

**The Christina Lake Management Plan**

**Implementation Strategy Manual**



**Prepared by:**

**Brenda LaCroix  
CLMP Project Manager**

**&**

**Rebecca McLean  
CLMP Science/Technical Assistant**

**Christina Lake, British Columbia  
August 2005**

## **Foreword**

The Christina Lake Management Plan “Implementation Strategy Manual” has been developed to ensure that the goals and objectives of the CLMP are realized. This manual is intended to serve as a guide in implementing actions recommended for immediate implementation (i.e. 2005/2006). Recommended actions are organized into broad categories. Each action item is then further broken apart to discuss the rationale, implementation tactics, and funding requirements. The number assigned to each action may be used to cross reference information in table 39 in the CLMP document. More detailed information regarding funding sources is presented in table 1 at the end of this document.

While the Christina Lake Stewardship Society may initiate implementation of some actions, local or provincial government agencies or other qualified groups must initiate other actions due to availability of resources including funding, professional staff, and expertise. Having said that, involvement by all stakeholders is crucial to successful implementation of any of the recommended actions whether it be in the role of lead agency or on a consultative basis.

Some actions have already been implemented or are in the process of being implemented. These particular actions are discussed in greater detail within this document and the results, if available, are summarized. Data, where applicable, and files for each item are located at the Community Stewardship Resource Centre.

## **TABLE OF CONTENTS**

<b>CORE OPERATIONS INITIATIVES .....</b>	<b>1</b>
Action (5.1A) > Secure core funding to keep the Community Stewardship Resource Centre (CSRC) open. ....	1
Action (5.1B) > Build and maintain a constituency of involved citizens. ....	2
Action (5.1C) > Form an agreement with project participants to ensure future participation in CLMP revision and implementation. ....	2
Action (5.1D) > Produce an annual CLMP progress report. ....	3
<b>PUBLIC EDUCATION AND COMMUNITY INVOLVEMENT INITIATIVES .....</b>	<b>5</b>
Action (3.2A) > Update/install informative signage. ....	5
Action (3.2F) > Develop and distribute a water conservation brochure. ....	7
Action (3.3E) > Coordinate local “Lake Clean-Up Day” event. ....	8
Action (3.1C) > Coordinate a “Fire Preparedness” informational display. ....	8
Action (3.1C) > Develop a “Wildfire and Property Protection” video. ....	9
Action (3.2E) > Continue media releases. ....	10
Action (4.1A) > Improve distribution of water quality and other data to the public. ....	10
Action (3.3A) > Determine community’s interest in applying for a Community Forest Licence. ....	11
Action (3.3F) > Promote acquisition and conservation of District Lot 498. ....	12
Action (3.4A,B) > Develop and deliver school programs. ....	13
Action (3.2G) > Develop and deliver an Internet-based habitat atlas for the Christina Lake watershed. ....	13
Action (3.2H) > Develop and deliver a map-based pamphlet about natural resources in the Christina Lake watershed. ....	14
<b>CONTINUE AND EXPAND UPON CURRENT MONITORING PROGRAMS .....</b>	<b>16</b>
Action (1.1C) > Support recommendations in Cavanagh, et al. (1994) to expand the current MWLAP water quality monitoring program. ....	16
Action (1.1A) > Establish a volunteer biological water quality monitoring program for major lake tributaries and Christina Creek. ....	17
Action (1.1D) > Establish a volunteer hydrometric data collection program. ....	18
Action (1.2C) > Conduct shoreline and tributary survey to identify potential restoration sites. ....	19
Action (1.2E) > Conduct sediment core sampling and analysis. ....	20

**Action (2.4C) > Promote a survey of Eurasian water milfoil infestation sites and conduct inventories of terrestrial noxious and invasive weeds.....21**

**Action (2.1A) > Assess potential fish habitat gains/losses associated with barrier removal on McRae Creek. .22**

**Action (2.2 E) > Provide support for a hydroacoustic kokanee population assessment. ....22**

**Action (2.2F ) > Conduct kokanee shore spawner enumeration.....23**

**Action (2.2G ) > Conduct kokanee stream spawner enumeration.....24**

**Action (2.2H) > Conduct creel surveys. ....24**

**Action (2.2I) > Conduct research about exotic species interactions with native species in aquatic ecosystems. ....25**

**FUNDING SOURCES ..... 27**

---

## Core Operations Initiatives

The success of all the actions listed in this section depends heavily upon the Community Stewardship Resource Centre (CSRC) remaining open to the public to act as a central location from which activities may be coordinated. Specific information regarding status of funding applications, required permits, etc. will be kept on file at the CSRC.

***Action (5.1A) > Secure core funding to keep the Community Stewardship Resource Centre (CSRC) open.***

### **Rationale:**

The CSRC provides a central location for project coordination, resource material cataloguing, and office and meeting facilities. Furthermore, the office space rental is low cost and acts as the Christina Lake Stewardship Society headquarters.

### **Implementation:**

Long term/multi-year funding will be sought out and proposals drafted for submission. The resource database/library will continue to grow and is available to the public.

*Progress:* A proposal was submitted to the BC Gaming Commission on August 4, 2005. A decision is pending.

