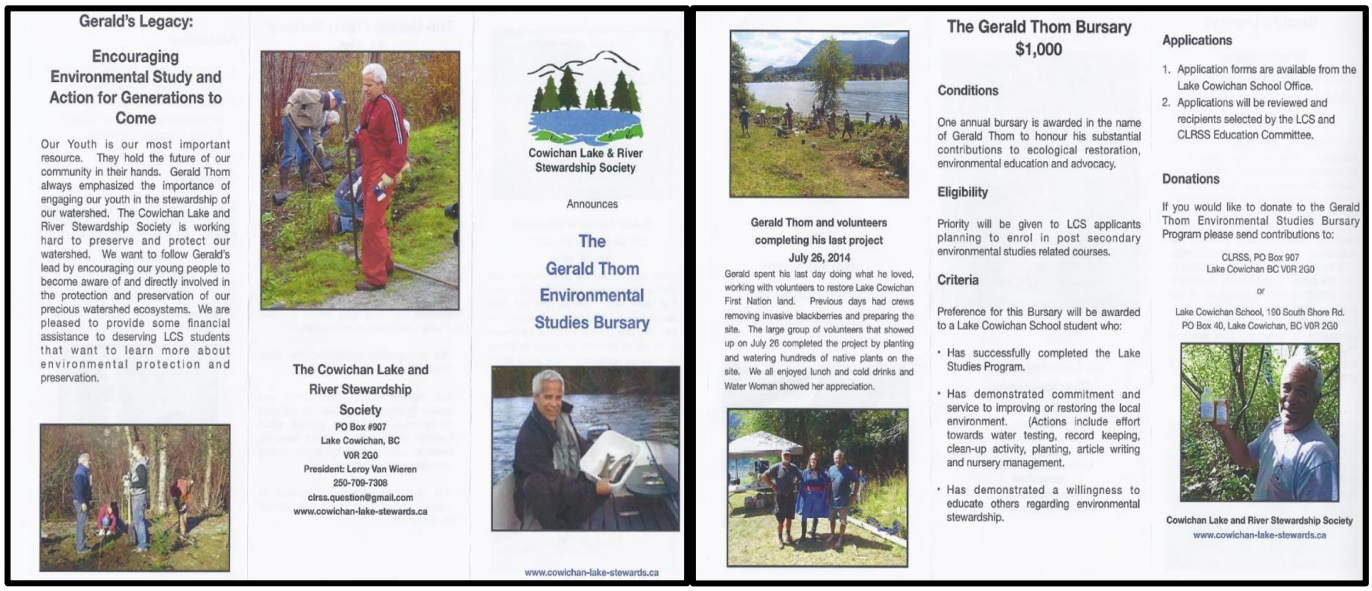
Annual River Cleanup

The third weekend in August is reserved for our annual river cleanup. This two-day event sees volunteers working in teams to rid our river of any foreign objects that have accumulated over the year. Saturday is the upper river cleanup organized by the CLRSS and Sunday is the lower river cleanup organized by Cowichan Tribes. Every year we remove tons of garage and hundreds of dollars in recyclable bottles from our river. After the work we all enjoy a barbecue and social event where we share stories about our day.

Fish Habitat Signs

CLRSS volunteers have spent the past few years installing these signs on roadways where they cross streams that are utilized by salmon and trout. These signs help improve community awareness of sensitive habitat and promote the health of our aquatic ecosystems.

Gerald Thom Bursary Brochure



Gerald's Legacy:

Encouraging Environmental Study and Action for Generations to Come

Our Youth is our most important resource. They hold the future of our community in their hands. Gerald Thom always emphasized the importance of engaging our youth in the stewardship of our watershed. The Cowichan Lake and River Stewardship Society is working hard to preserve and protect our watershed. We want to follow Gerald's lead by encouraging our young people to become aware of and directly involved in the protection and preservation of our precious watershed ecosystems. We are pleased to provide some financial assistance to deserving LCS students that want to learn more about environmental protection and preservation.

