

Ecosystem-Based Conservation Action Framework for Slocan Lake 2017-2022

Step #3

for
Slocan Lake Stewardship Society



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1.0 Introduction

The Slocan Lake Stewardship Society (SLSS) is a not-for-profit organization with the mission:

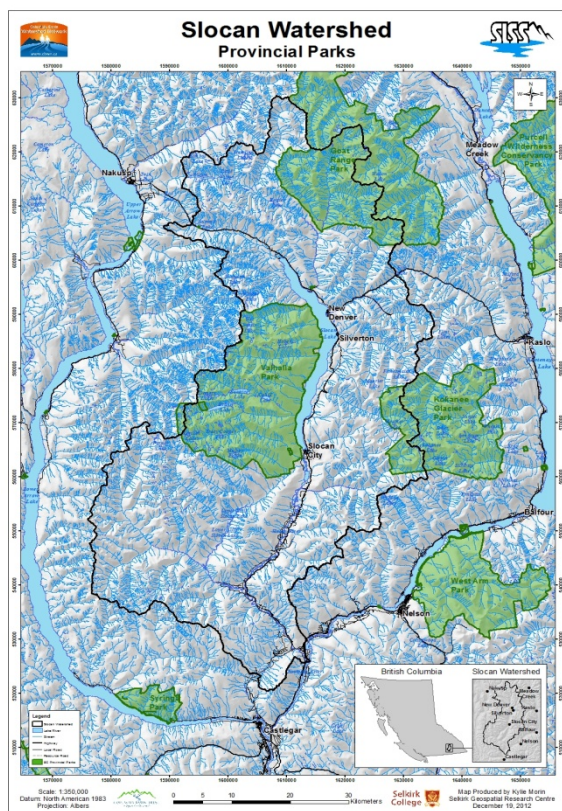
Working in community to protect the beauty, health and wonder of the magnificent Slocan Lake ecosystem for future generations.

SLSS works in partnership with local communities and residents to improve the Slocan Lake Watershed through science, education and advocacy. As an action-oriented organization with dedicated volunteers and strong partnerships, SLSS promotes watershed stewardship practices, improves and shares watershed knowledge, facilitates collaborations, and engages local communities and residents on issues related to watershed management.

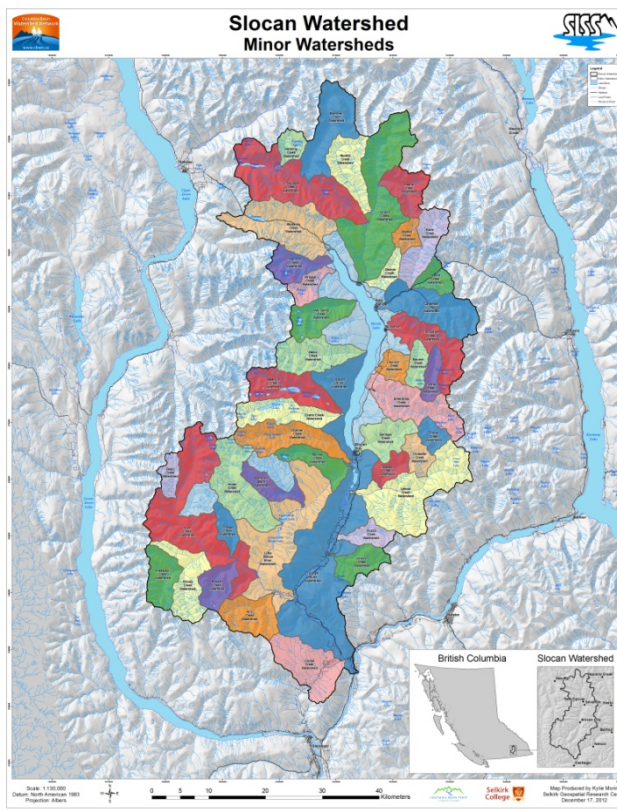
Safe-guarding the natural, undammed 183,026 hectare Slocan Lake Watershed (Figure 1) requires focused commitment and effort to address increasing pressures and risk of further degradation to key ecological values and functions. Key indicators of the Slocan Lake Watershed's health include surface water quality and quantity, native biodiversity, the integrity of the terrestrial and aquatic landscape, and adaptability to a changing climate.

The ecological health of the Slocan Lake Watershed is very important locally and regionally within the greater Columbia River Basin. Being one of the only major watersheds without a dam in the Canadian Columbia Basin, the Slocan Lake Watershed's biology and ecology is critical to preserve, study and document as a potential benchmark to evaluate hydrologic and ecologic changes of the many dammed reservoirs of the Columbia River Basin caused by Columbia River watershed management decisions.

In 2012, SLSS undertook a community values study known as *Imagine Slocan Lake*. This statistically valid study found that respondents highly valued clean water, healthy ecosystems and biodiversity, and wilderness parks and conservation areas. Over 77% of the respondents indicated they were concerned about the future of Slocan Lake. These concerns, among others, included lake contamination and loss of biodiversity/reduced fish and wildlife. The most frequently identified visions for Slocan Lake for 2032 and beyond were clean water, healthy aquatic and terrestrial ecosystems, undeveloped Crown land and quiet. A strong majority of respondents believed that planning for areas surrounding Slocan Lake should include land management direction for mountain sides and tributaries. The report concluded that a large number of respondents indicated that more regulation was needed to ensure that the lake and foreshore are properly managed.



a.



b.