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
CLSS	No	N/A	Ongoing

### **Funding:**

Presently, the most likely funding source for this action is the BC Gaming Commission - Direct Access Program. Consideration should also be given to establishing a CLSS endowment fund to provide ongoing funding to cover core expenses such as office rental, communications services, and staff salaries. This could eliminate or decrease the tremendous amount of time involved in drafting, submitting and waiting for approval from granting agencies. The table below provides funding details and may be used to track fund raising activities.

<i>Funding Details - BC Gaming Commission</i>	
<b>Letter of Intent Required/Deadline</b>	No/not applicable
<b>Proposal Deadline/Date Submitted</b>	July 1 – Aug 31, 2005/Aug 4, 2005
<b>Funding Requirements (\$) (including in-kind contributions)</b>	
<b>Funding Amount Requested (\$)</b>	\$42,309.20
<b>Funding Received (\$)</b>	Application pending

***Action (5.1B) > Build and maintain a constituency of involved citizens.***

**Rationale:**

Committed volunteers are crucial to successful implementation of all other recommended actions. Volunteerism also generates interest in local issues and increases public awareness.

**Implementation:**

Each of the CLSS directors will commit to seeing at least one recommended action through to fruition including proposal writing, volunteer recruitment, evaluating progress, and reporting. A volunteer sign up sheet may be posted on the CLSS website. Advertising for project specific volunteers in local newspapers should be considered. A “Stewardship Award” will be presented to local residents who demonstrate extraordinary stewardship involvement.

A booth will be set up weekly or bi-weekly at Bartlett’s Farm and Craft Fair to showcase the CLSS activities and recruit members and volunteers. Each director should commit to donating at least 4-8 hours over the course of the tourist season (May to August).

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
CLSS	No	N/A	Ongoing

**Funding:**

There may be some nominal costs associated with newspaper advertisements.

***Action (5.1C) > Form an agreement with project participants to ensure future participation in CLMP revision and implementation.***

**Rationale:**

Continuing support from CLMP project partners is essential to ensuring that implementation of CLMP initiatives is successful.

**Implementation:**

Following a review and approval of the final draft of the CLMP, a Memorandum of Understanding will be signed by all project partners to ensure that they will be involved in annual plan revision, implementation of various recommended actions, and/or provision of professional advice.

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
All CLMP Committee Members	No	N/A	July 2005

**Funding:**

Not required.

***Action (5.1D) > Produce an annual CLMP progress report.***

**Rationale:**

An annual report will help identify successes and define future direction for CLMP implementation.

**Implementation:**

The CLMP Project Manager, with input from the CLMP committees, will produce an annual report and distribute it to project partners. The following information was not received, not accessed or unavailable prior to the printing of this document but will be included as it becomes available:

- Forest health activities and the agencies/businesses responsible (CLMP section 5.3.0.4.1),
- Forest health – contact Ben Parfitt, BC office of the Canadian Centre for Policy Alternatives and author of “Battling the Beetle: Taking Action to Restore BC’s Interior Forests”,
- Forest age class data from Pope and Talbot (CLMP section 5.3.0.4, table 7),
- Species at Risk – Federal/Provincial bi-lateral agreement for protection of designated species at risk, information will be received from Adrian Wall, DFO, Kamloops (CLMP section 5.3.5.1),
- Kokanee stream spawner data from Ministry of Environment (table 11), and
- New well regulations – information will be received from Monte Meidvick, Ministry of Environment, Nelson office (contact number: 250-354-6376).

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
CLMP Project Manager, Committee Members	No	N/A	Annually

**Funding:**

Core expense funding should cover the costs of annual report preparation. If an exceptional amount of new information must be amended or appended, additional resources may be required (e.g. additional staff).

---

## Public Education and Community Involvement Initiatives

Public education and community involvement initiatives are critical to the success of the plan. The value of community support is immeasurable. Increasing public awareness about local issues is an effective way to educate watershed users about the impact daily activities can have on the natural environment and how these impacts affect them directly. Initiatives of this nature also foster a sense of community. These types of activities are relatively easy for the CLSS to implement with some cooperation from other agencies.

***Action (3.2A) > Update/install informative signage.***

### **Rationale:**

The use of signage is one way to educate the public on locally relevant subjects such as, for example, fish life cycles, geological features, or forest ecology. Informative signage can also alert watershed users to the impacts associated with various activities and provide contact numbers for access to further information or to report a particular activity.

### **Implementation:**

In cooperation with other responsible agencies, ensure existing signs display current, accurate information. Work with project partners to develop interpretive signage to be installed in areas deemed suitable (e.g. kokanee life cycle signs placed in Community Nature Park near Sutherland Creek).

*Progress:* Noxious weed information signs were placed at various infestation sites around the community in July 2005 including roadsides and the Community Nature Park. Blueweed (*Echium vulgare*) and Hoary Alyssum (*Berteroa incana*) were the highlighted weeds although Dalmatian Toadflax (*Linaria dalmatica*), Orange Hawkweed (*Hieracium aurantiacum*), and Spotted Knapweed (*Centaurea maculosa*) signs will be strategically placed early next year. The signs include a photograph of the weed in question, information on how to control the weed, and some facts about the status and impact of the weed in the local area.

