

# **Cowichan Shoreline Stewardship Project 2018 Annual Report**



**BRITISH COLUMBIA  
CONSERVATION  
FOUNDATION**



**Cowichan Lake & River  
Stewardship Society**

Prepared by:

Christine Brophy, Isaac Anderton, Melissa Evans

British Columbia Conservation Foundation  
1-7217 Lantzville Road  
Lantzville, BC, V0R 2H0

Cowichan Lake and River Stewardship Society  
P.O. Box #907  
Lake Cowichan, BC, V0R 2G0

May 2019

## Summary

In 2014, the Cowichan Shoreline Stewardship Project (CSSP) was implemented with the goal of reversing riparian and foreshore habitat loss related to single family home development along Cowichan Lake and River. The major objectives of CSSP are to (1) work with private landowners to restore up to 2,500 m<sup>2</sup> of lake and upper river shoreline habitat, annually, (2) provide local, high profile examples of the benefits of maintaining and restoring natural shorelines for ecological shoreline property resiliency, and (3) proactively inform and educate community members (students, landowners) on the inter-dependencies between shoreline habitats and land use practices.

The initial phase of CSSP (2014 – 2017) restored 8,602 m<sup>2</sup> of Cowichan Lake's shoreline. In addition, 215 landowner opinion surveys were completed to engage owners on best shoreline stewardship practices and identify continuing opportunities for riparian habitat restoration.

Phase 2 of CSSP (2017 – 2019) is now underway. In the summer of 2018, CSSP team members restored 3,117 m<sup>2</sup> of shoreline habitat at seven properties, including five private residences, a municipal park, and the province of BC's forestry research station, exceeding the annual target of 2,500 m<sup>2</sup>. A total of 384 m<sup>2</sup> were cleared of invasive species and the sites re-planted with 869 native potted plants (Hardhack, Nootka rose, Sweet gale) and 354 live-stake cuttings (Black cottonwood, red-osier dogwood, willow spp.). These efforts brought the total number of shoreline properties restored by CSSP to 39 as of 2018 and the total restored area to 13,812 m<sup>2</sup> along 1,336 linear meters of shoreline.

In addition to restoration activities, educational brochures were distributed to landowners and the general public and a riparian plant care and maintenance manual was provided to project site owners. Sixteen new participants took the riparian area opinion survey – short of the annual goal of 75 surveys completed, per annum – due to limitations on the number of shoreline residents who have not already completed the survey. It appears that the project has reached a “saturation point” in this regard, with all lakeshore residences having been visited once, and many more than once. However, the project's community engagement expanded in other respects, including riparian outdoor education classes for students from Lake Cowichan School and the Cowichan Lake Education Centre. CSSP also engaged surrounding communities through participation in Royal Roads University's Master's Program in Leadership (CLRSS led presentation and report on CSSP) and held a tour for local developers and realtors of restored shoreline properties in the fall of 2018.

## **Acknowledgments**

The BC Conservation Foundation (BCCF) and the Cowichan Lake and River Stewardship Society (CLRSS) wish to thank the following funders: Canada Summer Jobs (Summer Work Experience program, Government of Canada), Habitat Conservation Trust Foundation, Recreational Fisheries Conservation Partnership Program (Fisheries and Oceans Canada), and the Pacific Salmon Foundation.

BCCF and CLRSS also acknowledge the contribution of the following organizations to CSSP: Cowichan Valley Naturalists, Cowichan Community Land Trust, Lake Cowichan Secondary School, Town of Lake Cowichan, and Polster Environmental Services Ltd. Finally, BCCF and CLRSS wish to thank Cowichan Lake landowners who participated in riparian restoration activities on their properties. Many thanks are also extended to Cowichan Tribes for their cooperation on efforts to restore the Cowichan watershed's shoreline.

### *Special Dedication (in memoriam)*

The 2018 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 and spirit will always be greatly missed!

## Introduction

An estimated 30% of Cowichan Lake's shoreline has been impacted by single family housing-related disturbance, including lakebed substrate modification, riparian vegetation removal, and construction of retaining walls and docks (Law et al. 2012). In 2007, the Cowichan Basin Water Management Plan proposed a series of actions to proactively manage the basin's water resources and ecological function (CVRD et al. 2007). The Cowichan Shoreline Stewardship Project (CSSP) evolved to address several of the plan's objectives including, to "maintain, enhance, and restore aquatic and riparian habitats" and "foster basin thinking among all water users in the Cowichan Basin and ensure they understand and support water management initiatives".

Specific Management Plan actions addressed by the CSSP include:

- Inventory and assess aquatic and riparian habitats and restoration opportunities
- Expand habitat improvement projects, including riparian restoration and replanting
- Develop educational initiatives to enable students to understand important water issues and stewardship initiatives in their community
- Involve volunteers and form partnerships with nongovernmental organizations

In 2014, the British Columbia Conservation Foundation (BCCF) and Cowichan Lake and River Stewardship Society (CLRSS) acquired funding to begin addressing riparian and foreshore habitat loss related to single family home development along Cowichan Lake and River. The major annual objectives of CSSP are to (1) work with private landowners to restore up to 2,500 m<sup>2</sup> of lake and river shoreline habitat, annually, (2) provide local, high profile examples of the benefits of maintaining and restoring natural shorelines for ecological resiliency and in terms of sustaining shoreline properties, and (3) proactively engage and educate local developers, realtors, elected officials, and community members (students, landowners) on shoreline stewardship efforts.

CSSP is now in its second phase of implementation, following a three-year pilot project (2014–2017) spearheaded by CLRSS. CLRSS continues to lead the public education and community outreach components of the project, while BCCF leads project management and implementation of shoreline restoration activities.