Figure 1. a) The 183,026 hectare Slocan Lake Watershed contained within the black outline that traces the height of land forming the hydrologic boundary of the headwaters and greater ecosystem of Slocan Lake, extending from Summit Lake south to Springer Creek. Green areas are the Goat Range, Valhalla and Kokanee Glacier provincial parks, portions of which occur in the Slocan Lake Watershed. b) Over 20 sub-watersheds comprise and contribute to the greater Slocan Lake Watershed.

In order to implement these values as it carries out its mission, SLSS has been responsive to new science and ecological understanding of the Slocan Lake Watershed.

In 2015, SLSS embarked on a process to develop an ecosystem-based conservation strategy for the Slocan Lake Watershed to provide a scientific basis for how best to conserve the ecological health of the watershed into the future. An ecosystem-based approach fits within SLSS's overall strategic plan, and specifically supports the purpose of Goal 1, which is: *To protect, enhance, and restore Slocan Lake watershed by supporting research into its ecosystems, its cultural history and ongoing human impacts.* This approach was taken in order to consider the entire watershed as a complex ecological and hydrological system and to include all of its biodiversity.

The process moved through two key steps that have built the foundation of this Framework:

1. Resource Analysis (Step 1)¹: a compilation of current scientific research and expert opinion that identified vulnerable native species and critical habitat within the Slocan Lake Watershed, and pointed out the most pressing threats impacting their wellbeing and functioning.
2. Science & Conservation Action Planning Forum (Step 2)²: a day-long workshop with scientists, resource managers, local government and conservationists that identified priority actions that would most significantly contribute to maintaining healthy fish and wildlife populations and ecological functions in the Slocan Lake Watershed over the next 5-10 years.

Each of these essential components of the process has been reported on separately and integrated into the process of developing this document titled, *Ecosystem-based Conservation Action Framework for Slocan Lake 2017-2022*, which is referred to as “Step #3”. The Resource Analysis provided the scientific foundation and the Science Forum provided strategic direction regarding priority actions (Figure 2).

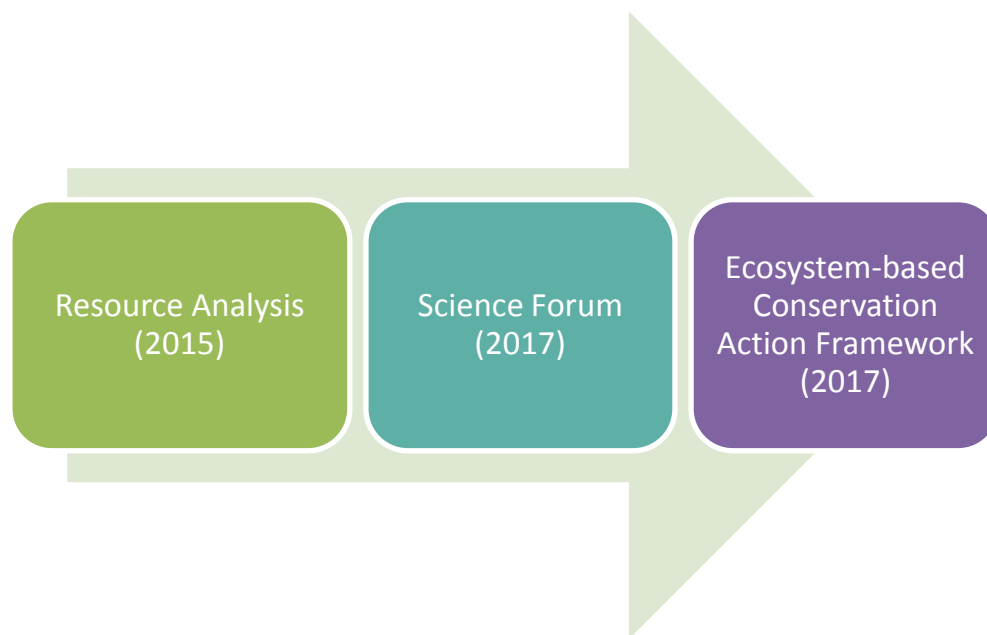


Figure 2. The three steps of SLSS’s conservation planning process to determine conservation priorities and achieve a Conservation Action Framework to guide activities for the next five years, 2017-2022.

¹ Mahr, M. 2015. Resource Analysis: Step #1 for an Ecosystem-based Conservation Action Framework for Slocan Lake. Report to Slocan Lake Stewardship Society. 29pp.

² Mahr, M. 2017. Slocan Lake Watershed Priority Conservation Actions Summary Report: Step #2 for an Ecosystem-based Conservation Action Framework for Slocan Lake. Report to Slocan Lake Stewardship Society. 30pp.

Conservation planning is a conservation organization's due diligence to ensure that it expends its valuable resources wisely, achieves more efficient and effective conservation action, and accomplishes its mission.

The purpose of this Conservation Framework is to identify the role of SLSS in pursuing high priority conservation actions for the Slocan Lake Watershed.

This Conservation Action Framework applies to the next five years, and is intended to inform SLSS's organizational strategic plan, by providing the scientific basis for supporting goals addressing science research of Slocan Lake's ecosystem; contributing to a culture of stewardship through educational programs and services; designing stewardship activities; and advocating for conservation policy that reflects SLSS's mission, values and purposes.

Thus, the SLSS Board of Directors has now generated the scientific basis for implementing its mission and responding to the values identified in *Imagine Slocan Lake*. The outcome of this process will enable SLSS's Board of Directors to make informed decisions and take responsible action. In addition, this framework will provide credible guidance to local, regional and provincial government in order that management decisions that protect the watershed can be accomplished.