Due to ongoing stream channel modifications on McRae Creek, a sign was placed on the north side of the creek mouth providing information about kokanee spawning habitat and the Federal Fisheries Act in an attempt to deter the public from altering the streambed further. The intention is to maintain unimpeded access to the stream for kokanee spawners.

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
CLSS, MWLAP, Park Committee, BC Parks, CL Chamber of Commerce, BWMC	*No	Community Nature Park, near mouth of McRae Creek, other locations	Summer/Fall 2005 and Spring 2006

\*All signs must meet the requirements under Electoral Area "C" Zoning By Law 900, Section 315.

### **Funding:**

Funding opportunities for this type of project will depend on the agency responsible for disseminating that particular information. For example, the CLSS may apply for funds to develop interpretive signage while BC Parks may have a budget allocated for updating existing trail signs. The Boundary Weed Management Committee funded the noxious weed signage and CLSS staff installed the signs. Further funding options that may be pursued by the CLSS are listed in the tables below.

<b><i>Funding Details – Phoenix Foundation</i></b>	
<b>Letter of Intent Required/Deadline</b>	Yes/Feb. 28 <sup>th</sup> and Aug. 15 <sup>th</sup> every year
<b>Proposal Deadline/Date Submitted</b>	Mar. 31 <sup>st</sup> and Sept. 15 <sup>th</sup> every year/
<b>Funding Requirements (\$) (including in-kind contributions)</b>	
<b>Funding Amount Requested (\$)</b>	
<b>Funding Received (\$)</b>	

<b><i>Funding Details – TD Friends of the Environment</i></b>	
<b>Letter of Intent Required/Deadline</b>	No/Not applicable
<b>Proposal Deadline/Date Submitted</b>	Open, *must apply online at <a href="http://www.td.com/fef/project.jsp#focus/">http://www.td.com/fef/project.jsp#focus/</a>
<b>Funding Requirements (\$) (including in-kind contributions)</b>	
<b>Funding Amount Requested (\$)</b>	
<b>Funding Received (\$)</b>	

<b><i>Funding Details – BC Gaming Commission</i></b>	
<b>Letter of Intent Required/Deadline</b>	No/Not applicable
<b>Proposal Deadline/Date Submitted</b>	July 1 <sup>st</sup> to Aug 31 <sup>st</sup> /
<b>Funding Requirements (\$) (including in-kind contributions)</b>	
<b>Funding Amount Requested (\$)</b>	
<b>Funding Received (\$)</b>	

**Action (3.2F) > Develop and distribute a water conservation brochure.**

**Rationale:**

Development and delivery of a clear, concisely composed brochure is one way to communicate the importance of protecting and conserving water resources to a large number of people.

**Implementation:**

In cooperation with local water districts and possibly MWLAP and the BC Lakes Stewardship Society, the CLSS will develop and distribute a water conservation brochure. The brochure will contain information about water quality and quantity issues in the Christina Lake watershed and provide useful tips on how to minimize water use.

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
CLSS, Local Water Districts, MWLAP (?)	No	N/A	Summer/Fall 2005

**Funding:**

Funding may be available through MWLAP although that is currently unconfirmed. Other potential sources are listed in the tables below.

<b><i>Funding Details – Phoenix Foundation</i></b>	
<b>Letter of Intent Required/Deadline</b>	Yes/Feb. 28 <sup>th</sup> and Aug. 15 <sup>th</sup> every year
<b>Proposal Deadline/Date Submitted</b>	Mar. 31 <sup>st</sup> and Sept. 15 <sup>th</sup> every year/
<b>Funding Requirements (\$) (including in-kind contributions)</b>	
<b>Funding Amount Requested (\$)</b>	
<b>Funding Received (\$)</b>	

<b><i>Funding Details – Shell Environmental Fund</i></b>	
<b>Letter of Intent Required/Deadline</b>	No/Not applicable
<b>Proposal Deadline/Date Submitted</b>	<\$500, no deadline, >\$500 Feb. 28 <sup>th</sup> and Oct. 1 <sup>st</sup> /
<b>Funding Requirements (\$) (including in-kind contributions)</b>	
<b>Funding Amount Requested (\$)</b>	
<b>Funding Received (\$)</b>	

**Action (3.3E) > Coordinate local “Lake Clean-Up Day” event.**

**Rationale:**

Engaging local residents in an initiative such as this promotes a sense of community pride.

**Implementation:**

“Lake Clean Up Day” will be an ongoing, annual event.

*Progress:* The 2005 “Lake Clean Up Day” was held on May 7, 2005. The next event will likely be scheduled for May 2006.

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
CLSS	No	Christina Lake	May of every year

**Funding:**

The success of “Lake Clean Up Day” is dependent primarily on community volunteer time and donated goods and services. Christina Lake Garbage Service picks up garbage free of charge and the Regional District of Kootenay-Boundary waives the disposal fees at the landfill. In addition, the TD Friends of the Environment Foundation (TDFEF) sponsors the “Pitch-in Canada” week event promoted by the “Pitch-in Canada” non-profit organization. Each year, the TDFEF mails an application package to the CLSS and provides garbage bags, t-shirts and a certificate of participation for the “Lake Clean-Up Day” event.

