

Cowichan Shoreline Stewardship Project: 2017 Annual Report



Prepared for

Cowichan Lake and River Stewardship Society
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Abstract

Starting in spring 2014, the Cowichan Lake and River Stewardship Society (CLRSS) succeeded in acquiring sufficient support from multiple partners to implement the *Cowichan Shoreline Stewardship Project* (CSSP) for a three-year pilot term (Phase 1: 2014 to 2016, inclusive). In spring 2017, Phase 2 of CSSP began with a new three-year term, notionally ending in March 2020. Phase 2 of CSSP is now a formal joint venture between CLRSS and the BC Conservation Foundation (BCCF), with the former primarily responsible for public outreach and stewardship education, and the latter responsible for delivering on-the-ground riparian habitat restoration.

Shoreline education remains a critical part of CSSP and was continued in 2017 through riparian owner visits and surveys, community events, and distribution of CSSP brochures and a Riparian Plant Care Manual. Brochures were widely distributed to shoreline owners and the general public, while the manual was specifically targeted to owners who volunteered their shorelines for riparian restoration in 2017. CLRSS members also continued a standardized (but slightly revised) *Riparian Area Opinion Survey* designed to annually track changes and trends in owners' environmental knowledge and preferences for shoreline stewardship practices. New riparian restoration signs, acknowledging sponsors, were also installed at all 2017 CSSP demonstration sites.

In late spring 2017 a total of 8 new shoreline properties, including private residences and publicly-owned lands, were approved as riparian restoration candidates. This increased the overall number of CSSP restoration sites to 32, from 2014 to 2017, inclusive. With the 8 - 2017 restoration sites included, a total of 1,206 linear meters of riparian habitat has now been restored on Cowichan Lake and River, which has bettered the original goal of 1,000 linear meters for Phase 1 of CSSP. In addition, 11,016 m² of riparian habitat has now been restored with native trees, shrubs and sedges on Cowichan Lake, tributary and river shorelines, which exceeds the minimum target of 2,500 m² a year, originally set as an objective in 2014.

For Phase 2 of CSSP, the primary restoration objective will continue to be improving 2,500 - 3,000 m² of riparian habitat at approximately 10 public & private properties, each year.

In 2017, CSSP's commitment to community engagement was further enhanced by continuing riparian outdoor education classes for students at Lake Cowichan School and at the Cowichan Lake Outdoor Education Centre. CSSP field staff also participated at a Royal Bank of Canada *Blue Water Day* event in Nanaimo (Woodgrove Branch) in early June, 2017. CLRSS members attended four community events in the Town of Lake Cowichan to promote shoreline stewardship and sustainability goals.

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CLRSS also wishes to acknowledge in-kind support from the following organizations which have contributed to the strong success of CSSP through its first four years: Cowichan Valley Naturalists' Society, Cowichan Community Land Trust, Lake Cowichan Secondary School, BC Conservation Foundation and Polster Environmental Services Ltd.

The CSSP Manager wishes to thank Cowichan Lake and River landowners who have participated and/or approved riparian restoration on their shoreline properties to-date. Thanks are also extended to the Lake Cowichan First Nation for cooperation in early efforts to restore the shoreline on their Reserve lands.

Craig Wightman and Naomi Harder of BCCF provided editing and report preparation assistance this year.

Special Dedication (*in memoriam*)

The 2017 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. His energy, intellect and engaging spirit will always be greatly missed!

2017 Sponsors Appreciation

“Cowichan Shoreline Stewardship Project”

Riparian Habitat Restoration at Work



Fisheries and Oceans
Canada

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Canada



RBC
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1.0 Introduction

Cowichan Lake lies in the headwaters of the Cowichan watershed, and includes dozens of tributary streams before emptying into Cowichan River (47 km long), one of three designated Canadian Heritage Rivers in BC (Epps 2011). Cowichan Lake has a mean depth of 50 m (152 m max. depth) and a surface area of 62 km², and supplies drinking water to municipal users (Town of Lake Cowichan and Town of Crofton). Much of the Town of Lake Cowichan's economy relies on the lake's natural beauty, summer tourism and a continuing supply of clean water. For this reason, many residents have expressed an ardent desire to preserve and protect aquatic and terrestrial ecosystems that border and sustain the lake. Since 2013, the Cowichan Lake and River Stewardship Society (CLRSS) has been the "community lead" in developing strategies directed at preserving a healthy large lake ecosystem (Cortex Consultants Ltd. 2013; Law and Brophy 2015).

Increased residential development bordering Cowichan Lake has changed the area's historical use from a landscape once dominated by industrial forestry to a more suburban and recreational lifestyle, placing the lake's long-term health at some risk (Law 2012). In response to perceived threats to riparian lakeshore habitats, a series of biophysical assessments were completed on the condition of the shoreline. A 2012 report (Law *et al* 2012) identified that 92% of the 110 km shoreline perimeter of Cowichan Lake is privately owned and 25% has already experienced a high level of physical disturbance. Of equal concern was that existing habitat protection regulations had been largely ineffective in controlling or reversing the pace of shoreline development impacts, especially in recent years (i.e., since early - mid 1990s).

Starting in 2014, CLRSS succeeded in acquiring sufficient funds from multiple granting organizations to implement the Cowichan Shoreline Stewardship Project (CSSP) for a three-year pilot project (aka Phase 1).

The objectives of Phase 1 were as follows:

1. Restore over 1,000 linear meters of shoreline with adjacent 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.

Between 2014 and 2016, CLRSS hired secondary students from Lake Cowichan School to work with the CSSP manager each summer to gain practical experience with shoreline restoration techniques. Phase 2 of CSSP began in spring 2017 under new direction of the British Columbia Conservation Foundation (BCCF), which assumed responsibility for the annual habitat restoration component. By agreement, CLRSS maintained the lead for the environmental education and community outreach component. Phase 2 of CSSP is projected for another three-year term, notionally ending in March 2020.

Annual objectives of CSSP Phase 2 are as follows:

1. Complete 10 (target minimum) shoreline restoration projects on public & private properties, representing 2,500 - 3,000 square meters of riparian habitat area.
2. Conduct at least 75 shoreline visits with lake and river property owners to demonstrate how maintaining shoreline/wetland ecological integrity & diversity is compatible with enhanced property values, lifestyle satisfaction and owner land use practices. With each visit, have each resident complete a standardized survey intended to measure their knowledge of riparian protection legislation and to gauge their personal preferences for retaining natural shoreline vegetation.
3. Engage youth and the broader community in hands-on stewardship activities to promote cultural & behavioural shifts necessary for ensuring long-term shoreline and wetland health.
4. Continue to work closely with the Cowichan Watershed Board, First Nations, all levels of government and land owners (including extensive private forests) to more fully protect riparian & wetland habitats throughout the watershed.

By the end of Phase 2, after 6 full years of CSSP activities, the goal is to meet the following objectives:

Objective 1: Restore 2 linear kilometers or 18,000 square meters of damaged shoreline habitats.

Objective 2: Conduct 600 shoreline property visits and 450 owner surveys to educate lake and river residents about the value of natural riparian zones and near-shore aquatic habitats.

Objective 3: Promote new and creative partnerships with senior and local governments, First Nations and industry to permanently protect 15 km of shoreline/riparian habitats on the lake and river.

Objective 4: Continue to engage Cowichan youth in stewardship as the basis for a cultural shift needed to protect shoreline ecological values for the future.

2.0 Methods

Cowichan Lake is bordered by a Pacific Northwest Temperate Rainforest within the Leeward Island Mountains (LIM) ecoregion (Epps 2011), and within a broad maritime climatic zone. Fig. 1 shows the location of Cowichan Lake on south central Vancouver Island, BC. Predominant weather patterns include warm dry summers and mild wet winters, with 90% of rainfall occurring between October and April. The Town of Lake Cowichan (pop. 2,974) is located at the east end of Cowichan Lake and is 27 km west of

Duncan. Lakeshore villages of Youbou (pop. 1,000) and Honeymoon Bay (pop. 600) are located northwest and west of the Town of Lake Cowichan (TLC), respectively, and the village of Mesachie Lake (pop. 800) is located on the south shore of Cowichan Lake, 6.5 km west of TLC.