2.0 Conservation Targets and Ecological Threats

This section summarizes key findings from the Resource Analysis and Science Forum to guide SLSS's decisions about which species and habitats are conservation targets for the Slocan Lake Watershed. Targets provide 'key entry points' for where effective action might improve the health of the ecosystem. By focusing on conservation targets, SLSS will always know what factors are driving its actions at a particular site.

2.1 Conservation Targets

Species of interest and conservation concern	Important habitat types	Special habitat features
<ul style="list-style-type: none"> • Bull trout • Kokanee • White sturgeon • Westslope cutthroat • Western toad • All bat species • Grizzly bear • Wolverine • Mountain Caribou • Great blue heron • Osprey • Old growth western red-cedar 	<ul style="list-style-type: none"> • Lake foreshore • Shallow lake • Wetland • Riparian area • Cottonwood forest • Interior Cedar-Hemlock forest & swamp 	<ul style="list-style-type: none"> • Fish spawning bed • Nesting and/or roosting site • Bat hibernaculum • Denning area • Migratory stopover site • Wildlife tree • Mineral lick • Warm spring • Cold water source • Ice field / glacier

2.2 Threats to the ecology of the Slocan Lake Watershed

Ecological threats affect the viability of biodiversity and impact key ecological attributes within ecosystems. Threats are defined as the proximate activities or processes that have caused, are causing or may cause the destruction, degradation and/or impairment of one or more of the identified conservation targets. Current and future threats that scientists at the Science Forum agree will most significantly impact the Slocan Lake Watershed's ecology are the following.

Introduction of new invasive species	<ul style="list-style-type: none"> • zebra & quagga mussels • bullfrog • fungus causing white-nose syndrome • northern pike
Direct loss or impairment of habitat	<ul style="list-style-type: none"> • extensive logging & road building • erosion • residential development • commercial development • barriers to wildlife corridors
Recreational pressure	<ul style="list-style-type: none"> • increased trail usage • multi-use trails • increased access to backcountry & high alpine
Uncertainty of climate change impacts	<ul style="list-style-type: none"> • vegetational changes • fire • hydrological changes (causing floods or extreme drought) • mudslides / landslides • loss of snowpack / loss of cold water creeks

3.0 Scientific Underpinnings of the Conservation Action Framework

3.1 Desired Outcomes

The Science Forum resulted in many positive solutions and activities for addressing critical habitat, species at risk, landscape connectivity, invasive species, recreational pressure and climate change in the Slocan Lake Watershed. Based on these results, Forum participants identified six key desired outcomes for ensuring Slocan Lake Watershed's ecosystem health that underpin this Conservation Action Framework.

Desired Outcomes:

1. Important habitat for native aquatic and terrestrial species is protected and restored
2. Species at risk are identified, monitored and stewarded
3. Habitat connectivity is enhanced to maintain ecological processes and unfragmented habitat
4. Invasive species are prevented from harming vulnerable native species
5. Recreational pressure on vulnerable species and sensitive habitats is monitored and reduced
6. Climate change resilience is increased through adaptation

3.2 Priority Actions Identified at the Science Forum

The above outcomes led to identification of priority actions that were collectively generated by Forum participants. The actions incorporated policies, objectives and activities that aligned with the participants' programmatic interests, and were not intended to be the sole responsibility of SLSS. To the extent these actions were strategically framed by SLSS and potential collaborators, SLSS has the opportunity to consider its role in the context of partnerships.

Priority Actions (not ranked):

1. Pursue Wildlife Habitat Area (WHA) designation for Bull Trout Spawning Areas
2. Identify & Conserve Remaining Old Growth Forest
3. Map Critical Habitat for Suites of Species at Risk
4. Propose Designation of the "Bonanza Biodiversity Corridor"
5. Manage & Monitor Invasive Species to Protect & Restore Sensitive Areas
6. Implement Species-specific Actions to Prevent Impacts of Invasive Species on Native Biodiversity
7. Develop an Ecosystem Climate Change Adaptation Strategy for Slocan Lake Watershed
8. Maintain Natural Foreshore Habitat

The first seven actions were identified during the Science Forum. The eighth action of “maintaining natural foreshore habitat” was added to the list in order to explicitly capture the ecological importance of conserving a healthy foreshore around Slocan Lake. Given that SLSS has prioritized the foreshore area for research, conservation and restoration in the past, it seems prudent to specifically add this action to the current list.

4.0 Recommended Strategic Actions

During the Science Forum, the above-mentioned actions were recommended based on everyone’s interests and for the purpose of exploring partnerships for larger buy-in and impact. Given the list of critical issues facing the Slocan Lake Watershed, what can SLSS, alone and with collaborators, do to advance these issues? Using a decision framework to guide conservation priority setting ensures that all projects, whether proactively identified by the organization or received as a suggested opportunity, can be systematically evaluated and prioritized for action.

4.1 Potential Role for SLSS

Action tables can help provide a decision framework. In the following tables, each of the eight recommended priority actions includes information for why this action is important. For example, one or more of the following will apply: the action will address a key indicator of watershed health; improve survivability for a target species of concern or interest; and/or conserve critical habitat or a special habitat feature. With respect to each action, the urgency and time-sensitivity are noted, if known.