**Action (3.1C) > Coordinate a “Fire Preparedness” informational display.**

**Rationale:**

Since Christina Lake is a rural, forested community, wildfire has the potential to inflict serious damage on personal property. Providing some information about available fireproofing options may encourage homeowners to make their property more resistant to wildfire damage.

**Implementation:**

The CLSS, in cooperation with the Christina Lake Fire Department, and possibly the Ministry of Forests, will set-up and staff an information booth at the AG Foods grocery store to provide information to residents and tourists about the threat of wildfire and what can be done to mitigate that threat.

Other items for future discussion include consideration of implementing an open burning by-law for Area “C” and development of an emergency response plan in conjunction with the Advisory Planning Commission, the RDKB, Ministry of Forests, and the Christina Lake Fire Department

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
CLSS, Christina Lake Fire Department, Ministry of Forests	No	Christina Lake	May of every year

**Funding:**

Very little funding is expected to be required for this action. Should the display require posters or other printed materials the costs are expected to be nominal and volunteers will staff the booth. The Christina Lake Fire Department and the Ministry of Forests have access to printed information and expertise in fire prevention. Both agencies can effectively relay information about preventative measures that can be employed by property owners to decrease the risk of property damage.

***Action (3.1C) > Develop a “Wildfire and Property Protection” video.***

**Rationale:**

As discussed above, Christina Lake is a rural, forested community, and wildfire has the potential to inflict serious damage on personal property. Providing information in the form of a locally produced video about fireproofing options may encourage homeowners to make their property more resistant to wildfire damage.

**Implementation:**

Progress: This item has been completed. In April 2005, CLSS President, Marion Beattie, accompanied a group of Grand Forks Secondary School students to a parcel of private land in the Fife area on the east side of Christina Lake. The students captured video footage of the tree thinning and ground fuel management activities that the owner had undertaken in an effort to spare his property from wildfire damage should one occur in the area. The students produced an instructional video. The video is available at the Community Stewardship Resource Centre.

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
CLSS, Grand Forks Secondary School students	No	Fife area, Christina Lake	April 2005

**Funding:**

No funding was required for this action.

***Action (3.2E) > Continue media releases.***

**Rationale:**

Media releases are an effective means of distributing information about local issues, projects, etc. to local residents.

**Implementation:**

The CLSS will continue to submit weekly articles to the Christina Lake News and to other area newspapers as appropriate. Consideration should also be given to developing an e-newsletter so that seasonal residents can be kept informed year-round.

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
CLSS	No	Christina Lake and surrounding area	Ongoing

**Funding:**

Newspaper article submissions are printed free of charge. A nominal fee is associated with running advertisements.

***Action (4.1A) > Improve distribution of water quality and other data to the public.***

**Rationale:**

Compilation and storage of data from various sources at the CSRC allows residents to easily access information at a central location. It is also important that volunteers who donate time for sampling see results in a timely fashion.

**Implementation:**

The CLSS will continue to request, collect, and house data for public access, building on the existing resource library. This action may be combined with others in the case of developing a water conservation brochure (Action 3.2F) or distributing information via media releases (Action 3.2E). Information will be posted on the CLSS website and links to agencies whose websites contain locally relevant data will be provided upon approval.

Accurate tourism levels and lake capacity for boat traffic have not been determined. These types of data could be very useful in measuring impacts associated with recreational activities in the watershed (e.g. spread of milfoil by boats, effects on water quality, displacement of wildlife, destruction of fish habitat).

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
CLSS, IHA, MWLAP, Community Mapping Network, CL Chamber of Commerce	No	Christina Lake and surrounding area	Ongoing

**Funding:**

Little if any funding should be needed to accomplish this action. Volunteer or staff time is required to collate and distribute data.

***Action (3.3A) > Determine community’s interest in applying for a Community Forest Licence.***

**Rationale:**

A Community Forest Licence allows local control of forest resources in a defined area and encourages a healthy local economy.

**Implementation:**

Progress: A Community Forest Committee (CFC) has been formed to investigate the options available in terms of obtaining a Community Forest Licence. Several groups are represented on the committee including the Area “C” Park Study Group, CLSS, and interested residents. The CFC will review guidebooks and liase with residents, Ministry of Forests staff and other government representatives to determine the feasibility of and level of interest in applying for a Community Forest Licence.

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
Community Forest Committee	No	Christina Lake area	

**Funding:**

At this time funding requirements are unknown.

***Action (3.3F) > Promote acquisition and conservation of District Lot 498.***

**Rationale:**

District Lot 498 was described by the Conservation Data Centre as “one of the last undeveloped lowland riparian habitats in the Christina Lake area.” This property is also unique in that it has riparian growth on both sides of Christina Creek, open forested areas, and grasslands making it suitable habitat for a vast array of organisms including several red and blue listed species. In conserving this property, the entire community will gain an invaluable natural area while preserving critical habitat for species at risk. Furthermore, according to the Area “C” Official Community Plan, “that part of DL498 that encompasses part of the Christina Creek lowlands will be designated as Park on the Land Use Map. The area will remain in a natural state until the Province, Regional District or a community group undertakes development and management of the land.”