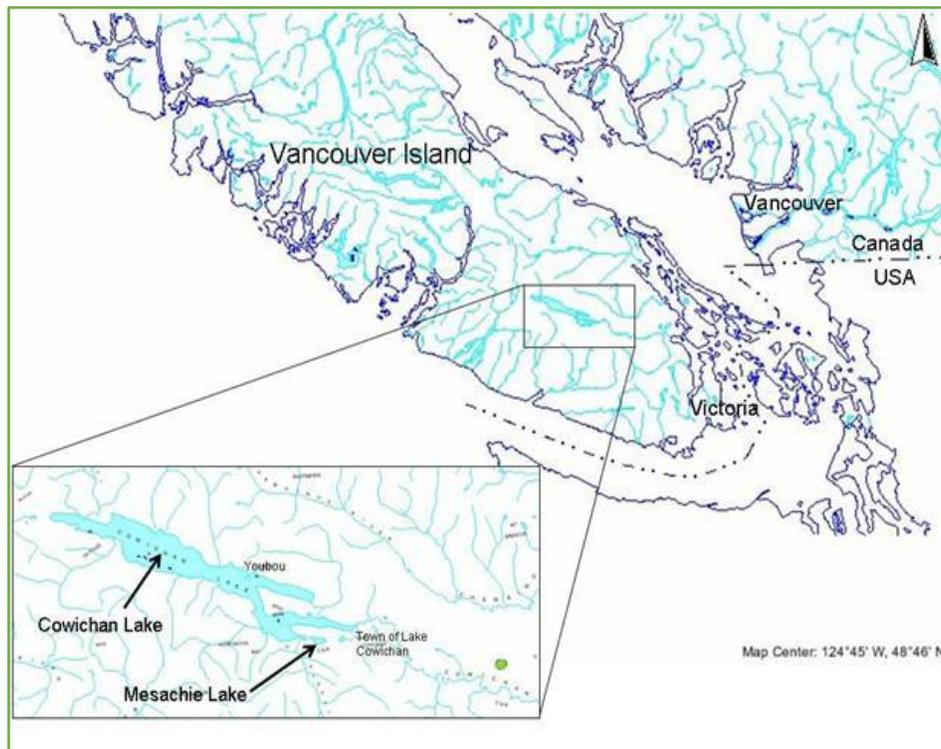


Figure 1. Location of Cowichan Lake and River on south central Vancouver Island, BC.

## Methods

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 the province of British Columbia (Figure 1). The lake supplies drinking water to the towns of Lake Cowichan and Crofton. Lake Cowichan (pop. 2,974) is located at the east end of Cowichan Lake and the communities of Youbou (pop. 1,000) and Honeymoon Bay (pop. 600) are located along the north and south shores of the lake, respectively. Downstream of the lake, the Cowichan and Koksilah rivers and estuaries have faced additional encroachment from the growing community of Duncan. Historically, most sites identified for restoration by CSSP have been located on the northern shore of Cowichan Lake and in or near the Town of Lake Cowichan where the largest concentrations of private properties are located (Figure 2).

### *Shoreline Restoration*

Candidate properties for riparian restoration are brought to the attention of CSSP through expression of interest during landowner visits and interviews, landowners contacting CLRSS after being interviewed in previous years, or through Cowichan Valley Regional District referral. Some property owners were legally required to implement riparian restoration due to contravention of the Cowichan Valley Regional District bylaw regarding Riparian Area Regulations. Criteria considered when selecting a potential restoration site include: the ecological function of the riparian area, impact of erosion on the shoreline, invasive species

management, existing shoreline alterations, surrounding native riparian species, annual water level fluctuation, and shoreline substrate composition.

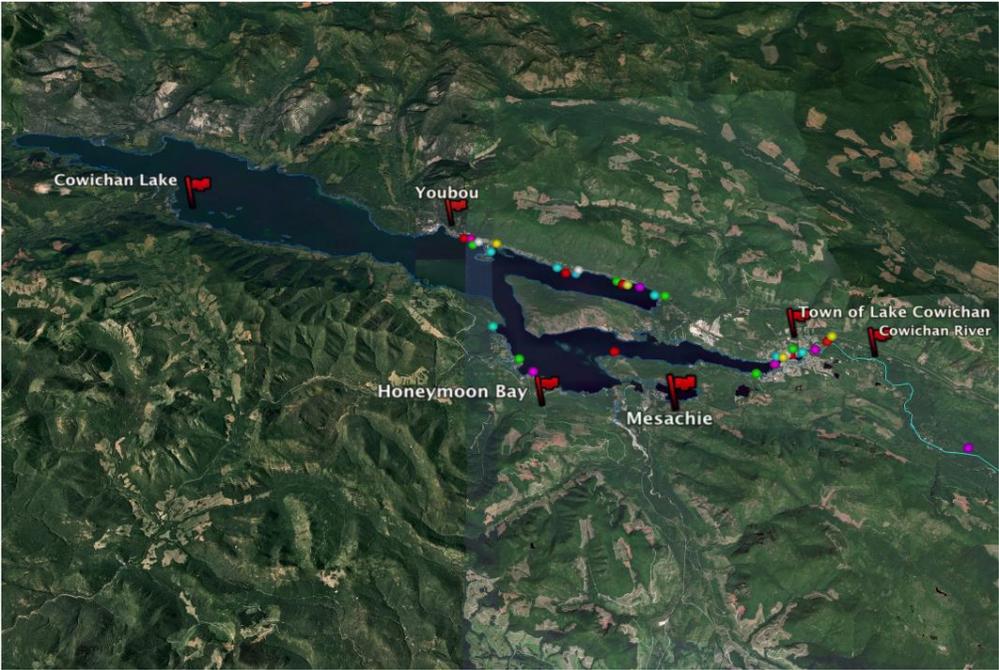


Figure 1. Locations of previously restored shoreline properties around Cowichan Lake and the upper river.