Each action also includes recommended potential roles for SLSS that are grouped under action areas such as, science, education, on-the-ground stewardship and policy & advocacy. Although SLSS may not actually do the *science*, it can commission science research as necessary and also support scientific studies that enhance overall knowledge as well as specific management decisions related to conservation targets and threats within the watershed. In terms of *education*, SLSS has a broad range of opportunities and tools that can help deliver its messages vis-à-vis the conservation of species and habitats, and the benefits of new government policies, such as Wildlife Habitat Areas, and new regulations, such as bull trout fishing regulations. *On-the-ground stewardship* is included within SLSS’s strategic plan education goal yet in this context of action planning warrants its own category as a type of activity that might include both science and education for tangible, on-the-ground outcomes, such as re-vegetating a section of foreshore or surveying the lake for mussel veligers. *Policy and advocacy* activities are those that enable and support successful implementation of local, regional and provincial government laws, regulations and planning tools, such as influencing the Regional District of Central Kootenay’s development permit areas around the lakeshore or designating the “Bonanza Biodiversity Corridor”.

The following actions have been evaluated in terms of *urgency* based a scale used by land trusts and the Kootenay Conservation Program when reviewing potential projects. The scale includes three categories:

- High: threatened with irreversible change within 10 years
- Moderate: threatened with reversible change within 10 years
- No short-term threat

Given that the eight priority actions are the most pressing issues facing the well-being of the Slocan Lake Watershed, there is a lot to do and with some urgency. This also means it is an exciting time for SLSS to decide what issues it wants to champion; and where it is better suited to encourage and support a conservation effort, in general, or as a facilitator or collaborator. This is also an important time for SLSS to explore what success could look like; what collaborators should be cultivated in order to achieve successful results; and how SLSS can encourage the development and maintenance of networks to achieve their goals.



4.2 Action Tables

#1 Bull Trout Spawning Areas					
Priority Action	Indicator of Watershed Health	Target Species	Target Habitat Type	Target Special Habitat Features	Potential Locations for Action
Support Wildlife Habitat Area (WHA) designation under the Forest Practices Code for Bull Trout Spawning Areas	Aquatic biodiversity: Presence and abundance of native fish populations	bull trout [federal Species of Concern (COSEWIC); provincial Blue-listed]	Riparian area	spawning beds, cold water sources	Silverton and Wilson creeks
<p>Urgency HIGH: Silverton Creek has the best bull trout habitat and highest populations in the Slocan Lake Watershed, with 70% of the lake's bull trout spawning in Silverton Creek. Interfor is currently logging in the upper Silverton-Maurier-Fennell watersheds; building new access roads and bridges and cutblocks could directly impact bull trout spawning areas.</p>					
<p>Time-sensitive Opportunity: Yes. The Village of Silverton recently approved pursuing a WHA designation for Silverton Creek and is prepared to lead this initiative with SLSS's support. SLSS would contribute to testing this new provincial policy and provide community education about WHAs.</p>					
<p>SLSS's Potential Role</p> <p><u>Science:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Support fish surveys and habitat assessment in Silverton and Wilson creeks. <input type="checkbox"/> Support continued monitoring of Jeremy Baxter's temperature data loggers in Silverton Creek as well as all creeks in the Slocan Lake Watershed to monitor changes in water temperature throughout. <p><u>Education:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Develop materials for educating area residents and fishers about the importance of bull trout in our creeks, lake and watershed (e.g., historically an iconic species for Sinixt); emphasize how bull trout require cold water temperatures. <input type="checkbox"/> Explain an initiative to designate Wildlife Habitat Areas for critical spawning beds. <input type="checkbox"/> Inform residents and visitors about the new fishing regulations to protect local bull trout populations on Slocan Lake. <p><u>On-the-ground Stewardship:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> To be determined <p><u>Policy & Advocacy:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Support local and provincial government efforts to designate a Wildlife Habitat Area for bull trout spawning areas in Silverton Creek. <input type="checkbox"/> Once successful, identify how the WHA process might also be applied to Wilson Creek bull trout spawning areas. <input type="checkbox"/> Continue communications with Interfor regarding their road-building and logging plans in the Silver Creek watershed and tributaries. 					

Potential Partners / Collaborators: Fisheries biologists (e.g., Jeremy Baxter, Crystal Lawrence), Village of Silverton, Ministry of Forests, Lands, Natural Resources Operations, BC Timber Sales, Interfor, Kalesnikoff, Fish & Wildlife Compensation Program, Kootenay Conservation Program, Regional District of Central Kootenay, First Nations, Valhalla Wilderness Society.

#2 Old Growth Forests & Swamps

Priority Action	Indicator of Watershed Health	Target Species	Target Habitat Type	Target Special Habitat Features	Potential Locations for Action
Support Identification & Conservation of Remaining Old Growth Forests & Swamps	Terrestrial biodiversity: Presence of forests and swamps with old growth characteristics	Old growth western red-cedar	Interior Cedar-Hemlock forests and swamps	wildlife trees denning areas	Bonanza Biodiversity Corridor, upper Silverton-Maurier-Fennell watersheds, Fitzstubbbs/Beaver Lakes area

Urgency HIGH: BC Timber Sales has been actively logging in the Bonanza Corridor and may have future cutblocks that include old growth cedar-hemlock forests and border old growth-dominated swamps; Interfor is currently logging in Silverton, Maurier and Fennell watersheds in areas of known old growth forests; BC Timber Sales has planned sales in the Beaver Lakes area that could include forests and swamps with old growth characteristics.

Time-sensitive Opportunity: Yes. 1) SLSS should continue collaborating with Valhalla Wilderness Society and Village of Silverton to ensure Interfor uses sound forest practices in its logging operations in the Silverton Creek watershed. 2) Meet with BC Timber Sales about future logging in high priority Old Growth Management Areas and other forests and swamps that have old growth characteristics.

SLSS's Potential Role

Science:

- ☐ Support SWAMP's field research that includes locating old growth cedar swamps.
- ☐ Support mapping of Old Growth Management Areas (OGMAs) for the watershed.