The Cowichan Lake and River Stewardship Society
PO Box #907
Lake Cowichan, BC
V0R 2G0
President: Leroy Van Wieren
250-709-7308
clrss.question@gmail.com
www.cowichan-lake-stewards.ca

Cowichan Lake & River Stewardship Society

Announces

The Gerald Thom Environmental Studies Bursary

www.cowichan-lake-stewards.ca

Gerald Thom and volunteers completing his last project July 26, 2014

Gerald spent his last day doing what he loved, working with volunteers to restore Lake Cowichan First Nation land. Previous days had crews removing invasive blackberries and preparing the site. The large group of volunteers that showed up on July 26 completed the project by planting and watering hundreds of native plants on the site. We all enjoyed lunch and cold drinks and Water Woman showed her appreciation.

The Gerald Thom Bursary $1,000

Conditions

One annual bursary is awarded in the name of Gerald Thom to honour his substantial contributions to ecological restoration, environmental education and advocacy.

Eligibility

Priority will be given to LCS applicants planning to enrol in post secondary environmental studies related courses.

Criteria

Preference for this Bursary will be awarded to a Lake Cowichan School student who:

- Has successfully completed the Lake Studies Program.
- Has demonstrated commitment and service to improving or restoring the local environment. (Actions include effort towards water testing, record keeping, clean-up activity, planting, article writing and nursery management.
- Has demonstrated a willingness to educate others regarding environmental stewardship.

Applications

1. Application forms are available from the Lake Cowichan School Office.
2. Applications will be reviewed and recipients selected by the LCS and CLRSS Education Committee.

Donations

If you would like to donate to the Gerald Thom Environmental Studies Bursary Program please send contributions to:

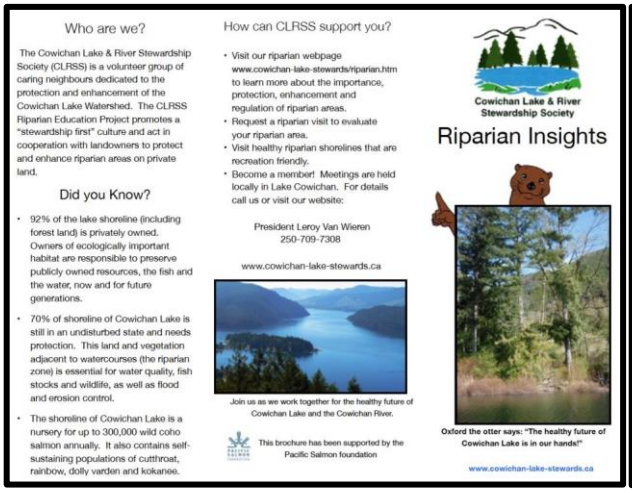
CLRSS, PO Box 907
Lake Cowichan BC V0R 2G0

or

Lake Cowichan School, 190 South Shore Rd.
PO Box 40, Lake Cowichan, BC V0R 2G0

Cowichan Lake and River Stewardship Society
www.cowichan-lake-stewards.ca

Riparian Insights Brochure



Who are we?

The Cowichan Lake & River Stewardship Society (CLRSS) is a volunteer group of caring neighbours dedicated to the protection and enhancement of the Cowichan Lake Watershed. The CLRSS Riparian Education Project promotes a "stewardship first" culture and act in cooperation with landowners to protect and enhance riparian areas on private land.

Did you Know?

- 92% of the lake shoreline (including forest land) is privately owned. Owners of ecologically important habitat are responsible to preserve publicly owned resources, the fish and the water, now and for future generations.
- 70% of shoreline of Cowichan Lake is still in an undisturbed state and needs protection. This land and vegetation adjacent to watercourses (the riparian zone) is essential for water quality, fish stocks and wildlife, as well as flood and erosion control.
- The shoreline of Cowichan Lake is a nursery for up to 300,000 wild coho salmon annually. It also contains self-sustaining populations of cutthroat, rainbow, dolly varden and kokanee.