In 2018, a final list of candidate restoration sites was confirmed by May. Restoration site planning and permitting was then completed using the following process:

1. An initial visit to the shoreline property was completed to identify and estimate impacts from development to the riparian area and to discuss restoration approaches with the landowner;
2. A site restoration plan was prepared identifying the objectives for restoration and the pre-restoration physical condition of the site, the amount of area to be restored, native species to be used, and any invasive plants to be removed (Appendix 1). Maps showing mean annual high-water levels and 200 year flood levels were used to design the location of foreshore plantings;
3. Draft plans were reviewed by Dave Polster, a local restoration ecologist, and revised as needed;
4. A second visit with the property owner to discuss the final draft of the riparian restoration plan and confirm the scope of work to be performed, at which time a CSSP/BCCF Property Riparian Area Restoration Agreement was signed-off by the CSSP Field Manager and the property owner;
5. The landowner provided a letter of approval, agreeing to the project, which 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 BC Water Act. In addition, a Fisheries and Oceans Canada Restoration Biologist was notified of project details in early June.

Potted plants were purchased from Streamside Native Plants Nursery in Bowser, B.C., and Green Thumb Nursery in Nanaimo, B.C. Botanical/scientific names were used when ordering stock to ensure the desired native species were ordered.

The planting protocols for all sites have remained consistent throughout the CSSP. Planting density and species followed the Ministry of Environment Riparian Restoration Guidelines (MOE 2006). *Plants of Coastal British Columbia* (Pojar and MacKinnon 2004) was the primary published reference used to understand the ecology of selected native riparian species and all riparian species used were native to the Cowichan Lake shoreline ecosystem. Plant species known to be most desired by ungulates and beavers in previous years (*Cornus stolonifera*, *Salix* spp., *Myrica gale*, *Acer macrophyllum*, *Populus balsamifera*, and *Physocarpus capitatus*) were protected from browsing by enclosing each plant with stucco wire mesh supported with rebar. Snow fencing and/or perimeter fencing was also used at public park sites with higher intensity use.

Live-staking using three riparian species, *Cornus stolonifera* (Red-osier dogwood), *Populus balsamifera* (Black cottonwood), and *Salix scouleriana* (Scouler’s willow) was continued in 2018, along with the use of wattle-fencing, where appropriate. Sites identified as having erosion issues as a result of a lack of living root systems were prescribed live-staking (D. Polster, pers. comm.). Live-cuttings were collected in TimberWest cut-blocks along Island Highway 18; the cuttings were approximately 2 m in length and planted using a 1.5 m steel bar with a narrow, pointed end. At each site, “as-built” measurements were taken of the restored area including photopoint documentation of work completed. The photos provide the basis of a comparative longer-term monitoring system.

The *CSSP Riparian Plant Care and Maintenance Manual* (Appendix 2) was distributed to CSSP participants in 2018 to detail the ecology of the riparian species planted, watering requirements, approximate time for species to establish root systems and become independent from summer watering, and how to prune for growth and height. Invasive plant management techniques were also covered in the manual.

Monitoring to assess overwinter survival will be assessed in the spring of 2019 for all sites planted in 2018 and reported on in a subsequent annual report.

### *Landowner Education and Opinion Assessment*

In 2018, landowner education continued to be organized and delivered by CLRSS volunteers. Landowner surveys were conducted using the revised edition of the *Riparian Area Opinion Survey* (Appendix 3) and focused on surveying new landowners in the area.

As part of the survey, a series of photographs (Figure 3), representing a variety of shoreline residences and planting “treatments” were shown to landowners. The survey is comprised of a series of questions aimed at assessing:

- Landowner awareness of local government regulations regarding the importance of riparian vegetation for fish and wildlife, water quality and erosion prevention;
- Landowner attitudes/preferences towards different private property development patterns/models (common to Lake Cowichan shorelines);
- Landowner demographic data: sex, age, length of ownership, residency (permanent or part-time).

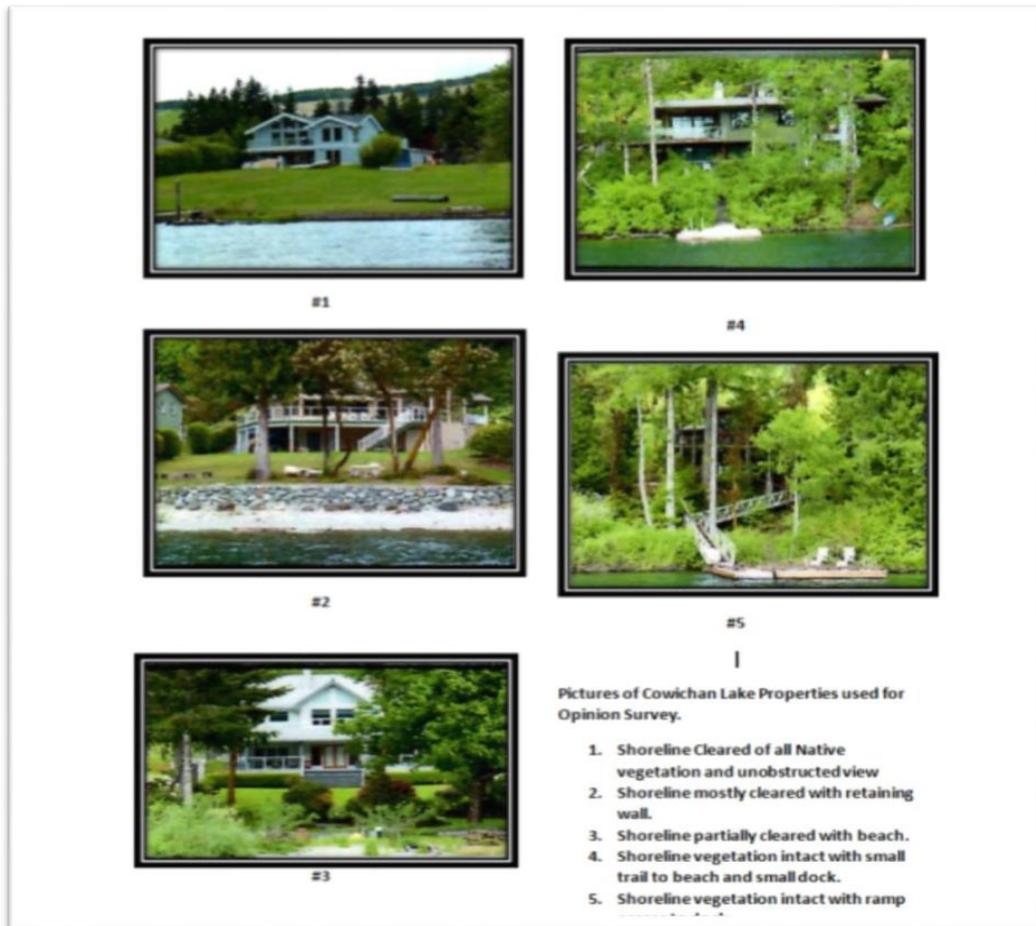


Figure 3. Five photos showing the diversity of riparian area conditions around Cowichan Lake.