Education:

- ☐ At the New Denver Friday Market and public events and to SLSS members include messaging about the importance of old growth forests and swamps through the Watershed and Wildlife Tree models.

On-the-ground Stewardship:

- ☐ To be determined

Policy & Advocacy:

- ☐ Continue conversations with Interfor with respect to operations in Silverton Creek watershed and its tributaries.

- ☐ Continue partnering with Valhalla Wilderness Society to inform forestry practices and policies with respect to old growth forests in the Slocan Lake Watershed.

Potential Partners / Collaborators: SWAMP, Ministry of Forests, Lands, Natural Resources Operations, BC Timber Sales, Interfor, Kalesnikoff, Village of Silverton, Regional District of Central Kootenay, First Nations, Valhalla Wilderness Society.

#3 Important Habitat

Priority Action	Indicator of Watershed Health	Target Species	Target Habitat Type	Target Special Habitat Features	Potential Locations for Action
Map Important Habitat for Suites of Species at Risk	<p>Integrity of the terrestrial and aquatic landscape for vulnerable native aquatic and terrestrial species</p> <p>Integrity of aquatic ecosystems including surface water quality and quantity and timing of flow</p>	Species at Risk to be determined on a project by project basis	Lake foreshore, Shallow lake, Wetland, Riparian area, Cottonwood forest, Interior Cedar-Hemlock forest	To be determined on a project by project basis	Bonanza Marsh, Bonanza Biodiversity Corridor, Summit Lake, Wilson-Fitzstubbbs watershed, others to be determined

Urgency: To be determined on a project by project basis.

Time-sensitive Opportunity: Yes. 1) Bonanza Biodiversity Corridor (see action #4) is threatened by continued logging and new motorized recreation trail are actively being proposed and developed. 2) The new 500m protection buffer around Summit Lake for western toads requires support.

SLSS's Potential Role

Science:

- ☐ Support the compilation, synthesis and mapping of species at risk and sensitive areas to help identify areas for future habitat protection.
- ☐ Support SWAMP sharing its wetlands data with NGOs, government and industry.
- ☐ Develop a mapping project with the Selkirk Geospatial Research Centre to be performed by their co-op students and funded by the Columbia Basin Watershed Network that would contribute information / datalayers from SLSS's foreshore analysis to critical habitat maps.

Education:

- ☐ At Friday Markets continue to share information about the species at risk in our watershed and the values of riparian habitat and wetlands through the Watershed Model.
- ☐ Develop a new Wildlife Tree Model and a kid-friendly educational brochure to accompany it.
- ☐ Continue participation in the Know Your Watershed program to encourage Lucerne's students to be outside in local watersheds.

- ☐ Provide landowner outreach to the new owners of the Rosebery Log Dump to encourage stewardship of the foreshore and shallow aquatic habitat.

On-the-ground Stewardship:

- ☐ To be determined on a project by project basis.

Policy & Advocacy:

- ☐ Support identification and implementation of designations, regulations and government planning tools, e.g., Wildlife Habitat Areas, Section 16s, Old Growth Management Areas, Development Permit Areas to help conserve critical habitat for the protection and recovery of species at risk and for providing climate change refugia.
- ☐ Encourage the Nature Conservancy of Canada to expand their South Selkirks Natural Areas Plan to include the entire Slocan Lake Watershed.
- ☐ Help create and maintain networks of partners committed to protecting critical habitat.

Potential Partners / Collaborators: SWAMP, wildlife biologists (e.g., Michael Proctor, Jakob Dulisse, Cori Lausen, Doris Hausleitner, Gary Davidson), Ministry of Forests, Lands, Natural Resources Operations, Selkirk Geospatial Research Centre, Kootenay Conservation Program, First Nations, Regional District of Central Kootenay, Nature Conservancy of Canada.

#4 Connectivity & Corridors

Priority Action	Indicator of Watershed Health	Target Species	Target Habitat Type	Target Special Habitat Features	Potential Locations for Action
Propose Designation of the “Bonanza Biodiversity Corridor”	Integrity of the terrestrial and aquatic landscape for functioning ecological processes, continuous (unfragmented) habitat, wildlife movement corridors	Kokanee, westslope cutthroat, western toad, bat species, grizzly bear, wolverine, caribou, great blue heron, osprey, old growth western red-cedar	Lake foreshore, Shallow lake, Wetland, Riparian area, Cottonwood forest, Interior Cedar-Hemlock forest & swamp	fish spawning beds, nesting and/or roosting sites, bat hibernacula, denning areas, migratory stopover sites, wildlife trees, warm springs, cold water sources	Bonanza Corridor from Bonanza Marsh to Summit Lake

Urgency HIGH: 1) Bonanza Biodiversity Corridor includes critical habitat (see action #3) threatened by logging and motorized recreation trails are actively being proposed and developed. 2) Further habitat fragmentation and loss impacts movement of wide-ranging wildlife like grizzly bear, wolverine, elk and caribou. 3) An opportunity to support healthy bat populations around Bonanza Marsh and the east end of Summit Lake.

Time-sensitive Opportunity: Yes. 1) There is momentum from the Science Forum for scientists and GIS analysts to compile the necessary datalayers to build maps. 2) There are champions in local and provincial government that are willing to advance a Bonanza Biodiversity Corridor proposal for

formal designation.

SLSS's Potential Role

Science:

- ☐ Support the timely creation of maps of the Bonanza Biodiversity Corridor by encouraging and incentivizing the creation and assemblage of datalayers by Michael Proctor, Ryan Durand with SWAMP, and Ian Parfitt at Selkirk Geospatial Research Centre.
- ☐ Support the Kootenay Conservation Program's assessment of landownership and the ecological and conservation values of the corridor.
- ☐ Collaborate with Greg Utzig and the Kootenay Resilience Project to illustrate how habitat corridors and mountain passes are key to facilitating changes in wildlife ranges with climate change.