How can CLRSS support you?

- Visit our riparian webpage www.cowichan-lake-stewards/riparian.htm to learn more about the importance, protection, enhancement and regulation of riparian areas.
- Request a riparian visit to evaluate your riparian area.
- Visit healthy riparian shorelines that are recreation friendly.
- Become a member! Meetings are held locally in Lake Cowichan. For details call us or visit our website:

President Leroy Van Wieren
250-709-7308

www.cowichan-lake-stewards.ca

Join us as we work together for the healthy future of Cowichan Lake and the Cowichan River.

This brochure has been supported by the Pacific Salmon foundation

Cowichan Lake & River Stewardship Society

Riparian Insights

Oxford the otter says: "The healthy future of Cowichan Lake is in our hands!"

www.cowichan-lake-stewards.ca

What can we do?

1. Leave our riparian areas intact.

Prevention is easier than restoration.

Common changes that can damage riparian health include:

- Clearing vegetation to create beaches, lawns or enhanced views.
- Adding fill, rock or sand to create beaches and extend property.
- Building docks and boat launches for recreation.
- Introducing non-native plants for aesthetics.
- Removing woody debris and aquatic "weeds" for water sports.

2. Minimize impact when accessing the water.

- Use only one point of access, build docks, frame views and use gravel pathways.

3. Restore damaged riparian areas.

Let natural re-vegetation take its course or re-establish native plants.
A native plant is one that occurs naturally in a particular region, ecosystem or habitat and occurred prior to European contact.

Native Plants:

- Are beautiful & low maintenance.
- provide wildlife with food, shelter and places to reproduce.
- Help regulate climate, prevent erosion, improve water quality and much more.

Do NOT collect native plants from the wild. Propagated native plants are readily available.

To learn more about native plants and local sources, visit our riparian webpage: www.cowichan-lake-stewards.ca/

4. Respect Riparian Area Regulations (RAR) and avoid fines.

Leave riparian areas intact for erosion control, water quality, habitat protection, coho production and flood prevention.

Any disturbance within 30 metres of the high water mark of lakes and streams requires contact with local government:

Riparian Habitat Contacts

CVRD Development Services 250-746-2620

Town of Lake Cowichan 250-749-6681

Provincial Government (Environment) 250-751-3100

Fisheries and Ocean Canada (Habitat Enquiries) 1-866-845-6776

For online contacts or more riparian habitat information, visit our riparian webpage.

CSSP Riparian Plant Care and Maintenance Manual

Care & Maintenance

Knowing how to care for your native riparian species is key to the success and survival of these plants in their first few years of establishment. This pamphlet will guide you on how to do this, and give you information on how to identify, care, monitor, and maintain your riparian species.

Sweet gale

Hard Hack

Salmonberry

Black Twinberry

summer months requires the following care after planting:

- Leave soaker hoses on for 2hrs or hand water during the permitted watering times (morning/evening) 3 days per week minimum
- Mulch with leaf litter around the "well" created at each plant base to retain moisture

If the following summer season is a drought, plants will need continued watering. One season of root growth may not have established the plant enough to survive harsh environmental stressors such as drought.

Plant Maturity & Maintenance

The riparian restoration completed on your property was designed with the long-term concept of how each plant will mature and co-exist with its neighboring plants. On average, each plant has 1-2 metres spacing between each plant, and will grow into this space in the proceeding years. Undisturbed riparian areas are naturally dense thickets in wetlands, however, if you prefer to not have your riparian species grow too thick or tall, **pruning** is an option available to all plants. Pruning in the riparian area is considered acceptable. Cutting just above the nodes on stems allows new growth to sprout at the place of cutting.