### *Community Engagement*

CSSP community engagement efforts in 2018 are summarized in the proceeding results and discussion section.

## Results and Discussion

### *Shoreline Restoration*

A total of seven sites were selected for riparian restoration in 2018, including five private residences, a Municipal Park, and one B.C. Ministry of Forests, Lands, Natural Resource Operations, and Rural Development (MFLNRORD) site (Figure 4).



Figure 2. Location of the seven properties that underwent shoreline restoration by CSSP in 2018 (yellow symbols denote location of restored shoreline).

Invasive plants were removed from a total of 384 m<sup>2</sup> at three of seven properties. Approximately 95 person-hours were required for invasive plant removal prior to site restoration with native species, which was accomplished with assistance from CLRSS volunteers and a student planting crew (Figure 5, Table 1).



Figure 5. Invasive plant removal at a private residence on Cowichan Lake.

A total of 869 potted plants and 354 live-stake cuttings of red-osier dogwood, black cottonwood, and willow were used in site restoration. Live stakes were used at sites where the foreshore had steep slopes or erosion or if the site was located in the riverbed where potted plants could not be used.

Table 1. Summary of invasive plant removal activities at shoreline properties restored by CSSP in 2018.

Restoration site	Coordinates (Lat, Long)	Invasive plants present	% area (m <sup>2</sup> ) requiring treatment	Removal method	Effort
7980 Greendale Road, Lake Cowichan	48.829817, -124.036641	Himalayan blackberry, English Ivy	39% (175/447.6 m <sup>2</sup> )	Hand-pulling; Matix axe; Hand-clippers	30 person-hours
20 Prospect Ave., Lake Cowichan	48.825386, -124.047843	None present	0% (0/193.5 m <sup>2</sup> )	None	0 person-hours
41 North Somenos Rd, Lake Cowichan	48.826616, -124.044693	Himalayan blackberry	24% (150/618 m <sup>2</sup> )	Hand-pulling; Matix axe; Hand-clippers	50 person-hours
7060 Forestry Rd., Mesachie	48.826584, -124.136775	None present	0% (0/620 m <sup>2</sup> )	None	0 person-hours
8334 Sa-Seen-Nos Road, Youbou	48.868530, -124.199835	None present	0% (0/551.33 m <sup>2</sup> )	None	0 person-hours
10638 Youbou Road, Youbou	48.874496, -124.213452	Himalayan blackberry	10% (59/577 m <sup>2</sup> )	Hand-pulling; Matix axe; Hand-clippers	15 person-hours
8815 Lakeview Park Rd., Lake Cowichan	48.819892, -124.076611	None present	0% (0/110 m <sup>2</sup> )	None	0 person-hours
<b>Total</b>			<b>12% (384/3117 m<sup>2</sup>)</b>		<b>95 person-hours</b>

Table 2 summarizes the riparian planting conducted in 2018, including area restored and mean plant densities. Riparian planting was divided into “foreshore” and “upland” species based on species affinity for wet or dry soils. Of the plants used, 60% were foreshore species and 40% 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 submerged for a period of the year were planted below the 164 m in elevation (the mean annual high-water line for Cowichan Lake).

Before and after photos of each of the restored sites are provided in Appendix 4. Overall, we restored a total of 3,117 m<sup>2</sup> of riparian habitat in 2018. Of this, 1,806 m<sup>2</sup> (58%) was located below the 164 m mean annual high water level. Planting densities averaged 0.34 plants/m<sup>2</sup> and were based on a dense planting prescription for each site. Dense planting methods help manage invasive species by providing successional advancement of riparian vegetation. The creation of a canopy of woody species (shading the understory growth) can also suppress the growth of problem weeds such as reed canary grass (*Phalaris arundinacea*) and Himalayan blackberry (*Rubus discolor*) as well as other shade intolerant invasive species (D. Polster, pers comm.).

Table 2. Summary of riparian restoration activities at sites along Cowichan Lake and the upper Cowichan River, including planting densities and number of potted plants and live-stake cuttings used

Property	Potted Plants	Live stakes	% Foreshore spp.	% Upland spp.	Area Restored (m <sup>2</sup> )	Density (Plants/m <sup>2</sup> )
7980 Greendale Rd, Lake Cowichan	65	64	74%	26%	447.6	0.29
20 Prospect Ave, Lake Cowichan	58	0	4%	96%	193.5	0.30
41 North Somenos Rd, Lake Cowichan	124	290	23%	77%	618	0.67
7060 Forestry Rd, Mesachie	140	0	100%	0%	620	0.23
8334 Sa-Seen-Os Rd, Youbou	196	0	84%	16%	551	0.36
10638 Youbou Rd, Youbou	42	0	83%	17%	577	0.07
8815 Lakeview Park Rd, Lake Cowichan	80	0	100%	0%	110	0.73
<b>Total</b>	<b>705</b>	<b>354</b>			<b>3117</b>	<b>0.34</b>

Table 3 summarizes, by rank, the major riparian species used in restoration activities in 2018. Hardhack was used frequently as it thrives across a wide range of environments and due to its utility in soil binding/erosion control. Nootka rose (*Rosa nutkana*) and sweet gale were also commonly used to enhance shoreline stability.