**Implementation:**

In cooperation with the Area “C” Parks Study Group, the CLSS will investigate the potential of obtaining funding to purchase DL 498 for use as a nature park. The first step is to send a letter to the Provincial Government expressing the desire of the community to pursue the acquisition of this parcel of land for conservation purposes.

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
CLSS, Area “C” Parks Study Group	No	DL 498	

**Funding:**

Application for funding to acquire DL 498 can be made to the Habitat Conservation Trust although they likely could not fund the entire purchase. Other partnerships should also be sought out to solidify community and government support in favour of this project. Doing so may significantly increase the chance that funding will be granted. Further funding details are provided below.

<i>Funding Details – Habitat Conservation Trust Fund</i>	
<b>Letter of Intent Required/Deadline</b>	Yes (submit online)/
<b>Proposal Deadline/Date Submitted</b>	(Proposal invitation required)
<b>Funding Requirements (\$) (including in-kind contributions)</b>	
<b>Funding Amount Requested (\$)</b>	
<b>Funding Received (\$)</b>	

***Action (3.4A,B) > Develop and deliver school programs.***

**Rationale:**

School programs are an excellent way to reach youth in the community and get them involved in local initiatives. Programs will highlight the natural features of the area including fish populations and water quality as well as broader level issues like climate change.

**Implementation:**

The CLSS will continue to collect and develop educational material relating to local, regional, and national environmental issues. School programs will be made available to grade 1 to 12 classes upon the request of a teacher or school principal.

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
CLSS	No	School District 51	Sept. to June annually

**Funding:**

No funding is necessary for this action although staff/volunteer time will be required.

***Action (3.2G) > Develop and deliver an Internet-based habitat atlas for the Christina Lake watershed.***

**Rationale:**

Residents, tourists, and regional planners could access local habitat information online to increase their understanding of natural resources in the watershed and take measures to ensure those resources are protected.

**Implementation:**

Progress: Implementation of this action has already begun. Through a partnership with Selkirk College and the Community Mapping Network, an Advanced GIS practicum student completed a set of 12 maps detailing various natural features and legal boundaries in the watershed. The Regional District of Kootenay-Boundary also supports this initiative.

These maps should be available on the Community Mapping Network in the near future, and will include an online tutorial on how to view, query, and use the atlas. As new data becomes available, a data custodian at Selkirk College will update the maps. Data exchange agreements will be required for any digital data received from the provincial government and should be arranged through Susan Lindner, DEA Coordinator, Base Mapping & Geomatic Services Branch (Telephone: (250) 356-5079, E-mail: [Susan.Lindner@gems7.gov.bc.ca](mailto:Susan.Lindner@gems7.gov.bc.ca)).

Some of the Christina Lake Management Plan digital data is already available for online viewing at [http://www.shim.bc.ca/christina\\_lake/main.cfm](http://www.shim.bc.ca/christina_lake/main.cfm)

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
CLSS, Community Mapping Network, Selkirk College, RDKB	No*	N/A	

\* Data exchange agreements may be required to acquire digital data.

**Funding:**

Funding required for the completion of this project has been estimated at \$5,000 to \$10,000. Aside from the possibility of the Regional District providing funds/resources, no other funding sources were identified at the time this document was prepared.

***Action (3.2H) > Develop and deliver a map-based pamphlet about natural resources in the Christina Lake watershed.***

**Rationale:**

Brochures can convey a large amount of information in an attractive, easy to understand manner. This brochure will utilize existing maps to increase awareness of local issues and the area’s natural features.

**Implementation:**

The CLSS, with assistance from the Community Mapping Network, will create a brochure using maps to convey information about the natural resources in the local area. These brochures will be distributed to local tourist information booths, businesses and campgrounds.

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
CLSS, Community Mapping Network	No	N/A	Spring 2006

**Funding:**

There will be a cost associated with printing the brochures although that will be dependant on specifics such as the number of brochures, number of colour photos/maps used, and size. Exact costs must be calculated when these details are determined. Some potential funding sources are presented below.

<b><i>Funding Details – TD Friends of the Environment</i></b>	
<b>Letter of Intent Required/Deadline</b>	No/Not applicable
<b>Proposal Deadline/Date Submitted</b>	Open, *must apply online at <a href="http://www.td.com/fef/project.jsp#focus/">http://www.td.com/fef/project.jsp#focus/</a>
<b>Funding Requirements (\$) (including in-kind contributions)</b>	
<b>Funding Amount Requested (\$)</b>	
<b>Funding Received (\$)</b>	

<b><i>Funding Details – Shell Environmental Fund</i></b>	
<b>Letter of Intent Required/Deadline</b>	No/Not applicable
<b>Proposal Deadline/Date Submitted</b>	<\$500, no deadline, >\$500 Feb. 28 <sup>th</sup> and Oct. 1 <sup>st</sup> /
<b>Funding Requirements (\$) (including in-kind contributions)</b>	
<b>Funding Amount Requested (\$)</b>	
<b>Funding Received (\$)</b>	

---

## Continue and Expand Upon Current Monitoring Programs

Various agencies have active monitoring programs in place in the Christina Lake watershed. The Interior Health Authority conducts water sampling for drinking and recreational water use and the Ministry of Water, Land and Air Protection conducts bi-annual water sampling to compare the results to the water quality objectives derived for Christina Lake. CLSS volunteers take weekly Secchi disk readings between May and October of each year. In addition, many local residents keep records of wildlife sightings, lake ice cover data, and questionable development activities. In many cases, the recommended actions require support and expert advice from government agencies or other qualified groups and/or individuals.