Education:

- ☐ Promote the value of the Bonanza Biodiversity Corridor at Wild Days tours in the area and at Toad Fest at Summit Lake.
- ☐ Develop a field tour with BC Timber Sales, RDCK and local government reps, local researchers and SWAMP.

On-the-ground Stewardship:

- ☐ Continued monitoring of Kokanee spawning in Bonanza Creek.
- ☐ Consider building a bat condo at Bonanza Marsh to support local bat populations dependent on shallow open water wetlands.

Policy & Advocacy:

- ☐ Partner with SWAMP to lead a Bonanza Biodiversity Corridor working group to advance the proposal.
- ☐ Partner with local government to bring the proposal to the RDCK to revise the Area Community Plan for Area H North.
- ☐ Partner with local government to bring the proposal to provincial government – e.g., follow up with Ann Bunka who suggested local government representatives from the 3 villages + Rural Area H could take the corridor proposal to the provincial government for recognition.
- ☐ Send Kathy Howard of BC Timber Sales mapped information because BCTS is currently road-building. Also, Contact Ken Scown, BCTS Woodlands Supervisor and Loreen Hodgkinson, BCTS Planning Forester to learn more about BCTS forestry and road-building activities in the corridor.
- ☐ Bring ecological information and proposals to RDCK staff and local government representatives for Parks staff to include in the mapping of recreation areas.
- ☐ Review existing guidelines and make proposal to Ministry of Forests, Lands, Natural Resources Operations to create Section 16 reserves (non-administered conservation lands under Land Act).
- ☐ Encourage the Nature Conservancy of Canada to expand their South Selkirks Natural Areas Plan to include the entire Slocan Lake Watershed.

Potential Partners / Collaborators: Biologists (e.g., Michael Proctor, Ryan Durand, Jakob Dulisse, Cori Lausen, Doris Hausleitner, Gary Davidson), SWAMP, Kootenay Conservation Program, Nature Conservancy of Canada, Ministry of Forests, Lands, Natural Resources Operations, BC Timber Sales, Greg Utzig and Kootenay Resilience Project, Ian Parfitt at Selkirk Geospatial Research Centre, First Nations, Regional District of Central Kootenay, Villages (New Denver, Silverton, Slocan), Hills Recreation Society, North Slocan Trail Society, Rosebery to Summit Lake Rail Trail Committee.

#5 Invasive Species (General)					
Priority Action	Indicator of Watershed Health	Target Species	Target Habitat Type	Target Special Habitat Features	Potential Locations for Action
Manage & Monitor Invasive Species to Protect Sensitive Areas	Terrestrial & aquatic biodiversity: Sensitive areas are free of highly invasive species such as zebra & quagga mussels, bullfrog, northern pike, fungus causing white nose syndrome.	bull trout, Kokanee, hibernating bat species, western toad	Lake foreshore, Shallow lake, Wetland, Riparian Area, Interior Cedar-Hemlock swamp	fish spawning beds, nesting and/or roosting sites, bat hibernacula	Sensitive areas such as the alpine, shallow lake shores, wetlands, riparian zones and places that are important for species at risk
<p>Urgency HIGH: 1) Preventing the introduction of high priority invasive species such as zebra and quagga mussels, bullfrogs, and white nose syndrome (bats) is critically important to the health of the native biodiversity – and actions are urgent because these invasive species have just arrived in BC (bullfrogs) or were just detected in adjacent areas (zebra mussels in Montana, and white nose syndrome in Washington).</p> <p>Urgency MODERATE: 1) Monitoring the introduction of such species as northern pike and yellow-flag iris is critical since they are found in other areas of the Kootenays and can easily be transported / introduced into our waterways. 2) Controlling / containing existing invasive species such as giant hogweed and Japanese knotweed is important for preventing further spread into new areas.</p>					
<p>Time-sensitive Opportunity: Yes. 1) The most pressing work for SLSS is to assist the Central Kootenay Invasive Species Society (CKISS) in monitoring the lake for invasive mussel species and to educate residents and visitors about why they should care about preventing the transporting of invasive species into the Slocan Lake Watershed.</p>					
<p>SLSS's Potential Role</p> <p><u>Science:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> To be determined. <p><u>Education:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Assist Central Kootenay Invasive Species Society (CKISS) in educating private landowners along the foreshore about the value of native vegetation and importance of controlling / containing existing invasives. <input type="checkbox"/> Incorporate invasive species messaging using CKISS materials at Friday Markets to educate campers and recreationists about the risks of bringing “hitch-hiking” invasive species into our watershed and the importance of cleaning, draining and drying their boats before entering Slocan Lake, and cleaning and drying hiking boots, fishing waders and bikes before entering local creeks or the backcountry. <input type="checkbox"/> Help promote prevention of zebra and quagga mussels in Slocan Lake by educating residents and visitors about the boat washing station in 					

Silverton; and explore new possible locations for installing the station removed by the Village of New Denver.

- ☐ Educate campers about their role as potential vectors for transporting infected bats from other areas in such things as camper awnings and umbrellas.
- ☐ Support the Villages in preventing the dumping of invasive plant species as yard waste along roadsides and in the undeveloped forest and riparian areas around towns.

On-the-ground Stewardship:

- ☐ Support field monitoring and management that prevents the introduction and spread of invasive species, for example, continue assisting CKISS in monitoring Slocan Lake for mussel veligers.