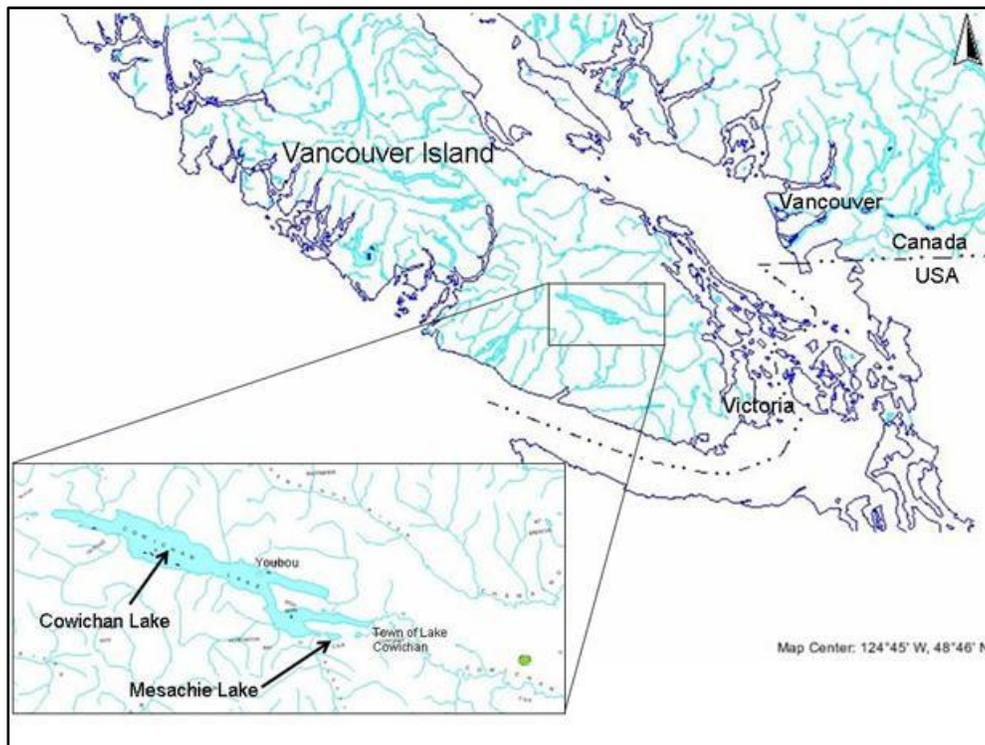


Figure 1. Location of Cowichan Lake on south central Vancouver Island, BC.

CSSP riparian restoration sites are located along the north and south shores of Cowichan Lake within the Towns of Lake Cowichan, Youbou, Mesachie Lake and Honeymoon Bay, as well as on 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 is currently.

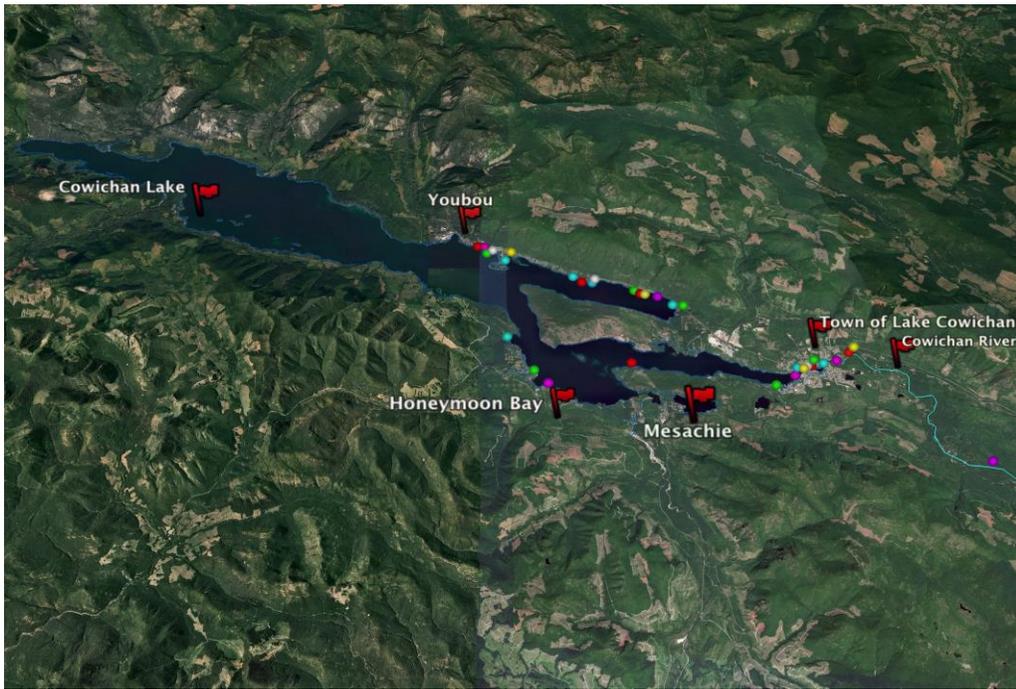


Figure 2: Location of CSSP 2014, 2015, 2016 and 2017 Sites on Cowichan Lake/River, Vancouver Island, BC.

CSSP began in May 2014 and the 3-year Phase 1 was completed in September 2016. Phase 2 officially began in April 2017. In 2014, CSSP was organized into three distinct but complementary projects to be undertaken each year of the 3-year pilot term. Phase 2 of CSSP has endorsed and continued with this successful formula including the following elements:

1. Targeted shoreline owner environmental education;
2. Shoreline restoration demonstration projects; and
3. Broad-based community engagement.

Each deliverable requires a level of detailed planning and organization, coupled with a field component. Shoreline habitat restoration also needs regulatory authorization from the provincial Ministry of Forests, Lands and Natural Resource Operations through Section 11 approvals under the Water Sustainability Act.

2.1 Landowner Education

Landowner education in 2017 was again organized and delivered by CLRSS volunteers. Activities included public engagement through distributing riparian education materials and the CSSP Riparian Plant Care and Maintenance Manual (Appendix 1). Major emphasis was also placed on conducting shoreline owner visits with a new revised version of the *Riparian Area Opinion Survey* (Appendix 2). These visits are considered an effective communication tool for educating shoreline property owners while providing

them an opportunity for voicing site-specific or general concerns about natural shoreline values and protection needs.

In 2017, CLRSS volunteers recognized a need to clarify specific details of the *Riparian Area Opinion Survey* that began in 2014 so that standard survey questions were unambiguous and repeatable, ensuring results are more consistent for trend measurement purposes over time. In addition, surveys were delivered by organized teams of two CLRSS volunteers who dedicate one day a week for conducting door-door owner contacts and surveys. Since 2014, volunteers have followed a fairly well-defined protocol for ensuring all property owners around the lake are contacted at least once during the life of the CSSP project. To that end, shoreline owner visits have been conducted as follows:

- I. From Creekside to Youbou. Starting at 9246 Youbou Road and proceeding west, visiting all developed (shoreline) properties to 1062 Alder Cres. (i.e., 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 Road) to Gordon Bay Provincial Campsite.

The 2017 *Riparian Area Opinion Survey* was used to capture a “snapshot of owner attitudes and knowledge” regarding riparian area stewardship on Cowichan Lake and River. The survey’s questions were designed to measure changes in landowner knowledge and preferences related to riparian area and shoreline restoration over the life of CSSP. In 2017, volunteers focused on residences that had not been previously surveyed in past years.

The Riparian Area Opinion Survey is a 10-question survey 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. The photos used in the 2017 survey represent five typical riparian situations that exist in the Cowichan study area.