Table 3. Major plant species used in riparian restoration in the Cowichan Shoreline Stewardship Project

Common name	Scientific name	Preferred Conditions	# plants	# sites	Benefits
Hardhack	<i>Spirea douglasii</i>	sun/wet	72	5	Provides excellent wildlife cover. Easily survives competition from grasses. Dense thickets have human buffering capability
Nootka Rose	<i>Rosa nutkana</i>	sun/wet/dry	59	6	Soil binding root systems
Sweet gale	<i>Myrica gale</i>	sun/wet	40	5	Can grow partially submerged year-round below 164m; roots system provides excellent cover for juvenile salmonids
Sword Fern	<i>Polystichum monumuntum</i>			3	
Kincikkinick	<i>Arctostaphylos uva-ursi</i>			2	
Oceanspray	<i>Holodiscus discolor</i>	sun/dry	38	5	Drought tolerant
Salal		Shade/sun/wet	36	4	Spreads quickly through long-stout rhizomes
Red Osier Dogwood	<i>Cornus stolonifera</i>	Shade/sun/wet	30	6	Soft wood cuttings; Rapidly developing root system. Provides excellent wildlife forage and cover
Slough sedge	<i>Carex obnupta</i>	Shade/sun/wet		3	Spreads quickly through long-stout rhizomes
Red flowering currant	<i>Ribes sanguenium</i>	sun/dry	29	4	Drought tolerant; early spring nectar for hummingbirds and butterflies; nesting sites or cover for song birds and small mammals

Dull Oregon grape	<i>Mahonia nervosa</i>	sun/dry	27	2	Shade tolerant; drought tolerant; tolerates rocky soils
Scouler's willow	<i>Salix sitkensis</i>	sun/moist	10	7	Have apical meristems throughout plant; Establishes easily with direct sticking of cuttings. Used for bio-engineering and slope stabilization
Pacific ninebark	<i>Physocarpus capitatus</i>	Shade/sun/wet	25	4	Soft wood cuttings; Rapidly developing root system. Provides excellent wildlife forage and cover

Summer drought conditions are common in the Cowichan watershed. Therefore, drought-tolerant species such as Nootka rose and Oceanspray were planted above the 164 m mean annual high water line and in areas with steeper slopes where drainage is greatest.

Restoration sites with gravel shorelines had an average of 45% existing native riparian coverage below the mean annual high water mark. Introducing additional native foreshore plants capable of withstanding lake inundation is a proven method for stabilizing the shore and creating habitat for rearing salmonids (Law et al. 2012). The success of this method has been realized in the CSSP project and has been measured with annual monitoring of plant survival conducted by the Field Manager, including photo-point comparisons to show the results of plant growth. An initial assessment plant survival following 2018's restoration activities will be completed in May of 2019.

Figures 7-8 provide examples of photo-point monitoring conducted in 2018 of CSSP sites restored in 2015. The site in Figure 7 illustrates the progression of foreshore vegetation from 90% invasive Canary reed grass, to its status in 2018 with now dominant native riparian species which are contributing to shore stabilization and habitat creation. Figure 8 illustrates a foreshore site progressing from a cleared, manicured, gravel beach to a densely vegetated foreshore with increased riparian habitat value.



Figure 6. A site at a private residence restored in 2015, before (left) and after (right), in 2018



Figure 7. A site at a private residence restored in 2015, before (left) and after (right), in 2018

*Landowner Education and Opinion Assessment*

In 2018, 16 new participants were surveyed, short of our annual target of 75 landowner contacts. It appears that the project has reached a “saturation point” in this regard, with all lakeshore residences having been visited once, and many more than once. However, the level of awareness of issues related to the health of the lake was high, with 100% of participants in 2018 expressing concern over the health of the watershed. Awareness of landowner responsibility regarding the removal of vegetation on their property was also high, at 100% in 2018. While not statistically tested, these data are suggestive of an increase in landowner awareness compared to the beginning of the project in 2014 (Table 4). In subsequent years, it may be of benefit to begin interviewing a randomly selected group of landowners to document longitudinal changes in attitudes, and given that most, if not all, landowners have already been interviewed once.

Table 4. CSSP Riparian Area Opinion Survey results on knowledge of environmental issues in the Cowichan watershed.

Year	2014		2015		2016		2017		2018	
Participants (N)	88		82		53		69		16	
Response	Yes	No								
Are you concerned about the health of the lake?	78%	22%	92%	8%	85%	15%	89%	11%	100%	0%
Are you aware of the riparian area location on your property? <sup>‡</sup>	-	-	-	-	-	-	81%	19%	81%	19%
Are you allowed to clear native plants?	30%	70%	20%	80%	10%	90%	9%	89%	0%	100%

<sup>‡</sup>Question added to survey in 2017

In 2018, we documented a trend towards landowners favouring more natural riparian areas (photo 5), and recreational values being divided between natural (photo 5) versus manicured (photo 1) foreshores (Table 5). We also documented a trend towards increasing awareness of

what constitutes a robust shoreline with regard to erosion and water quality protection and in terms of fish and wildlife values, with most landowners selecting the natural foreshore (photo 5).

Table 5. Landowner preferences for riparian landscape types, as depicted in Figure 3. Photos identified most frequently by landowners in response to a given survey question are indicated, as is the percent of surveyed individuals selecting that photo.