***Action (1.1C) > Support recommendations in Cavanagh, et al. (1994) to expand the current MWLAP water quality monitoring program.***

### **Rationale:**

Sufficient data is required to determine temporal and spatial trends in water quality. Although sampling is currently conducted twice yearly, during fall and spring turnover, many local residents feel it is not adequate enough to address concerns related to water quality in the summer months and in near shore areas.

### **Implementation:**

A consultant hired by MWLAP, recently conducted a review of the current water quality objectives. The report recommends that the current water quality monitoring program be expanded as was originally proposed in Cavanagh et al. 1994 (Christina Lake Water Quality Assessment and Objectives). The table below reiterates that recommended sampling program and was taken directly from Cavanagh et al. (1994). Implementation of this action is dependent on MWLAP staff and fund availability.

Location	Frequency	Date	Parameter
Deep stations	Monthly	Apr-Oct	Phytoplankton (1) Zooplankton (2) D.O. (profile) Temperature (profile) Secchi depth M F Fecal Chlorophyll a Turbidity
Deep stations (3 depths per station)	Monthly	Apr-Oct	Total Phosphorus Total Dissolved P NO2 / NO3 NH3 Organic N
6 shallow stations	Weekly	July-Aug	M F Fecal
6 tributaries	Monthly	Apr-Oct	M F Fecal
6 shallow stations	Monthly	Apr-Oct	Periphyton (4)
6 tributaries & 6 shallow stations	Monthly	Apr-Oct	D.O.
			Temperature Total Phosphorus Total Dissolved P NO2 / NO3 NH3 Organic N Turbidity

**Funding:**

Funding for this action depends on budget dollars available to MWLAP staff. The CLSS can participate by providing volunteer time for sample collection and to continue weekly Secchi disk readings.

***Action (1.1A) > Establish a volunteer biological water quality monitoring program for major lake tributaries and Christina Creek.***

**Rationale:**

Collection of biological data gives a more complete picture of water quality than chemical or physical data alone. The biological community in a stream may react to changes in water quality that are not readily apparent in physical/chemical test results. This type of monitoring gives a clearer picture of the health of a stream than narrowly focusing on levels of chemical contaminants or physical parameters. The difference between biological monitoring and chemical/physical monitoring has been described as comparing video footage to a snapshot.

**Implementation:**

CLSS volunteers, with technical assistance from MWLAP, will use the Streamkeepers Handbook as a guide to conduct biological sampling on major lake tributaries and Christina Creek. Sandner Creek data can be used as a measuring stick with which to compare data from other streams if the MWLAP biologist agrees. Sampling of this type is best done during low flow conditions although consideration must be given to the kokanee spawning runs to ensure no damage to spawners or redds occurs.

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
CLSS, MWLAP	Park Use permit required for Sandner Creek since it is within the boundaries of Gladstone Provincial Park	Sandner Creek, McRae Creek, Sutherland Creek, Christina Creek	Late summer/fall 2005

**Funding:**

Funding for this action is expected to be minimal. The sampling is to be done by volunteers and MWLAP will provide in-kind support in the form of technical assistance and volunteer training.

***Action (1.1D) > Establish a volunteer hydrometric data collection program.***

**Rationale:**

Water Survey of Canada hydrometric stations in the Christina lake watershed are no longer active with the most recent one being deactivated in 1990. As a result water level and flow measurements are not currently being recorded. In order to monitor any potential effects of climate change and to ensure that water supplies are managed to allow an adequate amount is reserved for sustaining the health of aquatic systems long term hydrometric trend data is very important.

**Implementation:**

*Progress:* Implementation of this action has already begun. Staff from the Resource Information Branch of the Ministry of Sustainable Resource Management in Victoria, have supplied the CLSS with gauge plates and markers.

Ministry of Environment (formerly MWLAP) hydrologist Phil Epp will provide expertise in terms of site selection and gauge installation. Further information is required so that any data currently being collected by the local water districts is not duplicated unnecessarily.

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
CLSS, MoE, MSRM, P&T	No	McRae Creek, Moody Creek, Sutherland Creek	Gauge installation: Sept. 8, 2005

**Funding:**

Funding sources for this action have not yet been determined. The Forest Investment Account (FIA) may be a source of funds although it is only accessible by Pope and Talbot. These funds can only be used to install gauges on streams that lie within P&T's operating areas.