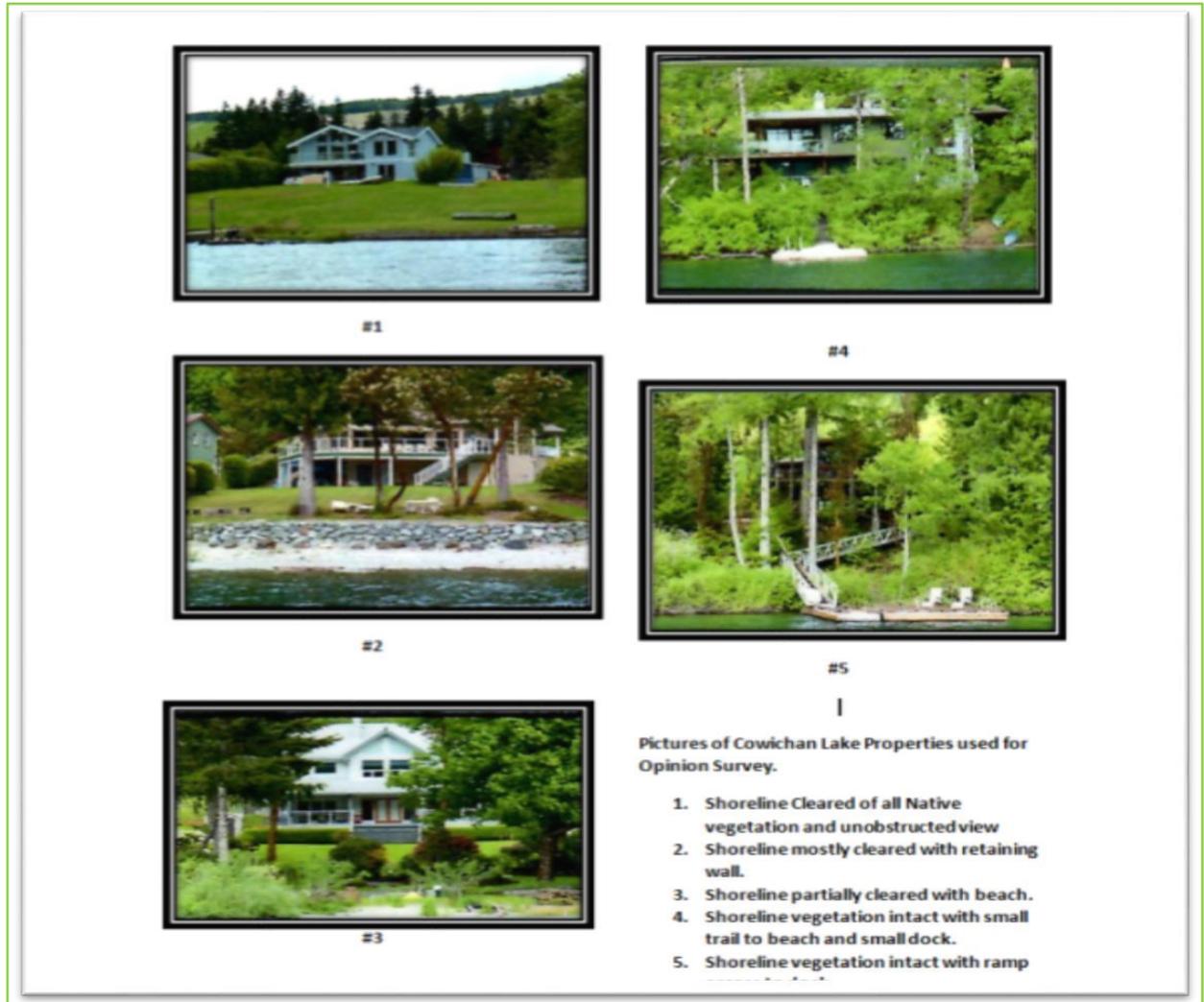


Figure 3. Five photos showing typical riparian conditions in the Cowichan Lake study area.

2.2 Shoreline Restoration

2.2.1 Site Selection

Candidate properties for riparian restoration in 2017 were brought to the attention of the CSSP manager as follows:

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

A ‘team approach’ was generally used to determine which proposed sites should be short-listed for future implementation. The team typically included the project manager, a CLRSS volunteer, Craig Wightman (BCCF) and Dave Polster (Polster Environmental Services Ltd, Duncan).

Criteria used to select a potential restoration site included:

- the ecological importance of the riparian area;
- impact of erosion on the shoreline;
- invasive species management;
- existing shoreline alterations (natural & anthropogenic);
- surrounding native riparian species;
- annual lake/river level fluctuations; and
- shoreline substrate composition.

Some property owners were legally required to perform riparian restoration because of previous CVRD bylaw infractions under the Riparian Area Regulation (RAR). In May 2017, a final list of candidate CSSP sites was selected. A tour of these 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 must adhere to the following steps each year:

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

Step 2. Project Manager develops a site restoration plan with objectives and physical conditions of the site, area to be restored, native plant species to be used, and invasive plants to be removed (Appendix 3). Sites on the Cowichan River use cadastral base maps (supplied by the CVRD or TimberWest). Both sets of maps provide property boundary lines, mean high water mark and scale. Draft restoration plans are digitally drawn using Google Earth Pro.

Step 3. Draft plans are reviewed by Restoration Ecologist, Dave Polster, MSc., RPBio., as well as used for on-site assessments where restoration prescriptions are amended and/or confirmed.

Step 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 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 writes a letter of approval, agreeing to the project within the shoreline 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 11” of the *Water Sustainability Act*. The Notification is a Provincial Permit, allowing work to proceed under 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 CSSP Riparian 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 for all CSSP sites.

In 2017, riparian restoration prescriptions were site-specific and data were collected using a CSSP Riparian Restoration Field Form. LIDAR orthographic maps with mean annual high-water lines and 200-year flood lines were used to design location of shoreline plantings. The CVRD public mapping site provided legal property boundaries, as well as TimberWest Forest Corp.'s for the Cowichan Lake bed and foreshore. 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 inventoried.

Plant delivery to restoration sites occurred in the following ways:

- transported direct from the nursery by commercial operators;
- Picked-up by the CSSP project manager in a 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 better understand the ecology of selected native riparian species. All riparian species used are common to the Cowichan Lake shoreline ecosystem.

In 2017, plant species that were found to be preferred forage by ungulates and beavers in previous years (*Cornus stolonifera*, *Salix sp.*, *Myrica gale*, *Acer macrophyllum*, *Populus balsamifera* and *Physocarpus capitatus*) were protected from browsing by enclosing the entire plant with stucco wire mesh, supported with rebar. Snow fencing and/or perimeter fencing was also used at public park sites where summer pedestrian traffic is high.

Live-staking of three riparian species including *Cornus stolonifera* (Red-osier dogwood), *Populus balsamifera* (Black cottonwood), and *Salix scouleriana* (Scouler's willow) was continued in 2017, and the bioengineering technique of wattle-fencing was introduced as a shoreline restoration method. Shoreline

sites identified as having erosion issues resulting from lack of living root systems were prescribed for live-staking (D. Polster, 2016, pers. comm.). Live-cuttings were collected from TimberWest cut-blocks along Island Highway 18. Cuttings were approximately 2 meters in length and “staked” using a 1.5 m steel bar with a narrow, pointed end used to drive deep planting holes in the ground (NB. bar designed by Dave Polster and manufactured by a local iron worker). Public signs were designed/erected to depict the basic technique of live-staking with riparian species (Appendix 6).

2.2.4 Riparian Restoration Site Care and Maintenance

After completion of restoration planting, a degree of care and maintenance was critical to ensure high plant survival rates. Soaker hoses remained a convenient method of site irrigation to provide a survival buffer against summer drought conditions.

The CSSP Riparian Plant Care & Maintenance Manual was first created in 2016 and continued to be used in 2017. The manual highlights the ecology of native riparian species, amount of watering necessary post-planting, approximate time for each species to establish effective root systems (to achieve independence from irrigation), and how to prune for growth and desired 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 was first piloted in spring 2015 and will be continued in May 2018. Monitoring of perennial shrubs, conifers, ferns and sedges planted at all CSSP restoration sites is conducted twice annually, first in mid-October (the beginning of dormancy and before high-water events) and then early May (peak of vegetative growth cycle). Plants were assessed using a standardized monitoring form (Appendix 7) designed by the CSSP project manager. Naturally occurring riparian plants in close proximity to restored sites were used as ‘benchmarks’ against which to measure the progress of restoration treatments.

Plant survival and related conditions were recorded using the following criteria:

- 1.** Use of the site-planting plan to identify locations of all plant species installed in each shoreline restoration project, and identified by scientific name on planting labels attached at the base of each plant.
- 2.** Within each planting polygon, each plant species was counted, the condition and vigor noted, as was any observed herbivory.
- 3.** Photographic points were located that provided repeated unobstructed views over time.

Photo-point monitoring will be continued in spring 2018, and GPS photo identification markers will be established at all CSSP 2017 riparian restoration sites.

2.3 Community Engagement

In 2017, the CLRSS Board continued efforts to engage the Lake Cowichan community as part of the Society's 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 an overarching goal of "keeping the community informed." Restoration tours have typically been offered twice annually to Cowichan Lake and River residents, CVRD Planners, BC Parks staff, Cowichan Watershed Board members, Town of Lake Cowichan (TLC) councillors, local media, CLRSS board directors and other interested groups. Tours typically include several CSSP restoration demonstration properties where detailed explanations of restoration activities are provided.

3.0 Results and Discussion

3.1 Landowner Education

In 2016, three brochures and a manual were prepared and these continued to be distributed in 2017. Brochures were given to all CSSP property owners and made available to the general public. The manual was given to all CSSP riparian restoration participating landowners. A brief description of the brochures and 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 for the bursary. As Gerald 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 newly installed riparian plantings. 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 information on regulations and bylaws intended to protect natural riparian areas.

3.1.2 Landowner Visits and Surveys

In 2017, the level of shoreline owners’ awareness of issues related to the health of the Cowichan Lake continued to grow by 4% over the 2016 response rate. Most shoreline residents are aware of what constitutes their sensitive riparian areas, and only a small percentage (9%) believe they can remove natural shoreline vegetation with impunity (Table 1).

Table 1. CSSP “Revised” *Riparian Area Opinion Survey* results: Awareness & knowledge of environmental issues on Lake Cowichan.