Appendix 2: Riparian Area Opinion Survey

Riparian Area Opinion Survey

DATE:	NAME:
ADDRESS:	PHONE:
EMAIL:	OWN/RENT
AMOUNT OF YEARS:	SUMMER/FULL TIME
LAKEFRONT/RIVER FRONT	

1. **Are you concerned about the health of Cowichan Lake?**
   YES/NO
   Comments

2. **View and Sunlight**
   Which property has the best view?
   Photo 1 2 3 4 5
   Comments:

3. **Vegetation Control**
   Are you allowed to remove vegetation and limb trees between your home and the water? Yes/No
   Comments:

4. **Privacy**
   Which Property would you prefer for privacy?
   Photo 1 2 3 4 5
   ***tree topping/limbing/arborist/law Comments:**

5. **Erosion/Water Quality**
   Which property would be best at resisting erosion and protecting water quality?
   Photos 1 2 3 4 5
   ***roots/natural filtration/wave suppression/septic Comments:**

6. **Fish & Wildlife**
   Which property provides the best habitat for fish and wildlife?
   Photos 1 2 3 4 5
   ***Coho/Cutthroat/Waterfowl/Aquatic/Mammals/Ungulates Comments:**

7. **Recreation**
   Which property has the most recreation value?
   Photos 1 2 3 4 5
   Comments:

8. **Maintenance Costs**
   Which property would require the least maintenance effort and cost?
   Photos 1 2 3 4 5
   ***Water/Fertilizer/Time/Weed Control/Relaxing Comments:**

9. **Property Value**
   Excluding the house in each photo, which property do you think has the greatest resale value?
   Photos 1 2 3 4 5
   ***natural landscape: time/money/gaining beach/privacy/wildlife Comments:**

10. **Are you interested in receiving advice on riparian restoration on your property?**
    YES/ NO

Appendix 3: Example CSSP Riparian Restoration Site Plan

Property Owner Name	Site Specific	Location on Lake: Lot: VIP: Parcel:	Site Specific

Start and End Date of Restoration (yyyy-mm-dd)		Time to Complete Project (24hrs)		Crew	members' full names

Enviro/Lake Conditions			Precipitation	☒None	☐ Light	☐Moderate	☐Heavy
	Cloud Cover	☐0-25%	☐25-50%	☐50-75%	☐75-100%		
			Foreshore Elevation (m)	79m		Site Aspect	Southern

Site Information			Total Area (m²) below 164m	Polygon #1 12.37L x 4.6 W= 56.9m² Polygon #2 16.15L x 3.4W= 54.9m² Total= 111.8m²	Area (m²) actually planted	111.8m²
	GPS Coordinates Lat/Long		48.7665° N 123.8785° W		Linear metres of planting	28.8m
	Site Comments	• Property owned for approx. two years by the current owner(s) • Previous owners there for decades; cleared forest in 90's along river to open land for a small farm (grass field) • Grass to river edge, where a 5-6 alders are the only vegetation providing root structure to stabilize river bank • River bends towards house and floods the lower portion of the grass field during high water events • Field area could be re-vegetated as well				

Shoreline Characteristics

Substrate	%Bdrk		%Bldr		%Cbbl		%Grvl	20	%Snd	80
Slope (%)										

Existing Emergent Veg	☐Sparse or _____0__%	Submergent Veg	☒ Sparse or _____%
Dominant Species:		Dominant Species: • Row of alders along river	