***Action (1.2C) > Conduct shoreline and tributary survey to identify potential restoration sites.***

**Rationale:**

This is an important first step in identifying sites that may be suitable for riparian restoration projects. Restoring riparian vegetation helps to restore critical fish and wildlife habitat, preserve water quality, and stabilize stream banks.

**Implementation:**

CLSS volunteers will conduct lakeshore and stream bank surveys to identify unstable banks, riparian areas infested with noxious weeds, or other disturbed sites for possible future restoration projects.

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
CLSS	No*	Christina Lake and tributaries	Fall 2005/Spring 2006

\*Permission to cross private property to access shore areas may be required.

**Funding:**

Funding for the initial surveys will be nominal. Some money will be required for boat gas, however CLSS volunteers, and possibly Selkirk College students, will donate time

to conduct the survey. Potential funding sources for restoration projects are listed in the tables below.

<i>Funding Details – TD Friends of the Environment</i>	
<b>Letter of Intent Required/Deadline</b>	No/Not applicable
<b>Proposal Deadline/Date Submitted</b>	Open, *must apply online at <a href="http://www.td.com/fef/project.jsp#focus/">http://www.td.com/fef/project.jsp#focus/</a>
<b>Funding Requirements (\$) (including in-kind contributions)</b>	
<b>Funding Amount Requested (\$)</b>	
<b>Funding Received (\$)</b>	

<i>Funding Details – Shell Environmental Fund</i>	
<b>Letter of Intent Required/Deadline</b>	No/Not applicable
<b>Proposal Deadline/Date Submitted</b>	<\$500, no deadline, >\$500 Feb. 28 <sup>th</sup> and Oct. 1 <sup>st</sup> /
<b>Funding Requirements (\$) (including in-kind contributions)</b>	
<b>Funding Amount Requested (\$)</b>	
<b>Funding Received (\$)</b>	

***Action (1.2E) > Conduct sediment core sampling and analysis.***

**Rationale:**

Sediment coring is usually conducted in lakes that are in a much more advanced stage of eutrophication than Christina Lake. However, Selkirk College instructor Frank Fowler has expressed an interest in collecting a sample since he has collected a number of samples from area lakes in recent years. This exercise provides a good educational opportunity for Selkirk College students.

**Implementation:**

The sediment coring apparatus and field crew will be supplied by Selkirk College. Analytical options must be determined prior to sample collection. CLSS will make arrangements to have a boat available and will receive a copy of the results once the analysis has been completed.

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
CLSS, Selkirk College	?	Christina Lake, north and south basin	Fall 2005

**Funding:**

Funding requirements for this action will be limited to boat gas costs.

**Action (2.4C) > Promote a survey of Eurasian water milfoil infestation sites and conduct inventories of terrestrial noxious and invasive weeds.**

**Rationale:**

Eurasian water milfoil: The RDKB has commissioned DG Reagan and Associates to conduct an assessment of the current Eurasian water milfoil (*Myriophyllum spicatum*) control program. The final report was received in May 2005 but it did not adequately address the issues or clearly identify Eurasian water milfoil control options. CLSS staff and directors provided feedback on the shortcomings of the report and submitted them to the Area “C” Regional Director for consideration.

Despite past and current control efforts, Eurasian water milfoil has steadily increased in Christina Lake since the first plants were reported in the mid 1980’s. A map depicting all infestation sites has never been created but would be an excellent tool to monitor the effectiveness of the current program and identify areas where infestation sites are increasing or decreasing in size.

Terrestrial Plants: Terrestrial noxious and invasive weed infestations continue to spread and increase in size in many parts of the watershed. Accurate information on the presence and distribution of noxious and invasive weeds is required before management options can be determined and control efforts can be undertaken.

**Implementation:**

CLSS has a handheld GPS unit and will further investigate the possibility of using a boat to map infestation sites. The potential to create a practicum project for an Advanced GIS student from Selkirk College should also be considered. If feasible, this action should be repeated on an annual basis to map infestation sites and monitor where growth is expanding or being controlled.

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
CLSS, RDKB, Selkirk College	No	Christina Lake	Fall 2005/Spring 2006

**Funding:**

The RDKB current pays for the Eurasian water milfoil control program through local tax revenue. If deemed appropriate, this action could possibly be funded through a portion of the existing budget. The Habitat Conservation Trust Fund may be another funding source.

***Action (2.1A) > Assess potential fish habitat gains/losses associated with barrier removal on McRae Creek.***

**Rationale:**

Local residents have expressed concern regarding a large debris jam on McRae Creek. The debris jam was originally reported in 1973 as being a barrier to upstream kokanee (*Oncorhynchus nerka*) spawner migration. Concerned citizens would like to see the barrier removed, however the potential habitat gains/losses and the risk of damage to private property had to be assessed before any consideration was given to removing the barrier.

**Implementation:**

*Progress:* In an attempt to address local concerns, CLSS staff and Selkirk College students and instructors spent 2 days evaluating fish habitat on McRae Creek in April 2005. The crew surveyed the creek beginning at the mouth and ending at what is locally known as “the potholes”. Habitat feature data was captured with a Trimble Explorer GPS unit and recorded in field books. Habitat features will be confirmed during the stream spawner kokanee enumeration due to occur in September 2005. The data will be mapped and a report drafted when the students return to classes in the fall (2005). Initial observations suggested that barrier removal would actually result in a significant loss of valuable habitat and likely cause damage to private property and/or detrimental stream bank erosion downstream.