Policy & Advocacy:

- ☐ Continue collaboration and coordination with the Central Kootenay Invasive Species Society to strengthen partnerships among all levels of government, private landowners, SWAMP and BC Parks to improve communications and collective results in the Slocan Lake Watershed.

Potential Partners / Collaborators: Central Kootenay Invasive Species Society, Fish & Wildlife Compensation Program, BC Parks, SWAMP, Regional District of Central Kootenay, Villages and Municipal campgrounds, Rosebery to Summit Lake Rail Trail Committee, Slocan River Streamkeepers, Wildlife Conservation Society Canada, Ministry of Forests, Lands, Natural Resources Operations, Forest Licensees, Columbia Basin Trust.

#6 Invasive Species (Species-Specific)					
Priority Action	Indicator of Watershed Health	Target Species	Target Habitat Type	Target Special Habitat Features	Potential Locations for Action
Implement Species-specific Actions to Prevent Impacts of Invasive Species on Native Biodiversity	Terrestrial & aquatic biodiversity: Local native populations of bats, fish and amphibians are prioritized for conservation so populations are robust if/when highly invasive species such as zebra & quagga mussels, bullfrog, northern pike, and the fungus causing white nose syndrome are introduced into the Slocan Lake Watershed.	bull trout, Kokanee, bats, western toad	Lake foreshore, Shallow lake, Wetland, Riparian Area, Interior Cedar-Hemlock swamp	fish spawning beds, nesting and/or roosting sites, bat hibernacula	1) Slocan Lake remains free of zebra and quagga mussels. 2) Old mines like the Molly Hughes along Slocan Lake's foreshore and in Sandon are investigated for use as bat hibernacula

Urgency HIGH: 1) Preventing the introduction of high priority invasive species such as zebra and quagga mussels, bullfrogs, and white nose syndrome (bats) is critically important to the health of the native biodiversity – and actions are urgent because these invasive species have just arrived in BC (bullfrogs) or were just detected in adjacent areas (zebra mussels in Montana, and white nose syndrome in Washington).

Time-sensitive Opportunity: Yes. 1) Wildlife Conservation Society Canada’s (WCS) has designated North American Bat (NABat) surveys areas in the Slocan Lake Watershed as part of a 5-year research study to locate bats in advance of white nose syndrome being introduced into the area.

SLSS’s Potential Role

Science:

- ☐ Support WCS’s field work to monitor bats throughout their NABat survey units in the Slocan Lake Watershed.
- ☐ Partner with SWAMP to inventory and map wetlands throughout the watershed as potential locations for looking for bullfrogs in the future.
- ☐ Support CKISS with acoustic monitoring of bull frogs.
- ☐ Support field efforts to map spawning habitats of native species so the information exists in advance of potential introduction of pike into Slocan Lake’s system.

Education:

- ☐ Have bat conservation + white nose syndrome, bullfrog, and pike information at SLSS’s Friday Market table.
- ☐ Educate campers about their role as potential vectors for transporting infected bats from other areas in such things as camper awnings and umbrellas.

On-the-ground Stewardship:

- ☐ Enhance bat habitat near shallow lakes and wetlands - potential projects could be investigating installation of bat condos at Bonanza Marsh and the east end of Summit Lake.

Policy & Advocacy:

- ☐ Support WCS’s work with Ministry of Energy & Mines to prevent blasting and closing of mines found to be bat hibernacula, and promote the use of gates at caves that are bat-friendly and protect human safety.

Potential Partners / Collaborators on Bats: Wildlife Conservation Society Canada, Central Kootenay Invasive Species Society, Kootenay Community Bat Project, BC Parks, Village-operated campgrounds, Ministry of Mines & Energy, Valhalla Wilderness Society, North Slocan Trail Society, Rosebery to Summit Lake Rail Trail Committee.

Potential Partners / Collaborators on Mussels, Bullfrogs and Pike: BC Parks through permits, signs, education; Ministry of Forests, Lands, Natural Resources Operations, through Recreation Sites and Trails BC, Fish & Wildlife Branch, and Forestry; Ministry of Environment especially for zebra and quagga mussels; Ministry of Transportation and Infrastructure for commercial vehicle scale operators and boat inspections; commercial and recreation tenure holders; Conservation Officers and other permitting and enforcement officers such as Natural Resource Officers, Land Officers; Central Kootenay Invasive Species Society; SWAMP; Villages and Village-operated campgrounds; Regional District of Central Kootenay; First Nations; Kootenay Conservation Program; consultants and researchers who are in the field and could alert others to the presence or spread of invasives; Sufferfest; North Slocan Trail Society; Rosebery to Summit Lake Rail Trail Committee.