Year	2014	2015	2016	2017	2018
Participants (N)	91	71	53	69	16
In your opinion, which property has the best view?	Photo 3 (36%)	Photo 3 and 4 (35%)	Photo 4 (40%)	Photo 5 (60%)	Photo 5 (63%)
Which of these properties do you prefer for privacy?	Photo 5 (39%)	Photo 5 (45%)	Photo 5 (40%)	Photo 5 (35%)	Photo 5 (63%)
Which of these properties have the best recreation value for your family?	Photo 3 (42%)	Photo 3 (48%)	Photo 3 (30%)	Photo 5 (36%)	Photo 1 and 5 (31%)
Which property would be best at resisting erosion and protecting water quality?	Photo 5 (58%)	Photo 5 (52%)	Photo 5 (57%)	Photo 5 (49%)	Photo 5 (60%)
Which property provides the best habitat for fish and wildlife?	Photo 5 (55%)	Photo 5 (76%)	Photo 5 (70%)	Photo 5 (57%)	Photo 5 (40%)
Which do you think has greater real estate value?	Photo 3 (58%)	Photo 3 (59%)	Photo 3 (49%)	Photo 5 (51%)	Photo 5 (54%)
Are you interested in restoring your riparian area as part of CSSP? <sup>‡</sup>	-	-	-	Yes (17%)	Yes (33%)

<sup>‡</sup>added to survey in 2017



Photo #1



Photo #2



Photo #3



Photo #4



Photo #5

Landowner opinion on property values appear to have shifted towards a natural foreshore (photo 5) compared to previous survey years, wherein a manicured foreshore was indicated as favoured (photo 3). However, the survey results indicated a low interest in site restoration in both 2017 and 2018 (the “yes” response to the survey’s final question) suggesting that while landowner understanding of natural shoreline values is high, there remains a need to continue outreach and advocacy for shoreline restoration in the region.

## *Community Engagement*

Beginning in 2016, the Cowichan Lake Research Station became a CSSP participating property and provided 2,286 m<sup>2</sup> of lakefront to the project. The Cowichan Lake Research Station also began growing 500 live-cuttings of willow species and red-osier dogwood into rooted plugs to be used at CSSP sites in 2018 (Figure 8). The rooted plugs will continue to be used in 2019.



Figure 8. Rooted plugs of willow species and red-osier dogwood showing progression of growth at Cowichan Lake Forestry Research Station.

In 2018, CSSP staff continued to engage with youth from Lake Cowichan Secondary (LCS) by conducting a native riparian plants identification lesson (Figure 9). The lesson was taught to Biology 11 students, a grade 4/5 class from LCS, and consisted of three components:

- A 20-minute power point presentation on the riparian area and its ecological importance
- Due to heavy rains on the day of a scheduled field component to Saywell Park (Town of Lake Cowichan), CSSP staff brought cuttings of riparian vegetation indoors to identify and discuss propagation methods
- Transferring and planting the cuttings in the LCS greenhouse

CSSP staff also worked with grades 6 and 7 students from Cowichan Valley District Schools at the Cowichan Lake Education Centre (CLEC) during spring 2018 (Figure 9). A total of 70 youths were divided into three groups of 20-30 students and then participated in a CSSP Riparian Plants Species Treasure Hunt. Each student was given an exercise that required them to locate, identify, and sketch riparian plant species, as well as to describe their ecological importance.



Figure 9. Lake Cowichan Secondary School (LCS) Grade 6/7 at the Cowichan Lake Education Center (CLEC) for Riparian Outdoor Education (Taken at CLEC 2018).

On September 24th, 2018, CSSP delivered a Riparian Restoration Site Tour (Figure 10) for CSSP project funders, CLRSS members, Cowichan Valley real estate agents, regional district planners and directors, Town of Lake Cowichan council members, environmental professionals, CSSP property participants, local area residents, and other interested persons. The tour included visits to four previously restored sites, which demonstrated a variety of riparian prescriptions, planting techniques, and types of foreshore conditions requiring restoration (eroding shorelines, loss of riparian vegetation, invasive species management). The tour ended with a “wrap-up luncheon” at the local Jakes on the Lake restaurant for further discussion about the project.

In October, 2018, CLRSS volunteers also participated in a “Leadership Challenge”, part of the Master of Arts in Leadership Program at Royal Roads University. The purpose of the Leadership Challenge is to create a mutually beneficial learning experience for graduate students in the Masters of Leadership program and an organizational sponsor. As an organizational sponsor, the CLRSS gave a presentation to Leadership Challenge students on the purpose of CLRSS and how this is fulfilled by CSSP, as well as the origins and status of the CSSP today. The CLRSS also prepared a report for the Leadership Challenge entitled “*Health of a Lake and a River: Stewarding the Waters Ahead,*” which detailed the CLRSS’s key challenges informing some primary questions for the students of the Leadership Challenge to explore. Students of the Leadership Challenge will in turn evaluate CLRSS’s key challenges and attempt to find effective solutions for CLRSS to use in the future.



Figure 10. CSSP Riparian Restoration Site Tour, September 24th, 2018.

Continued recommendations for maintaining CSSP efficacy include:

1. Increase media exposure: to raise public awareness of CSSP; during 2019-2020 CSSP/CLRSS should continue engaging local media such as Shaw Cable and CVRD News for an interview about CSSP.
2. Continue riparian outdoor education at LCS and Cowichan Valley District Schools: offering riparian area education to the youths of Cowichan Lake and the Cowichan Valley will provide ecological knowledge currently not offered in the public-school system.
3. Introduce emergent and submergent aquatic plant species at some sites: Given the current low summer water levels, consideration should be given to planting aquatic macrophyte species at some sites. In addition to providing habitat complexity, these plants will help protect against waves, stabilizing shores, and reducing erosion.
4. Encourage property owners to prune planted riparian vegetation to increase root growth: The CSSP Property Native Plant Maintenance Manual explains how to properly prune riparian species. This should be followed by a local workshop that to further educate owners on the care and maintenance of their riparian species as well as invasive plant management.

## References

CVRD (Cowichan Valley Regional District) et al. 2007. Cowichan Basin water management plan. Prepared by Westland Resource Group, Inc.

Law, P., C. Nessman, M. Kehler, and G. Horncastle. 2012. Cowichan Lake shoreline habitat assessment: foreshore inventory and mapping project. B.C. Conservation Foundation project completion report.