**Funding:**

Funding was/is not required for this action.

***Action (2.2 E) > Provide support for a hydroacoustic kokanee population assessment.***

**Rationale:**

Currently available information regarding the status of Christina Lake’s native fish populations is scattered and, in some cases, contradictory. A hydroacoustic survey is one method available for estimating the total in-lake kokanee population by age class.

**Implementation:**

The CLSS will provide assistance to MWLAP fisheries staff as required to complete this project.

Progress: MWLAP fisheries staff completed the survey on July 6, 2005. The CLSS provided space for sample processing. Results were not available at the time this document was printed.

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
MWLAP, CLSS	Yes	Christina Lake	July 5 & 6, 2005

**Funding:**

This action was funded by MWLAP.

***Action (2.2F) > Conduct kokanee shore spawner enumeration.***

**Rationale:**

Kokanee shore spawner enumerations have been conducted since 2001 although 2004 was the only year it was done at night. In 2003, enumerators recommended that the enumeration be conducted at night as it was strongly (and correctly) suspected that the kokanee spawned at night. Since data collected over a number of years is required to make accurate assumptions about the kokanee shore spawner population, this action item should continue to occur on an annual basis.

**Implementation:**

In conjunction with MWLAP and the BC Conservation Foundation, the CLSS will continue to provide staff and support to ensure that the enumeration is successful. The project includes GPS data capture, fish and redd counts, sample collection and analysis for ageing, and reporting.

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
MWLAP, CLSS	Yes	Christina Lake	July 5 & 6, 2005

**Funding:**

This action has and will continue to be funded by the BC Conservation Foundation. Ministry of Environment fisheries personnel are responsible for applying for required funds. The CLSS oversees administrative duties for the project, provides staff, and coordinates equipment.

**Action (2.2G ) > Conduct kokanee stream spawner enumeration.**

**Rationale:**

Stream spawner enumerations have been conducted for McRae, Sutherland, and Sandner Creeks numerous times by various individuals over recent years although the data does not appear to have been collated. Several years of consistently collected data is required in order to accurately assess the kokanee stream spawner population in Christina Lake.

**Implementation:**

CLSS volunteers will continue to monitor creeks for spawning activity in late August each year and conduct enumerations on McRae, Sutherland, and Sandner Creeks. The information collected will continue to be sent to MWLAP for entry into their fisheries information system.

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
CLSS	No	McRae, Sutherland, and Sandner Creek	August/September annually

**Funding:**

This action will be completed entirely by volunteers and requires no additional funding.

**Action (2.2H) > Conduct creel surveys.**

**Rationale:**

Creel surveys are one way to determine if fishing regulations are effective. Creel survey data consists of species caught, size/weight, and number of angler days/year.

**Implementation:**

The CLSS will conduct creel surveys 4 or 5 days a month with some guidance from MWLAP to ensure that the correct methodology is employed. Randomly selected dates and times will be chosen. The CLSS will also coordinate with Christina Lake Marina to collect fish catch data more frequently throughout the year.

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
CLSS	No	Christina Lake	April to October, yearly

**Funding:**

CLSS volunteers will conduct angler interviews and collect information.

***Action (2.21) > Conduct research about exotic species interactions with native species in aquatic ecosystems.***

**Rationale:**

Since Christina Lake contains a number of non-native aquatic species, some research is required to determine potential interactions with native species. This research is an important first step in determining the effects non-native species have on native species in Christina Lake.

**Implementation:**

The CLSS will conduct research on interactions of non-native species with native species. This will include scrutiny of available literature documenting assessment methods and study findings used in other similar lake ecosystems.

This will also include collaborating with Ministry of Environment staff to determine funding requirements, sources, and methodologies available for assessing the Christina Lake Burbot (*Lota lota*) population, development of a presentation package for the Columbia Basin Fish and Wildlife Compensation Program to highlight the possibility that many non-native fish species have migrated to Christina Lake from the Columbia River system, and coordination of a meeting with West Kootenay-Boundary MLA Katrine Conroy so that she may become more familiar with local issues.

<b>Responsibility</b>	<b>Permit Required?</b>	<b>Location</b>	<b>Time Frame</b>
CLSS	No	N/A	2006

**Funding:**

One potential funding option for the research component of this action is Environment Canada's EcoAction Community Funding Program.

<b><i>Funding Details – Environment Canada’s EcoAction Community Funding Program</i></b>	
<b>Letter of Intent Required/Deadline</b>	No/Not applicable
<b>Proposal Deadline/Date Submitted</b>	Feb. 1 <sup>st</sup> and Oct. 1 <sup>st</sup> , annually
<b>Funding Requirements (\$) (including in-kind contributions)</b>	
<b>Funding Amount Requested (\$)</b>	
<b>Funding Received (\$)</b>	

---

## **Funding Sources**

Additional details about potential funding sources are provided in the attached table.