Environmental Issues	2014 (88 participants)	2015 (82 participants)	2016 (53 participants)	2017 (69 participants)
Are you concerned about the health of the lake?	Yes / No 78% / 22%	Yes / No 91.5% / 8.5%	Yes / No 84.9% / 15.1%	Yes / No 89% / 11%
Are you aware of the location of the riparian area on your property? (This question was new in the 2017 revision)				Yes / No 81% / 19%
Are you allowed to clear native vegetation in the riparian area? Why do you think that is? (This question was revised in 2017)	Yes / No 30% / 70%	Yes / No 20% / 80%	Yes / No 10% / 90%	Yes / No 9% / 89%



Photo #1

Photo #2

Photo #3

Photo #4

Photo #5

In 2017, it appeared that shoreline owners may now be placing more value on natural riparian areas for visual aesthetics, when a solid majority of 60% selected the least developed shoreline as providing the best viewscape. This was followed by a perception that the least developed shoreline also provided the greatest recreational value, representing 36% of 2017 respondents. It is noteworthy that 2017 was the first year in which Photo #3 was not selected as the most preferred for recreational activities by shoreline owners. These new revelations may suggest the beginning of a positive shift in public sentiment about the innate social values of maintaining healthy riparian areas (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)	2017 (69 Participants)
In your opinion, which property has the best view from the house? (Selected from stock photos)	35.6% Photo #3	35.4% Photo #3 & #4	39.6% Photo #4	60% Photo #5
Which of these properties do you prefer for privacy? (Selected from stock photos)	38.6% Photo #5	44.6% Photo #5	39.6% Photo #5	35% Photo #5
Which of these properties have the most recreation value for you and your family? (Selected from stock photos)	42% Photo #3	47.5% Photo #3	30.2% Photo #3	36% Photo #5



In terms of environmental conditions, there was a modest decline (of 7.5%) in landowners' preference for the least disturbed shoreline in 2017 (i.e., photo #5). From 2014 to 2016, survey results remained relatively consistent. That said, the four year trend suggests there is still a need to increase public education about healthy shorelines, a task CLRSS continues to lead with enthusiasm (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)	2017 (69 Participants)
Which property would be best at resisting erosion and protecting water quality? (Photo 5 correct answer)	58% Photo #5	51.9% Photo #5	56.6% Photo #5	49% Photo #5
Which property provides the best habitat for fish and wildlife? (Photo 5 correct answer)	55.1% Photo #5	76.3% Photo #5	69.8% Photo #5	57% Photo #5



In terms of strict economic considerations, there was an apparent shift in landowner preference with photo #5 polling a surprising 51% of respondent support in 2017 (Table 4). This result is more in line with 2017 results in Table 2, where more shoreline residents are beginning to recognize the inherent (and not necessarily monetized) values of preserving natural riparian areas.

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

	2014 (88 Participants)	2015 (82 Participants)	2016 (53 Participants)	2017 (69 Participants)
Which property would require the least maintenance effort and cost? (This question was dropped in the revised 2017 survey)	42.2% Photo #5	48.8% Photo #5	52.8% Photo #5	N/A
Which do you think has greater real-estate value - a property with a cleared foreshore (like property #1) or an intact riparian area with lake access (like property #5) (This question was revised in 2017)	58.3% Photo #3	58.5% Photo #3	49.1% Photo #3	35% Photo #3 51% Photo #5
Are you interested in restoring your riparian area as part of CSSP?				Yes 17% No 83%
Are you interested in having your riparian area assessed in order to receive a CLRSS stewardship sign? (This question was added in 2017)				Yes 26% No 73%



Photo #1

Photo #2

Photo #3

Photo #4

Photo #5

3.2 Shoreline Restoration

In 2017, candidates for riparian restoration were identified from results of the 2016 *Riparian Area Opinion Survey* and from a prospective site tour of publicly-owned lands in late fall 2016. Private property owners who expressed a need for restoration generally recognized their shorelines were in poor riparian condition. An initial on-site site assessment followed to determine their eligibility based on biophysical criteria. In addition, a provincial park, forest recreation site, forest research center and municipal park, all with degraded or simplified riparian habitat, were selected as 2017 candidates. In total, 8 sites were finally confirmed for riparian treatments in 2017 (Fig. 4, 5).

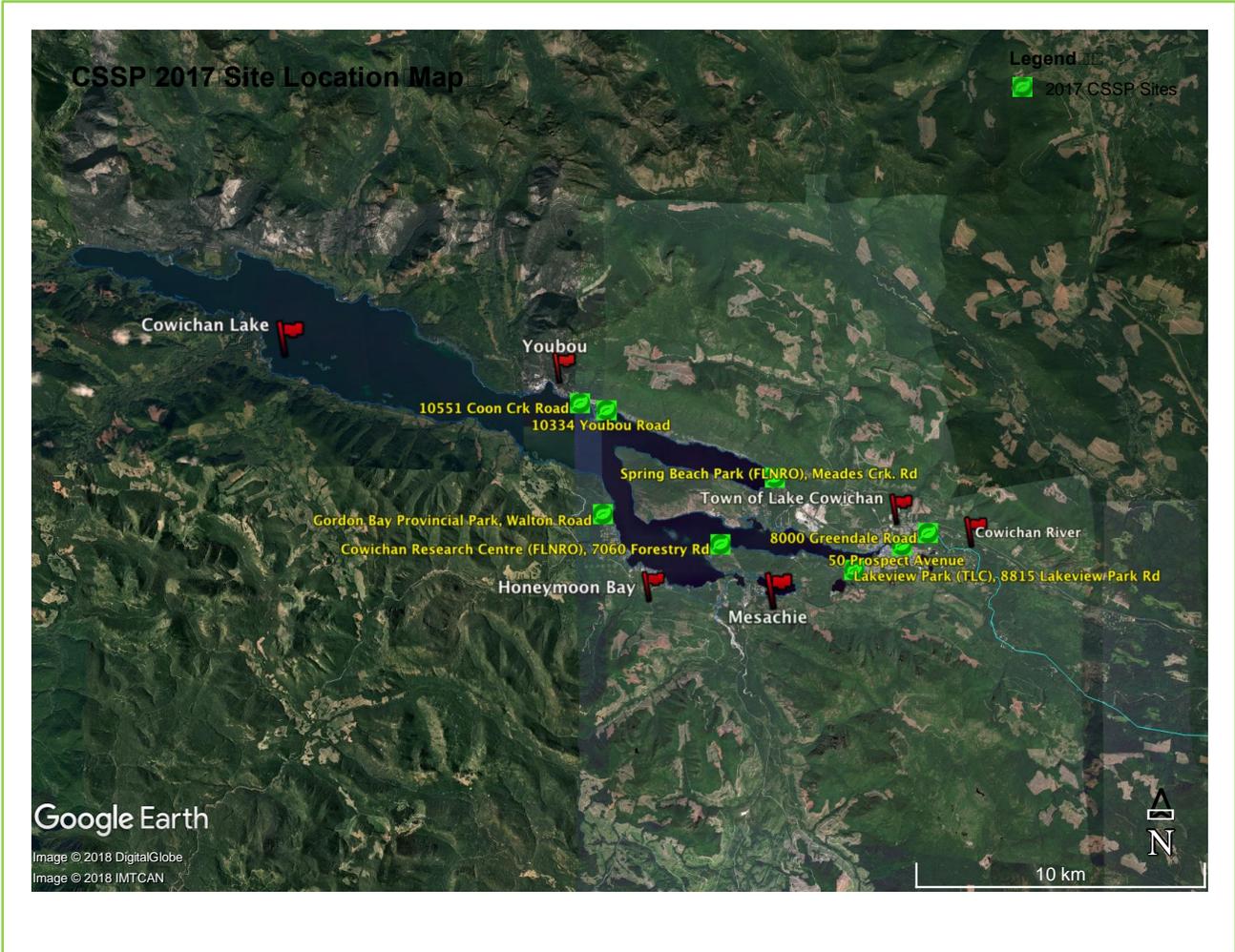


Figure 4. Location Map of 2017 CSSP properties where riparian restoration was completed on Cowichan Lake and River (i.e., green 'leaves' depict distribution of 2017 sites).