MOE (Ministry of Environment). 2006. Standards for riparian restoration planning, treatments, treatment effectiveness evaluation, and inspection and maintenance.

Pojar, J. and A. McKinnon. 2004. Plants of coastal British Columbia. Lone Pine Publishers.

Appendix 1: 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 <sup>2</sup> ) below 164m	Polygon #1 12.37L x 4.6 W= 56.9m <sup>2</sup> Polygon #2 16.15L x 3.4W= 54.9m <sup>2</sup> Total= 111.8m <sup>2</sup>	Area (m <sup>2</sup> ) actually planted	111.8m <sup>2</sup>		
	GPS Coordinates Lat/Long	48.7665° N 123.8785° W		Linear metres of planting	28.8m	
	Site Comments	<ul style="list-style-type: none"> <li>Property owned for approx. two years by the Pritchard's</li> <li>Previous owners there for decades; cleared in 90's forest along river to open land for a small farm (grass field)</li> <li>Grass to river edge, where a 5-6 alders are the only vegetation providing root structure to stabilize river bank</li> <li>River bends in towards house and floods the lower portion of the grass field during high water events</li> <li>Field area could be re-vegetated as well</li> </ul>				
<b>Shoreline Characteristics</b>						
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"> <li>Row of alders along river</li> </ul>		
<b>Restoration Planning</b>						
Plan Compiled by: <input checked="" type="checkbox"/> D. Polster <input checked="" type="checkbox"/> Christine Brophy						

## Site Restoration Objectives

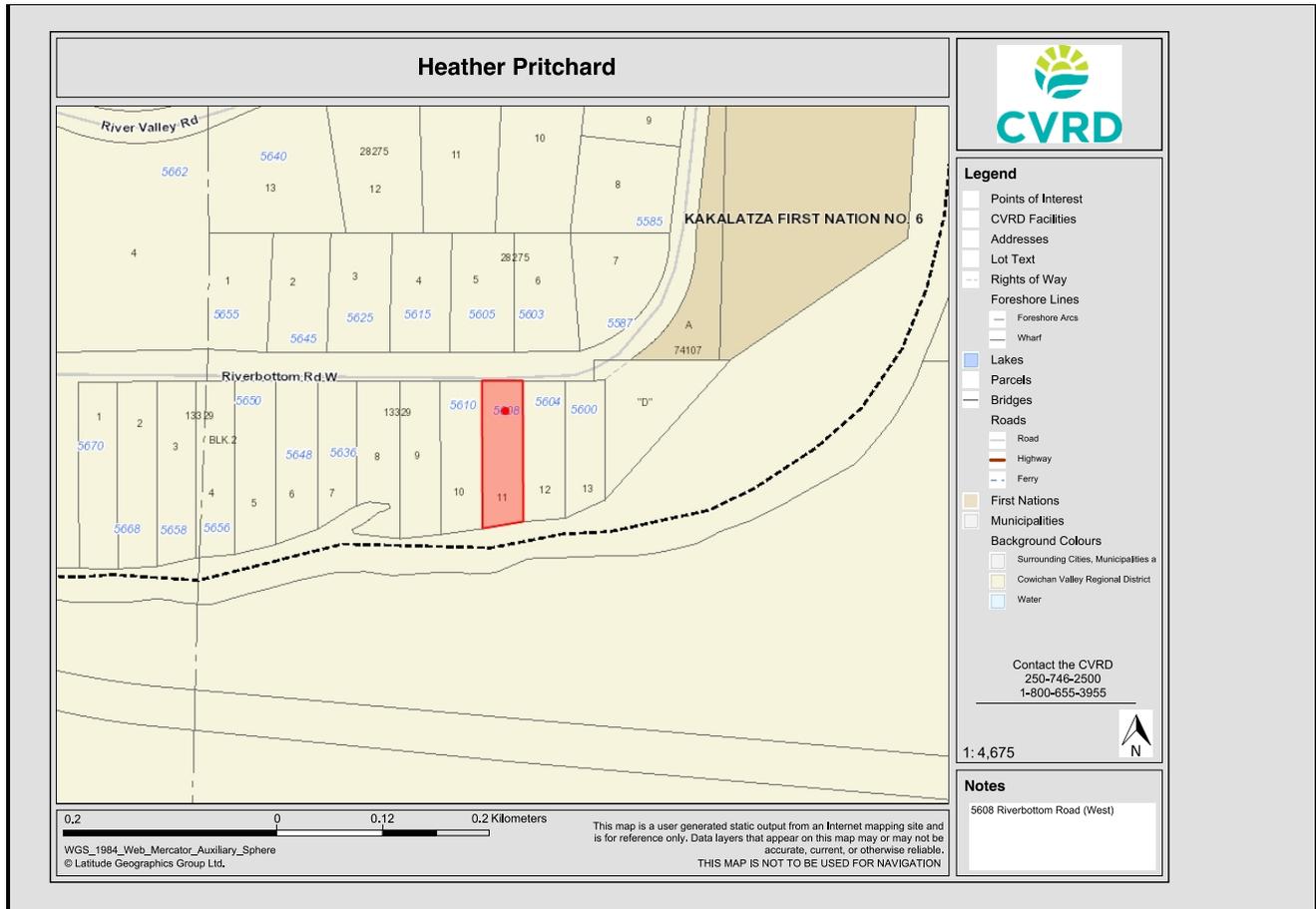
- Stabilize bank with willow root systems through live-staking
- Alders along high water's edge
- Black-cotton wood
- Conifers above high water
- Slough sedge along fringe of high water mark



- 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 madix-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 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 2: Landowner Education Materials and CSSP Riparian Plant Care and Maintenance Manual.