#7 Climate Change					
Priority Action	Indicator of Watershed Health	Target Species	Target Habitat Type	Target Special Habitat Features	Potential Locations for Action
Climate Change Adaptation Strategy for Slocan Lake Watershed	<p>Integrity of natural features (creeks, floodplains, wetlands and forests) to provide natural infrastructure</p> <p>Adaptability of the ecology of the Slocan Lake Watershed to a changing climate</p>	bull trout, Kokanee, westslope cutthroat, western toad, bat species, grizzly bear, wolverine, caribou, old growth western red-cedar	Lake foreshore, Shallow lake, Wetland, Riparian area, Cottonwood forest, Interior Cedar-Hemlock forest & swamp	fish spawning beds, nesting and/or roosting sites, bat hibernacula, denning areas, migratory stopover sites, wildlife trees, cold water sources, ice fields and glaciers	<p>1) Glacier-fed creeks like Silverton, Sharp and Enterprise creeks.</p> <p>2) Wetlands and riparian areas from alpine to valley bottoms serving as buffers and sponges for floodwater storage</p>
<p>Urgency HIGH: There's unpredictability in exactly when climate change impacts (fire, flooding, mudslides) will occur and their severity. Preventative actions will increase the ability of the natural system to absorb and buffer extreme conditions. Also as climate changes, habitats will be shifting and there will be losses and gains of some plant and animal species in the watershed.</p>					
<p>Time-sensitive Opportunity: Yes. 1) The Slocan Integral Forestry Cooperative (SIFCO) has proposed taking the lead on identifying elements of a scoping study including analysis of opportunities and constraints which was referred to as Ecosystem Climate Change Adaptation Strategy (ECCAS).</p>					
<p>SLSS's Potential Role</p> <p><u>Science:</u></p> <ul style="list-style-type: none"> □ Support research and strategies contributing to the Ecosystem Climate Change Adaptation Strategy, which could include identifying areas for wildlife connectivity and species refugia; gap analysis and monitoring, e.g., snow and water, wetlands; compile all existing data in one place; prioritize actions and do pilot projects; develop a conservation plan with analysis of transition areas; identify key areas for acquisition or inclusion in protected areas; identify where restoration can provide mitigation or increase adaptation; look at trends, changes expected and how to adapt. <p><u>Education:</u></p> <ul style="list-style-type: none"> □ Share with SLSS members and residents how climate change poses a significant threat to the ecology and communities of the Slocan Lake Watershed through: changing native vegetation, fire cycles (frequency, intensity), hydrological changes (floods, mudslides, extreme drought) loss of snowpack, loss of cold water creeks. <p><u>On-the-ground Stewardship:</u></p> <ul style="list-style-type: none"> □ To be determined. <p><u>Policy & Advocacy:</u></p>					

- Support SIFCO in producing a Ecosystem Climate Change Adaptation Strategy with two phases: Phase I Scoping Study: to include available information and studies; Slocan Lake watershed specifics such as, constraints / barriers, opportunities, and weaknesses and gaps in knowledge of the Slocan Lake Watershed; outcome options and conservation plan; areas for wildlife connectivity and species refugia; compile all existing data on snow and water, wetlands and aquifers in one place; identify where restoration can provide mitigation or increase adaptation; look at trends, changes expected and how to adapt. Phase II: Vulnerability Assessment: to build on Scoping Study and identify key values to focus on; map locations; summarizes climate changes; assess exposure; assess value vulnerabilities / adaptive capacity – use kootenayresilience.org information; develop adaptive strategies; identify constraints and opportunities – what can be done to overcome these; develop a monitoring plan. Vulnerability assessment would evaluate adaptive capacity.

Potential Partners / Collaborators: Slocan Integral Forestry Cooperative (SIFCO), scientists (e.g., Greg Utzig, Martin Carver), Ministry of Environment, Ministry of Forests, Lands, Natural Resources Operations, West Kootenay Climate Vulnerability and Resilience Project, Columbia Basin Trust's Climate Action Program, Regional District of Central Kootenay, three Villages, SWAMP, Central Kootenay Invasive Species Society, Kootenay Conservation Program, Slocan River Streamkeepers, Resource Industry, First Nations, Healthy Communities Society, Sustainable Ag Community, School Districts 8 & 10.

#8 Maintaining Healthy Foreshore Habitat					
Priority Action	Indicator of Watershed Health	Target Species	Target Habitat Type	Target Special Habitat Features	Potential Locations for Action
Designation of Foreshore Enhancement & Rehabilitation Areas	<p>Integrity of the terrestrial and aquatic landscape for vulnerable native aquatic and terrestrial species</p> <p>Integrity of aquatic ecosystems including surface water quality</p>	bull trout, Kokanee, bat species, great blue heron, osprey, old growth western red-cedar	Lake foreshore, Wetland, Riparian area, Cottonwood forest, Interior Cedar-Hemlock forest	Fish spawning beds, nesting and/or roosting sites, bat hibernacula, migratory stopover sites, wildlife trees	Rosebery Log Dump and others to be determined
Urgency (to be determined):					
Time-sensitive Opportunity: No. 1) Education could occur along the Rosebery to Hills Rail Trail and Girl Guide Beach to develop enhancement projects and provide education of the importance of the foreshore along Slocan Lake. 2) Reach out to landowners in the new development at the Rosebery Log Dump to inform planting of native vegetation along the lakeshore and native landscaping of residential lots.					
SLSS's Potential Role <u>Science:</u> <input type="checkbox"/> To be determined. <u>Education:</u> <input type="checkbox"/> Discuss the characteristics and value of a healthy Lakeshore to residents and visitors at Friday Markets. Reinforce this message with kids using the Watershed Model. <input type="checkbox"/> Reach out with stewardship information to new landowners of the Rosebery Log Dump. <u>On-the-ground Stewardship:</u> <input type="checkbox"/> Revisit the science SLSS generated in the Shoreline Habitat Inventory and Assessment to investigate more deeply the colour-coded segments of Slocan Lake for potential foreshore enhancement and restoration sites and identify 2-4 areas for future on-site projects. <u>Policy & Advocacy:</u> <input type="checkbox"/> Continue to support municipal and RDCK policies that support natural, unaltered foreshores and beaches.					
Potential Partners / Collaborators: Three Villages, Regional District of Central Kootenay, Central Kootenay Invasive Species Society, Fish & Wildlife Compensation Program, Rosebery Parklands & Trails Commission (Galena Trail) and Rosebery Parklands Development Society, First Nations, Real Estate agencies.					