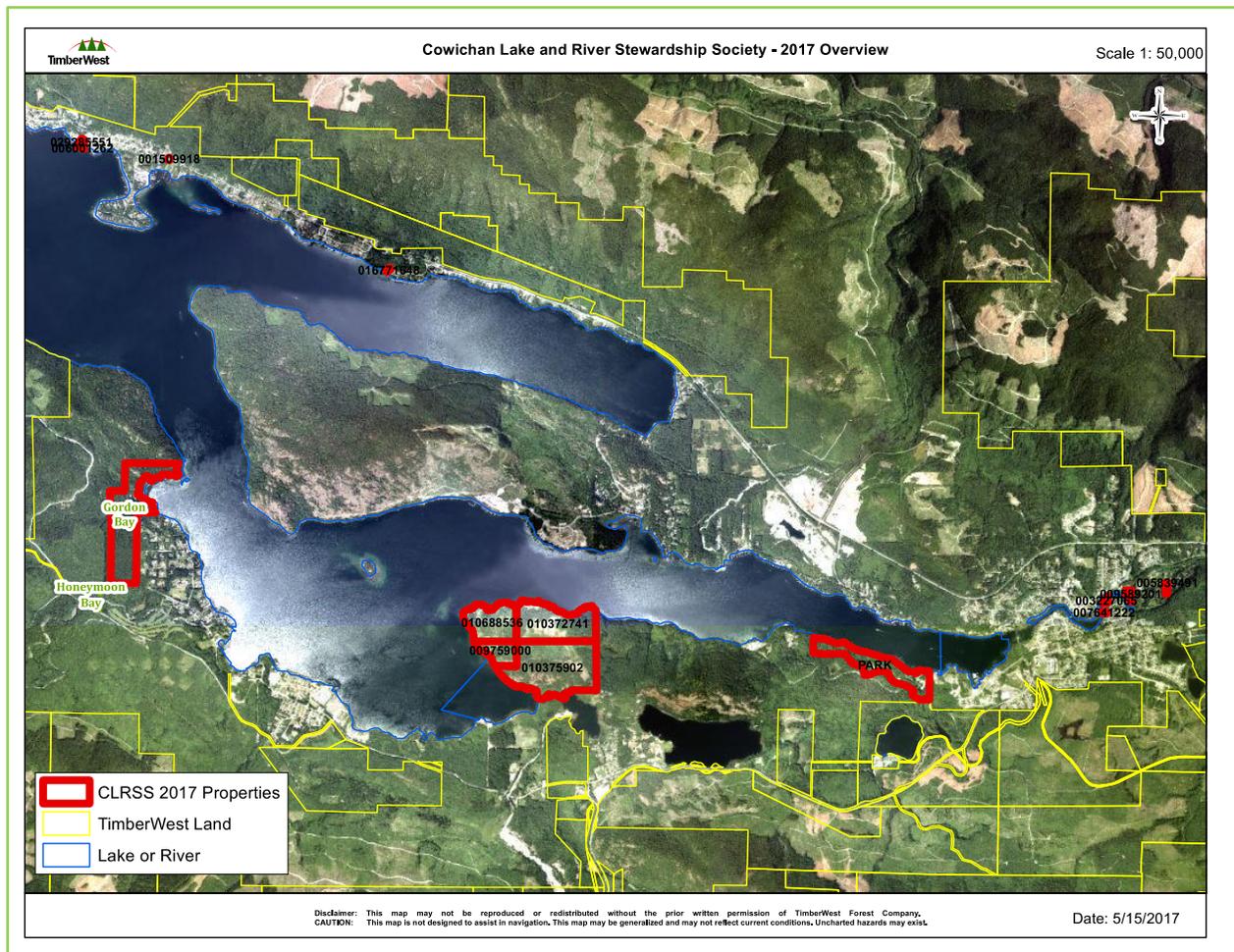


Figure 5. Overview map of 2017 CSSP sites in relation to TimberWest-owned foreshore property.

In 2017, 31% of total restoration labour involved removal of invasive plant species prior to any riparian planting (Table 5). Invasive species needed to be removed by hand due to most sites being inaccessible to machinery and many invasives well-mixed with native riparian plants, which needed to be protected.

In 2017, removal of invasive plant species took a total of 21.5 hours. This compares to 2014 when it took just 11 hours to remove invasives; in 2015 it took 44 hours; and in 2016 it took 62 hours. Consequently, invasive plant removal in 2017 showed a substantial decrease in the recent trend of increasing invasive species removal time at many CSSP restoration sites.

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

2017 Riparian Restoration Sites	Invasive Plant Species Present	Percent of Area (m ²) Requiring Removing Invasive Plants	Method(s) of Invasive Plant Removal	Time Spent Removing Invasive Plants
10334 Youbou Road, Youbou	Yellow flag-iris, Himalayan blackberry	20%	Hand-pulling; mattocks; Hand-clippers	2 Hour
10551 Coon Crk. Rd., Youbou	Himalayan blackberry	10%	Hand-pulling; mattocks; Hand-clippers	0.5 Hour
50 Prospect Ave.	Himalayan blackberry	50%	Hand-pulling; mattocks; Hand-clippers	3 Hours
8000 Greendale Rd., Cowichan Lake	English ivy, Himalayan blackberry, Yellow flag-iris, Canary reed-grass	90%	Hand-pulling; mattocks; Hand-clippers	8 Hours
7060 Forestry Rd., Mesachie	None	0%	None	0 Hours
61 South Shore Road, Lake Cowichan	Himalayan blackberry	50%	Hand-pulling; mattocks; Hand-clippers	8 Hours
8815 Lakeview Park Rd.	None	0%	None	0 Hours
Spring Beach Community Park (FLNRO)	None	0%	None	0 Hours
Total = 8 Sites		Average = 31%		Total = 21.5 Hours

A total of 954 potted plants and approximately 1,000 live-stake cuttings of Red osier dogwood (*Cornus stolonifera*), Black cottonwood (*Populus balsamifera*) and willow species (*Salix spp.*) were used for riparian restoration in 2017. The bioengineering method of revegetation using live-stake cuttings was implemented in 2016 and continued in 2017 because embedded cuttings act as: (1) soil augmentation; (2) barriers to earth movement; (3) moisture wicks; and, (4) hydraulic drains (Polster, 2016).

Another method of bioengineering using live-stake cuttings termed “live wattle-fence construction” was implemented in 2017. Live-wattle fences were used as a natural construction method for river bank

protection and erosion control (Fig. 6). Wattle-fences were used at two of the private properties and live-staking was completed at one public property. In 2017, 25% of the sites required live-staking or wattle-fencing due to the shoreline having steep slopes, extensive erosion, or were located on a riverbed where potted plants cannot be used effectively.



Figure 6. Construction of a live-stake wattle fence at a CSSP 2017 site along Cowichan River.

Table 6 summarizes the 2017 riparian planting types, amount of area restored and mean plant densities. Riparian planting was divided into “foreshore” and “upland” species based on a species’ affinity for wet or dry soil conditions. Of the 954 plants used, 89% used were foreshore species and 11% were upland species. Foreshore riparian plant species such as Hardhack (*Spirea douglasii*), Sweet gale (*Myrica gale*), Red-osier dogwood (*Cornus stolonifera*) and Willow species (*Salix. spp*), that are adapted to wet soils and can be partially submerged for a period of the year, were planted below the 164-meter elevation (i.e., the mean annual high-water elevation for Cowichan Lake).

Of the total 3,409 m² planted in 2017, 89% of the restoration areas were planted below the 164 m mean annual high-water level. Planting densities averaged one plant/0.45 m², based on restoration prescriptions of dense plantings for each site. Dense planting methods help to manage invasive species by providing rapid successional advancement of riparian vegetation. Creation of a canopy of woody species (shading the understory growth) can suppress the growth of problem weeds such as reed canary grass (*Phalaris arundinacea*) and blackberry (*Rubus discolor*), and other shade intolerant invasive species (D. Polster, MSc., RPBio., pers. comm.).

Table 6. 2017 Riparian habitat restoration statistics on plant totals, area and planting densities.

CSSP 2017 Riparian Restoration Sites	Riparian Plants Summary				Area Restored (m ²)	Mean Plant Density Plant/m ²
	Total Potted Plants (100% of Sites)	Live-stake Cuttings (25% of Sites)	Percentage of Foreshore Riparian Species	Percentage of Upland Riparian Species		
10334 Youbou Road, Youbou	164	0	100%	0%	510	0.32
10551 Coon Creek Road	26	0	65%	35%	45	0.60
Spring Beach Community Park, Meades Creek Road	136	0	100%	0%	264	0.51
8000 Greendale Road	55	200 (wattle- fence)	69%	31%	75	0.73
50 Prospect Road	31	350 (wattle- fence)	85%	15%	103	0.30
8815 Lakeview Road	85	0	100%	0%	175	0.48
7060 Forestry Road	359	0	100%	0%	1666	0.21
Gordon Bay Provincial Park, Walton Road	98	476 (live- stakes)	100%	0%	570.85	0.40
Totals	954	1,026			3,409	
Averages	119		90%	10%	426	0.45

Table 7 shows the ranking of various riparian plant species based on the total number of plant species used in 2017. Nootka rose (*Rosa nutkana*) was planted most frequently (in total plants and sites used) due to its ability to thrive a wide range of environments and its soil binding root systems (rhizome root systems). Hardhack (*Spirea douglasii*), along with Sweet gale (*Myrica gale*) and Slough-sedge (*Carex obnupta*), were also commonly used for their rhizome root systems that are capable of creating dense root thickets, aiding greatly in long-term resilience and survival.