### Cowichan Lake and River Stewardship Society Brochure

 <p><b>Safe Boating Practices</b></p> <p>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 <a href="http://www.cowichan-lake-stewards.ca">www.cowichan-lake-stewards.ca</a>.</p> <p><b>Water Quality Monitoring</b></p> <p>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: <a href="http://www.bcslss.org/">www.bcslss.org/</a></p> <p><b>Committees</b></p> <p>There are several committees in the CLRSS focusing on various aspects of our work. To learn more or volunteer, please see our website <a href="http://www.cowichan-lake-stewards.ca">www.cowichan-lake-stewards.ca</a>.</p> <ul style="list-style-type: none"> <li>Water Traffic Committee</li> <li>Education Committee</li> <li>Membership Committee</li> <li>Retail Sales Committee</li> <li>Annual River Clean-up Committee</li> <li>Executive Finance Committee</li> <li>Water Monitoring Committee</li> <li>Cowichan Shoreline Stewardship Committee</li> </ul>	 <p><b>Cowichan Lake and River Stewardship Society</b>  <b>PO Box #907</b>  <b>Lake Cowichan, BC</b>  <b>V0R 2G0</b></p> <p>For current information visit our webpage <a href="http://www.cowichan-lake-stewards.ca">www.cowichan-lake-stewards.ca</a></p> <p>email enquiries <a href="mailto:webmaster@cowichan-lake-stewards.ca">webmaster@cowichan-lake-stewards.ca</a></p> <p>President Leroy Van Wieren          Phone 250-709-7308          email <a href="mailto:lvan@bcslss.ca">lvan@bcslss.ca</a></p> 	 <p><b>Cowichan Lake &amp; River Stewardship Society</b>          Dedicated to the Protection and Health of the Cowichan Watershed</p> 	 <p><b>Cowichan Shoreline Stewardship Project</b></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 VUJ 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 651 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><b>Cowichan Shoreline Stewardship Project</b></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><b>Saywell Park Restoration</b></p> <p>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><b>Annual River Cleanup</b></p> <p>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><b>Fish Habitat Signs</b></p> <p>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> 
---	---	---	---	---	--

### Gerald Thom Bursary Brochure

<p><b>Gerald's Legacy:</b></p> <p><b>Encouraging Environmental Study and Action for Generations to Come</b></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><b>The Cowichan Lake and River Stewardship Society</b>  <b>PO Box #907</b>  <b>Lake Cowichan, BC</b>  <b>V0R 2G0</b></p> <p>President: Leroy Van Wieren          250-709-7308  <a href="mailto:clrss.question@gmail.com">clrss.question@gmail.com</a>  <a href="http://www.cowichan-lake-stewards.ca">www.cowichan-lake-stewards.ca</a></p>	 <p>Announces</p> <p><b>The Gerald Thom Environmental Studies Bursary</b></p>  <p><a href="http://www.cowichan-lake-stewards.ca">www.cowichan-lake-stewards.ca</a></p>	 <p><b>The Gerald Thom Bursary \$1,000</b></p> <p><b>Conditions</b></p> <p>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><b>Eligibility</b></p> <p>Priority will be given to LCS applicants planning to enrol in post secondary environmental studies related courses.</p> <p><b>Criteria</b></p> <p>Preference for this Bursary will be awarded to a Lake Cowichan School student who:</p> <ul style="list-style-type: none"> <li>Has successfully completed the Lake Studies Program.</li> <li>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.</li> <li>Has demonstrated a willingness to educate others regarding environmental stewardship.</li> </ul> 	<p><b>Applications</b></p> <ol style="list-style-type: none"> <li>Application forms are available from the Lake Cowichan School Office.</li> <li>Applications will be reviewed and recipients selected by the LCS and CLRSS Education Committee.</li> </ol> <p><b>Donations</b></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, 100 South Shore Rd.          PO Box 40, Lake Cowichan, BC V0R 2G0</p>  <p>Cowichan Lake and River Stewardship Society  <a href="http://www.cowichan-lake-stewards.ca">www.cowichan-lake-stewards.ca</a></p>
--	--	--	---	--

# 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 kokoiwas.

### How can CLRSS support you?

- Visit our riparian webpage [www.cowichan-lake-stewards.ca/riparian.htm](http://www.cowichan-lake-stewards.ca/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](http://www.cowichan-lake-stewards.ca)



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



Oxford the otter says: "The healthy future of Cowichan Lake is in our hands!"  
[www.cowichan-lake-stewards.ca](http://www.cowichan-lake-stewards.ca)



## Riparian Insights

## 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.

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/](http://www.cowichan-lake-stewards.ca/)


- 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 3: 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)	
<b>QUESTION 1</b>	<b>Are you concerned about the health of Cowichan Lake/River? If so, what exactly are you concerned about?</b>	COMMENTS:
<b>QUESTION 2</b>	<p><b>Are you aware of the location of the riparian area on your property?</b> (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:
<b>QUESTION 3</b>	<b>Are you allowed to clear native vegetation in the riparian area?</b>	COMMENTS:
<b>QUESTION 4</b>	<p><b>Why do you think that is?</b> (If unaware, explain science)</p> <p><b>Which of these properties would be best at resisting erosion and protecting water quality?</b> (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:
<b>QUESTION 5</b>	<p><b>Which of these properties provides the best habitat for fish and wildlife?</b> (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:
<b>QUESTION 6</b>	<b>In your opinion, which of these properties has the best view from the house?</b> 1 2 3 4 5	COMMENTS:
<b>QUESTION 7</b>	<b>Which of these properties do you prefer for privacy?</b> 1 2 3 4 5	COMMENTS:
<b>QUESTION 8</b>	<b>Which of these properties would have the most recreational value for you and your family?</b> 1 2 3 4 5	COMMENTS:
<b>QUESTION 9</b>	<b>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)?</b> 1 5	COMMENTS:

Appendix 4: Before, during, and after photos of CSSP restoration sites in 2018.

## 7980 Greendale Road, Lake Cowichan



# 20 Prospect Avenue, Lake Cowichan



# 41 North Somenos Road, Lake Cowichan



# 7060 Forestry Road, Mesachie



# 8334 Sa-seen-os Road, Youbou



# 10638 Youbou Road, Youbou



# 8815 Lakeview Park Road, Lake Cowichan