Restoration Planning

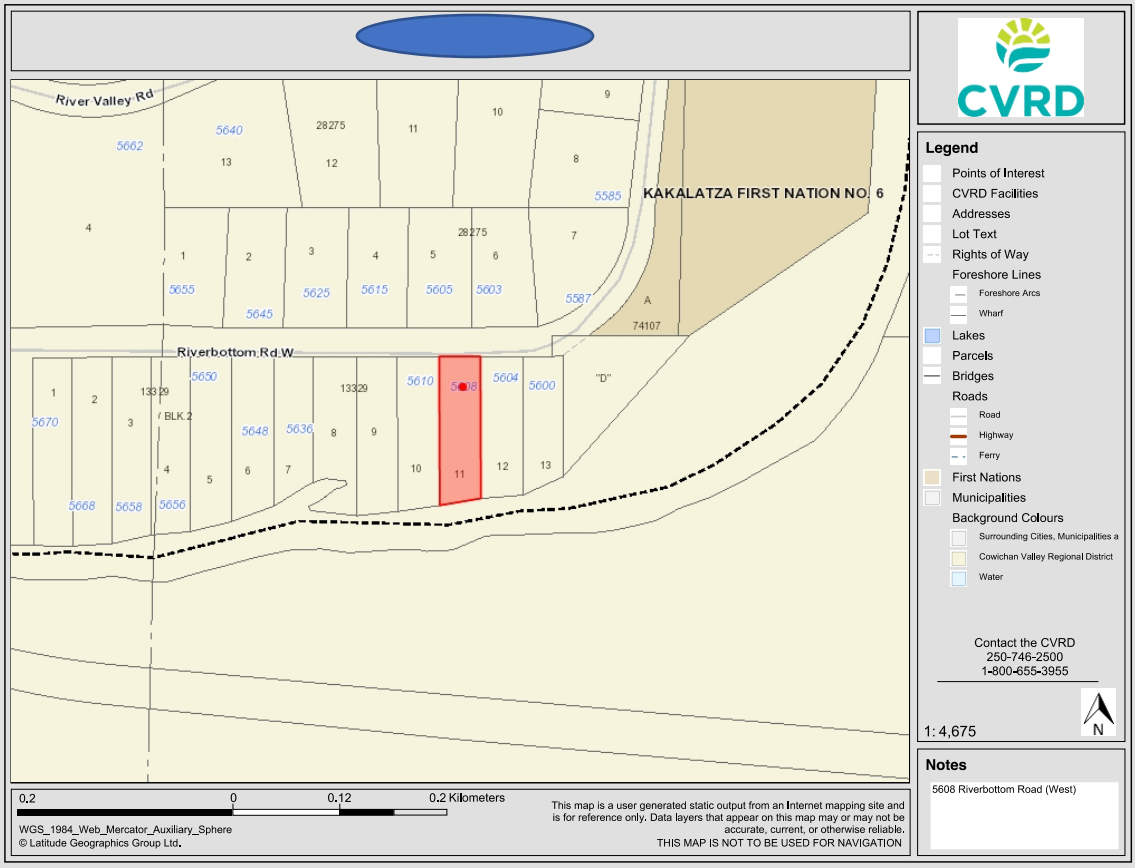
Plan Compiled by: ☒ D. Polster ☒ Christine Brophy

Site Restoration Objectives

- **Stabilize bank with willow live-staking**
- **Alders along high water's edge**
- **Black-cottonwood**
- **Conifers above high water**
- **Slough sedge along fringe of high water mark**

- Facing upstream
- Willow live-staking throughout eroded area

- Field upland planting polygon to be planted with diverse amount of upland riparian species suited for drier soils



Comments about the Site Planting and Equipment Used:

Site Planting:

- All plant species used were planted by hand with a combination of mattock-axe, shovel and staking bar (used to loosen the ground beneath the base of the planting hole to assist in root penetration)
- Planting hole was filled with fresh water by hose or bucket from Cowichan River and a mixture of soil compost and native maple leaves collected from Lake Cowichan Area was filled approximately 1/3 of the planting depth
- Stucco wire fencing with used to enclose plants prone to herbivory (red-osier dogwood, crab apple, Pacific ninebark, Indian plum, and mock orange)
- Garden rubber soaker hoses were placed around each planted plant and used daily for approximately 2 hours during the morning to reduce evaporation

Approx. Site Cost: TBA

Plants:

Hours of Labor:

Fencing/Soil:

Total:

Appendix 4: CSSP Property Riparian Area Restoration Agreement

Cowichan Lake & River Stewardship Society

Cowichan Shoreline Stewardship Project (CSSP)
Property Riparian Area Restoration Agreement:

The riparian zone refers to the terrestrial area along bodies of fresh water that has a significant influence on processes occurring within the fresh water ecosystem. The riparian area is the interface between land and a lake, river or stream.
This agreement is to ensure that both the CLRSS & the land owner(s) are aware of the details of the planned riparian restoration, the financial contributions, and the post restoration maintenance and monitoring procedure.