Table 7. 2017 top ten riparian species used in shoreline habitat 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 Ecological Use
1	Nootka Rose	<i>Rosa nutkana</i>	sun/wet/dry	Foreshore/ Upland	200	8	2	Soil binding root systems
2	Red Osier Dogwood	<i>Cornus stolonifera</i>	Shade/sun/ wet	Foreshore	169	5	5	Provides excellent wildlife/fish hiding cover. Easily survives competition from grasses
3	Scouler's Willow	<i>Salix scouleriana</i>	sun/wet	Foreshore	100	8	2	Establishes easily with direct sticking of cuttings. Used for bio-engineering and slope stabilization.
4	Sweet gale	<i>Myrica gale</i>	sun/wet	Foreshore	95	4	1	Can grow partially submerged year-round below 164m; root system creates excellent cover for juvenile salmonids
5	Slough Sedge	<i>Carex obnupta</i>	shade/wet	Foreshore	80	2	1	Spreads quickly through long-stout rhizomes
6	Hardhack	<i>Spirea douglasii</i>	sun/wet	Foreshore	56	5	2	Provides excellent wildlife cover. Easily survives competition from grasses. Dense thickets have human buffering capability
7	Black Twinberry	<i>Lonicera involucrata</i>	moist/partial shade	Foreshore	50	4	5	Rapidly developing root system. Provides excellent wildlife forage and cover
8	Salmonberry	<i>Rubus spectabilis</i>	shade/wet	Foreshore	30	2	2	Rapidly developing root system. Provides excellent wildlife forage and cover
9	Oceanspray	<i>Holodiscus discolor</i>	sun/dry	Upland	20	2	3	Drought tolerant
10	Sitka Willow	<i>Salix sitchensis</i>	sun/moist	Foreshore/ Upland	10	2	2	Have apical meristems throughout plant; Establishes easily with direct sticking of cuttings. Used for bio-engineering and slope stabilization

Seasonal summer drought is common in the Cowichan watershed and drought-tolerant species such as Nootka rose (*Rosa nutkana*) and Oceanspray (*Holodiscus discolor*) were planted above the 164 m mean annual high-water mark, and in areas with steeper slopes where water runoff is greatest. From May to

September 2017, Cowichan Lake levels declined steadily (Fig. 7), and average air temperature was approximately 20°C for July and August (Fig. 8; Gov. Canada 2017). Daily summer maximum temperatures were considerably warmer.

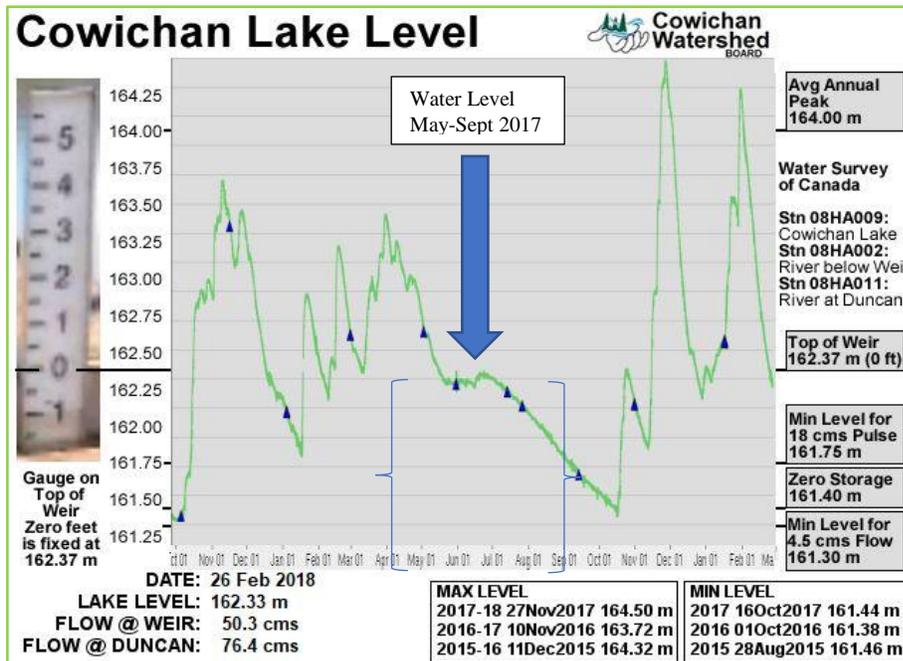


Figure 7. Cowichan Lake water levels during CSSP planting May to September 2017 (Cowichan Watershed Board, 2017).

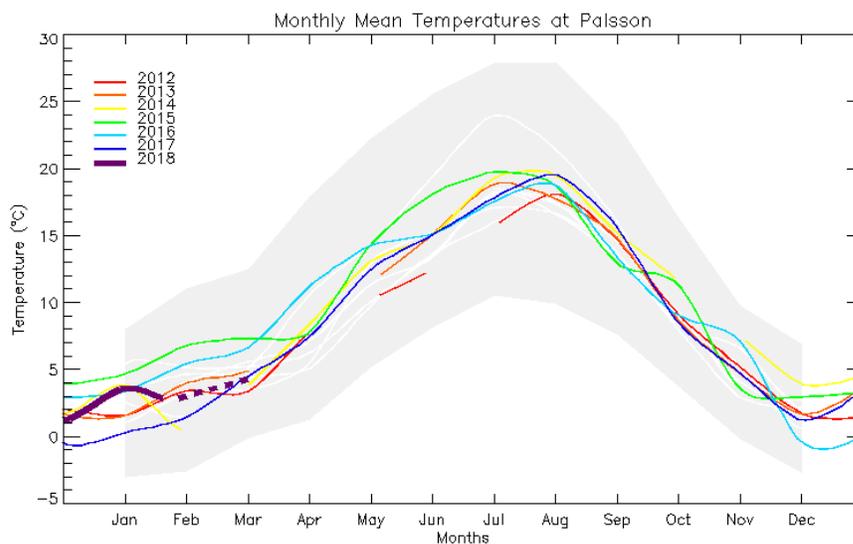


Figure 8. Monthly average air temperature recorded at Palsson Elementary School in Lake Cowichan (2012-2018; Gov. Canada 2017).

CSSP sites restored in 2017 with gravel shorelines had an average of 45% existing native riparian plant coverage below the mean annual high-water mark. Efforts to introduce foreshore plants capable of withstanding seasonal lake inundation have proved successful in stabilizing the shore and creating better

habitat for rearing salmonids (Law 2012). Success has been measured through an annual plant survival monitoring program led by the CSSP project manager. Plant survival monitoring for years 2014, 2015, 2016 and 2017 will be conducted in May of 2018, along with standard photo-point monitoring that will visually show the results of plant growth.

Fig. 9 shows an example of photo-point monitoring from a 2014 CSSP site that displays the progression from a cleared foreshore to its current status in 2017, exhibiting substantial growth of re-introduced riparian species which are contributing to shore stabilization and habitat creation.



Figure 9. Before (2014) and after (2017) at Paradise RV Park, a 2014 CSSP riparian restoration site.

3.3 Community Engagement

In May 2017, CSSP staff continued to engage with student youth at Lake Cowichan School (LCS) by conducting a native riparian plants identification lesson (Fig. 10). The lesson was taught to grades 4/5 and Biology 11 students and consisted of three components: (1) A 20-minute PowerPoint presentation on the riparian area and its ecological importance; (2) A field trip to Saywell Park (Town of Lake Cowichan) for a 30-minute riparian plant identification lesson, and practical demonstration on taking willow and red osier dogwood cuttings; and (3) Transferring and planting the cuttings in the LCS greenhouse. In 2017, heavy rains occurred on the day of the lesson and the field component was cancelled. As a contingency, CSSP staff brought in cuttings of local riparian vegetation to identify and discuss propagation methods with the students.



Figure 10. LCS Grade 4/5 class PowerPoint on CSSP Riparian Education created by CSSP student staff.

CSSP staff continued to engage students in grades 6 and 7 from Cowichan Valley District Schools at the Cowichan Lake Outdoor Education Centre (CLEC) in spring 2017 (Figure 11). A total of 70 were divided into 3 groups of 20-30 students each to participate 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 11. Lake Cowichan School (LCS) Grades 6/7 students at the Cowichan Lake Outdoor Education Center (CLEC) for riparian plant species lesson (spring 2017).

In early June 2017, CSSP staff also engaged with the general public by participating in a Royal Bank of Canada (RBC) *Blue Water Day* in Nanaimo. RBC's *Blue Water Project* helped fund CSSP in 2017 with a grant of \$10,000 for riparian restoration.

RBC's *Blue Water Project* is a 10-year global charitable commitment of \$50 million to more than 770 charitable organizations worldwide that helps protect and steward clean water. An information booth was set-up at RBC's Woodgrove Branch where CSSP staff offered brochures, reports and other literature about the project to bank clients and others, as well as an enter-to-win raffle. A formal RBC cheque presentation was also given on the day in celebration of the *Blue Water Project's* support for CSSP in 2017. In summer 2018, the plan is to have local RBC staff volunteer some time planting at a CSSP restoration site on the next *Blue Water Day*.



Figure 12. RBC *Blue Water Day* cheque presentation to CSSP project manager, Christine Brophy (4th from right) of BCCF.

On September 2, 2017, CSSP staff hosted a *Riparian Restoration Site Tour* for project funders, CLRSS members, CVRD staff and 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 persons. The tour included visits to five properties selected from 2014, 2015,

2016 and 2017 restoration sites that demonstrated a variety of riparian prescriptions, planting techniques and types of foreshore conditions that warranted restoration (e.g., eroding shorelines, foreshores cleared of riparian vegetation, invasive species management, etc.). The tour ended with a “wrap-up luncheon” at a CSSP private site to provide an opportunity for further discussion about CSSP progress to date. The Lake Cowichan Gazette subsequently published an article on the tour emphasizing the importance of riparian areas and the negative impact that clearing riparian habitat has on the large lake environment.



Figure 13. Lake Cowichan Gazette news article on CSSP Riparian Restoration Site Tour, September 2017.

CLRSS members continued to devote enormous energy to the CSSP objective of public engagement and environmental education. In 2017, more than 400 hours of volunteer time was spent conducting shoreline owner surveys, attending special community events, riparian planting and attending public meetings with fellow concerned citizens.

4.0 Recommendations for Future CSSP Activities

1. Increase CSSP media exposure.

To raise general public awareness of CSSP, there is a pressing need to increase the amount of local media coverage. CSSP should contact local media outlets like Shaw Cable, CHEK-TV, Lake Cowichan Gazette and CVRD News for interviews about the CSSP in 2018.

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 instill knowledge on riparian/large lake ecosystems that is currently not offered in the local public-school system.

3. **Introduce emergent and submergent aquatic plants at some sites.**
Given recurring low summer water levels on Cowichan Lake, consideration should be given to planting aquatic macrophyte species at some sites. In addition to enhancing habitat complexity for fish and invertebrate species, these plants can help buffer sensitive shorelines against wave erosion.

4. **Encourage property owners to prune planted riparian vegetation to increase root growth.**
The CSSP *Native Plant Care & Maintenance Manual* was developed by the project manager and explains how to properly prune native riparian species. This should be more broadly reinforced by staging a local workshop at Cowichan Lake to educate shoreline owners about care and maintenance of riparian species, as well as implementing invasive species control on their properties.

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

 <p>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.</p> <p>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.bcslss.org/</p> <p>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.</p> <ul style="list-style-type: none"> 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 	 <p>Cowichan Lake and River Stewardship Society PO Box #907 Lake Cowichan, BC V0R 2G0</p> <p>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</p> 	 <p>Cowichan Lake & River Stewardship Society Dedicated to the Protection and Health of the Cowichan Watershed</p> 	 <p>Cowichan Shoreline Stewardship Project</p> <p>The Cowichan Lake and River Stewardship Society has set the goal of protecting 35% and restoring 2% 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 UBC Environmental Studies student to supervise the restorations.</p> <p>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.</p>	 <p>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.</p> <p>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.</p> 	 <p>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 garbage 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.</p> <p>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.</p> 
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Gerald Thom Bursary Brochure

<p>Gerald's Legacy:</p> <p>Encouraging Environmental Study and Action for Generations to Come</p> <p>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.</p> 	 <p>The Cowichan Lake and River Stewardship Society PO Box #907 Lake Cowichan, BC V0R 2G0</p> <p>President: Leroy Van Wieren 250-709-7308 clrss.questions@gmail.com www.cowichan-lake-stewards.ca</p>	 <p>Announces</p> <p>The Gerald Thom Environmental Studies Bursary</p>  <p>www.cowichan-lake-stewards.ca</p>	 <p>The Gerald Thom Bursary \$1,000</p> <p>Conditions One annual bursary is awarded in the name of Gerald Thom to honour his substantial contributions to ecological restoration, environmental education and advocacy.</p> <p>Eligibility Priority will be given to LCS applicants planning to enrol in post-secondary environmental studies related courses.</p> <p>Criteria Preference for this Bursary will be awarded to a Lake Cowichan School student who:</p> <ul style="list-style-type: none"> 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. 	<p>Applications</p> <ol style="list-style-type: none"> Application forms are available from the Lake Cowichan School Office. Applications will be reviewed and recipients selected by the LCS and CLRSS Education Committee. <p>Donations</p> <p>If you would like to donate to the Gerald Thom Environmental Studies Bursary Program please send contributions to:</p> <p>CLRSS, PO Box 907 Lake Cowichan BC V0R 2G0</p> <p>or</p> <p>Lake Cowichan School, 150 South Shore Rd. PO Box 40, Lake Cowichan, BC V0R 2G0</p>  <p>Cowichan Lake and River Stewardship Society www.cowichan-lake-stewards.ca</p>
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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-stewardship.com 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

Riparian Insights



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

www.cowichan-lake-steward.ca

What can we do?

- 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.
- Minimize impact when accessing the water.**
 - Use only one point of access, build docks, frame views and use gravel pathways.
- 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.
- 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.
 


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-steward.ca

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.

Cowichan Shoreline Stewardship Project: 2016 Annual Report

Appendix 2: Revised Riparian Area Opinion Survey.

SCRIPT		
<p><i>Hello my name is # and this is #. We are from the Cowichan Lake and River Stewardship Society. Are you aware of our work?</i></p> <p>DATE:</p>	<p><i>Part of our stewardship work involves having a conversation with as many lakeshore property owners as we can. Would you have 10 minutes for us?</i></p> <p>NAME:</p>	<p><i>We have a simple and fun survey that we do with folks. There are 10 questions. May we have this information?</i></p> <p>ADDRESS:</p>
PHONE NUMBER:	EMAIL ADDRESS:	LENGTH OF OWNERSHIP in YEARS:
FULL-TIME or PART-TIME	LAKEFRONT or RIVERFRONT (CIRCLE ONE)	
QUESTION 1	Are you concerned about the health of Cowichan Lake/River? If so, what exactly are you concerned about?	COMMENTS:
QUESTION 2	<p>Are you aware of the location of the riparian area on your property? (If not, explain the RAR)</p> <p>In 2006 the Provincial Government passed a law protecting the riparian area on private land. The riparian set-back is 30m from the average high winter water mark on either side of any watercourse, river or lake. This law asks local governments like the CVRD to pass bylaws to protect the special zone nearest any water course. The law is designed to protect fish habitats. A Qualified Environmental Professional (QEP) can assess the property and advise home-owners about variances to the bylaws.</p>	COMMENTS:
QUESTION 3	Are you allowed to clear native vegetation in the riparian area? Why do you think that is? (If unaware, explain science)	COMMENTS:
QUESTION 4	<p>Which of these properties would be best at resisting erosion and protecting water quality? (If unaware, explain science) 1 2 3 4 5</p> <p>Erosion is the washing away of land on the edge of the water. Wind, waves, and human activity can allow soil to wash into the lake water. The foliage of native riparian plants buffers rain and wave action and the roots hold the soil intact. The energy from wave action is absorbed by plants, shrubs and trees, protecting the foreshore from washing away. Manmade retaining walls can contribute to erosion because the energy of the waves is transferred to the wall footings, washing away the lake bottom supporting the wall. Over time, the wall will collapse. Loose, fine gravel that we like for our beaches is lifted and deposited further down the shoreline.</p>	COMMENTS:
QUESTION 5	<p>Which of these properties provides the best habitat for fish and wildlife? (If unaware, explain science) 1 2 3 4 5</p> <p>The riparian area is incredibly important to leave as nature had intended. This is because the trees drop leaves and insects that become fish food; the overhanging branches provide shade to moderate water temperatures and provide a protective cover in which small fish can hide from predators; the plants hold the soil in place so that sediment does not wash into the lake, covering fish and amphibian eggs, and reducing visibility for the larger fish. Birds need nesting places, food sources and protection for their young. Amphibians need a shady, moist habitat. Deer and elk forage on shrubs. Mink and otter burrow into banks and decaying logs. Fallen trees, called large woody debris, provide cover and also protect the foreshore from erosion.</p>	COMMENTS:
QUESTION 6	In your opinion, which of these properties has the best view from the house? 1 2 3 4 5	COMMENTS:
QUESTION 7	Which of these properties do you prefer for privacy? 1 2 3 4 5	COMMENTS:
QUESTION 8	Which of these properties would have the most recreational value for you and your family?	COMMENTS:
QUESTION 9	<p>Which do you think has greater real-estate value – a property with a cleared foreshore (like property 1) or an intact riparian with access (like property 5)? 1 2 3 4 5</p> <p style="text-align: center;">1 5</p>	COMMENTS:

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Appendix 3: Example CSSP Riparian Restoration Site Plan.