The Land Owner agrees:

To the restoration as discussed:

- Timing: _____
- Approximate number of plants: _____

That the restoration plan is based on a set budget and that additional planting will require an owner contribution;

To allow CLRSS to access their property to perform the work;

That the CLRSS is responsible and liable for their staff and directors while they are on the owner's property;

That the CLRSS will take photos of the restoration work (before, during and after) at agreed times and with prior permission;

To allow the CLRSS to visit the site, at agreed times and with prior permission, to demonstrate the work and to monitor progress, and for research purposes;

That the restoration is a one-time effort, and that the CLRSS is not required to continually monitor, repair or replace initial plantings;

That the CLRSS will provide the owner with instructions for follow-up care and maintenance of the riparian restoration site.

Additional comments and considerations:

Signature (owner): _____

Address: _____

Signature (CLRSS): _____

Date: _____

Appendix 5**:** CSSP Riparian Restoration Field Form

Property Owner Name		Location on Lake:	
Start and End Date of Restoration (yyyy-mm-dd)		Time to Complete Project (24hrs)		Crew	

Enviro/Lake Conditions	Air Temp		Precipitation	☐None	☐Light	☐Moderate	☐Heavy
	Cloud Cover	☐0-25%	☐25-50%	☐50-75%	☐75-100%		
	Water Temp		Foreshore Elevation (m)		Site Aspect		

Site Information	FIM Reach #		Total Area (m²) below 164m		Area (m²) actually planted	
	GPS Coordinates Lat/Long					
	Site Comments & Planting Methods					

Shoreline Characteristics

Substrate	%Bdrk		%Bldr		%Cbbl		%Grvl		%Snd	
Slope (%)										

Existing Emergent Veg	☐Sparse or _____%	Submergent Veg	☐ Sparse or _____%
Dominant Species:		Dominant Species: _____ _____ _____	

Restoration Planning

Plan Compiled by: ☐ D. Polster ☐ Christine Brophy ☐ Mandy Hobkirk

Site Restoration Objectives

Riparian Plant Species

ID	Plant Name (Scientific)	Plant name (Common)	Size (Gallons)	Number of Plants	Price	Total Cost

Comments about the Site Planting and Equipment Used:

Appendix 6: Live-Staking Information Sign Used at Various CSSP Sites

Appendix 7: Riparian Area Restoration Monitoring Form

CSSP Site Monitoring Form			**Date** **Time** **Crew**				
			Site History **Year Restoration Completed**			**Management or restoration since last visit**	
			Season	☐Spring	☐ Summer	☐Fall	☐Winter
	Cloud cover	☐0-25	☐25-50	☐50-75	☐75-100		
			Foreshore Elevation (m)			**Site Aspect**	
			River Flow (m^3/s)		**Weather**		**Control Ref. Site**

Substrate/Soil Conditions	**%Bdrk**		**%Bldr**		**%Cbbl**		**%Grvl**		**%Snd**		
Effective Plant Coverage – Post Riparian Treatment	_____ _%		**Vigor (High, Moderate, Low)**	_____							
			Native Riparian Seedling Abundance								

Species Mix:

		Average Condition (Poor/Fair/Excellent)	Distance from 164m average high-water mark	Animal Damage (High/Med/Low)	New Growth/Bud Present (Y/N)	% of herbaceous coverage

Appendix 8: CSSP Riparian Plants Species *Treasure Hunt* Worksheet (for public schools)

Plant name	Picture	Draw the flower/ leaves	Ecological Importance