Property Owner Name				Location on Lake: Lot: VIP: Parcel:		5608 Riverbottom Road West, Sahtlam, BC 11 13329 001-851-764				
Start and End Date of Restoration (yyyy-mm-dd)				Time to Complete Project (24hrs)				Project Lead		Christine Brophy
Enviro/Lake Conditions	Precipitation		<input checked="" type="checkbox"/> None		<input type="checkbox"/> Light		<input type="checkbox"/> Moderate		<input type="checkbox"/> Heavy	
	Cloud Cover		<input type="checkbox"/> 0-25%		<input type="checkbox"/> 25-50%		<input type="checkbox"/> 50-75%		<input type="checkbox"/> 75-100%	
	Foreshore Elevation (m)		79m		Site Aspect		Southern			
Site Information	Total Area (m ²) below 164m		Polygon #1 12.37L x 4.6 W = 56.9m ² Polygon #2 16.15L x 3.4W = 54.9m ² Total = 111.8m ²		Area (m ²) actually planted		111.8m ²			
	GPS Coordinates Lat/Long		48.7665° N 123.8785° W		Linear metres of planting		28.8m			
	Site Comments		<ul style="list-style-type: none"> Property owned for approx. two years by the Pritchard's Previous owners there for decades; cleared in 90's forest 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 in 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		<input type="checkbox"/> Sparse or _____ 0 %			Submergent Veg		<input checked="" type="checkbox"/> Sparse or _____ %			
Dominant Species:					Dominant Species:					
					<ul style="list-style-type: none"> Row of alders along river 					
Restoration Planning										
Plan Compiled by: <input checked="" type="checkbox"/> D. Polster <input checked="" type="checkbox"/> C. Brophy										

Site Restoration Objectives

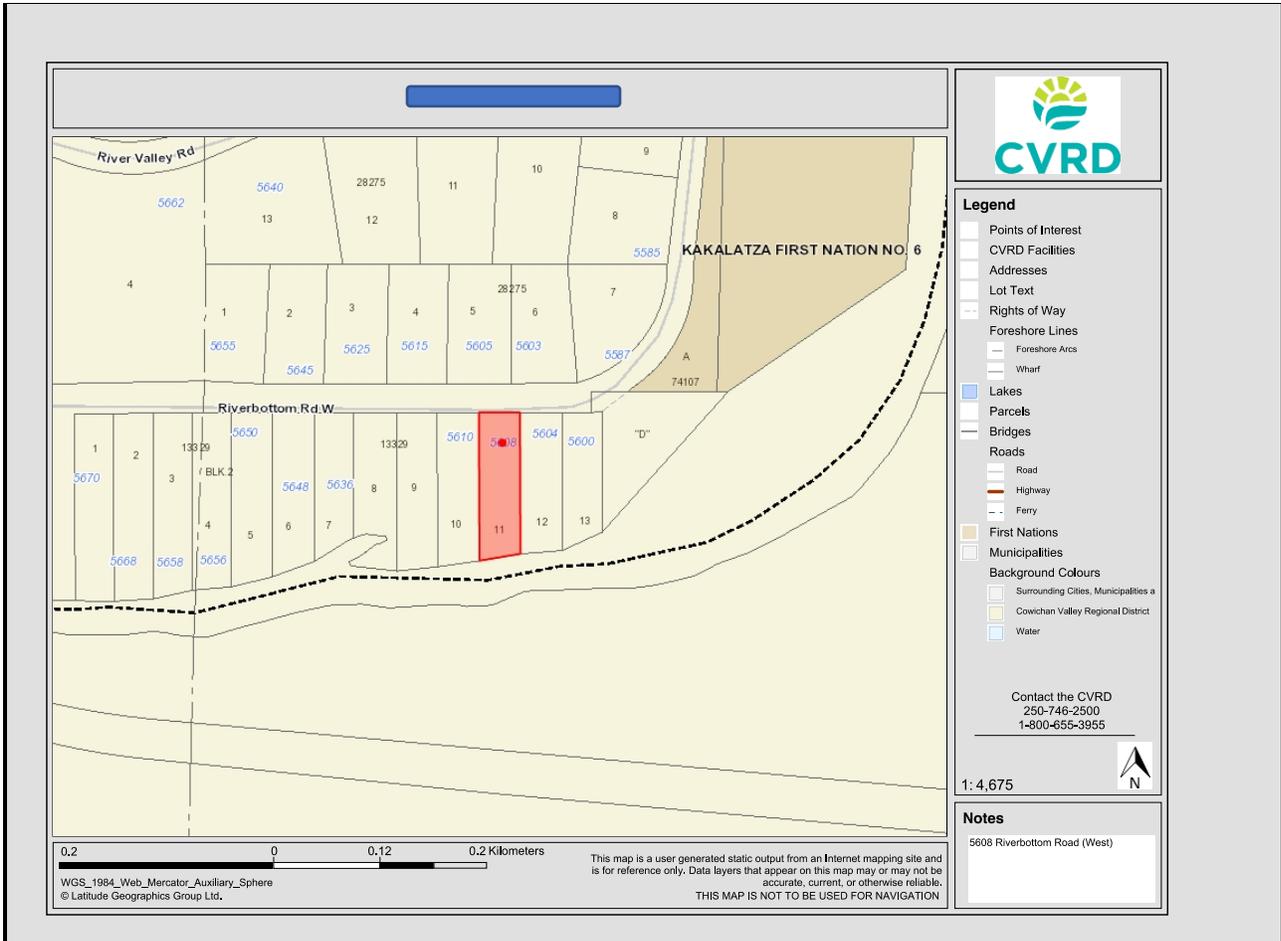
- Stabilize bank with willow root systems through live-staking
- Alders along high water's edge
- Black-cottonwood
- Conifers above high water
- Slough sedge along fringe of high water mark



- 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 mattocks, 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 Lake 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 Form.



British Columbia
Conservation
Foundation

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

The riparian zone refers to terrestrial areas adjacent to waterways which exert significant influence on processes occurring within fresh water ecosystems. The riparian area is the "living" interface between land and a lake, river, stream or wetland. This agreement ensures that both BCCF & Cowichan land owner(s) accept specific details of the planned riparian restoration, the financial contributions and post-restoration maintenance and monitoring procedures.

The Land Owner agrees:

To the restoration as discussed:

Proposed timing:

Approximate number of plants, species and square metres treated:

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

To allow BCCF employees and supervised volunteers to access their property to perform the agreed work;

That BCCF is responsible and liable for their staff and volunteers while they are on the owner's property performing agreed work;

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

To allow BCCF staff to visit the site, at agreed times and with prior permission, to demonstrate the work, monitor plant progress and conduct applied research;

That riparian restoration is a one-time commitment, and that BCCF is not legally required to continually monitor, repair or replace initial riparian plantings;

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

Additional comments & considerations:

Land Owner(s) Signature(s):

Property Address:

Date:

BCCF Staff Signature:

Date:

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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		<input type="checkbox"/> None	<input type="checkbox"/> Light	<input type="checkbox"/> Moderate	<input type="checkbox"/> Heavy
	Cloud Cover	<input type="checkbox"/> 0-25%	<input type="checkbox"/> 25-50%	<input type="checkbox"/> 50-75%	<input type="checkbox"/> 75-100%		
	Water Temp	Foreshore Elevation (m)			Site Aspect		
Site Information	FIM Reach #	Total Area (m ²) below 164m		Area (m ²) actually planted			
	GPS Coordinates Lat/Long						
	Site Comments & Planting Methods						
Shoreline Characteristics							
Substrate	%Bdrk	%Bldr	%Cbbl	%Grvl	%Snd		
Slope (%)							
Existing Emergent Veg	<input type="checkbox"/> Sparse or _____%		Submergent Veg		<input type="checkbox"/> Sparse or _____%		
Dominant Species:			Dominant Species:				
Restoration Planning							
Plan Compiled by: <input type="checkbox"/> D. Polster <input type="checkbox"/> Christine Brophy <input type="checkbox"/> 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:							

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Appendix 7: Riparian Area Restoration Monitoring Form.

Riparian Restoration Monitoring Field Form				Date									
				Time									
				Crew									
Property name & location on Lake/River:				Site History				Management or restoration since last visit					
Enviro/Lake Conditions		Air Temp (°C)		Season		<input type="checkbox"/> Spring		<input type="checkbox"/> Summer		<input type="checkbox"/> Fall <input type="checkbox"/> Winter			
		Cloud Cover (%)		<input type="checkbox"/> 0-25		<input type="checkbox"/> 25-50		<input type="checkbox"/> 50-75		<input type="checkbox"/> 75-100			
		Water Temp (°C)		Foreshore Elevation (m)				Site Aspect					
Site Information		Lake Level (m)		River Flow (m³/s)		Weather		Control Reference Site					
		GPS Coordinates Lat/Long											
		Site Comments											
Observations													
Substrate (For Summer Surveys Only)		%Bdrk		%Bldr		%Cbbl			%Grvl		%Snd		
Slope (%)													
Approximate survival or mortality rate		_____ %		Vigor (High, Moderate, Low)		_____							
Competing Vegetation/Invasive				Native Riparian Seedling Abundance									
Disturbance indicators													
		Yes (High/Med/Low)		No				Yes		No			
Surface Erosion						Elk Grazing							
Sediment Deposition						Bear							
Erosion from wave action						Beaver Damage							
Roots exposed (planted too shallow)						River Otter uprooting							
Comments:													
Upland/Foreshore Riparian Species Count													
Species	Tally	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				
Comments: <hr/> <hr/> <hr/>													

Appendix 8: Example of CSSP Riparian Plant Species Treasure Hunt Worksheet.

Plant name	Picture	Draw the flower/ leaves	Ecological Importance
			
			
			
			