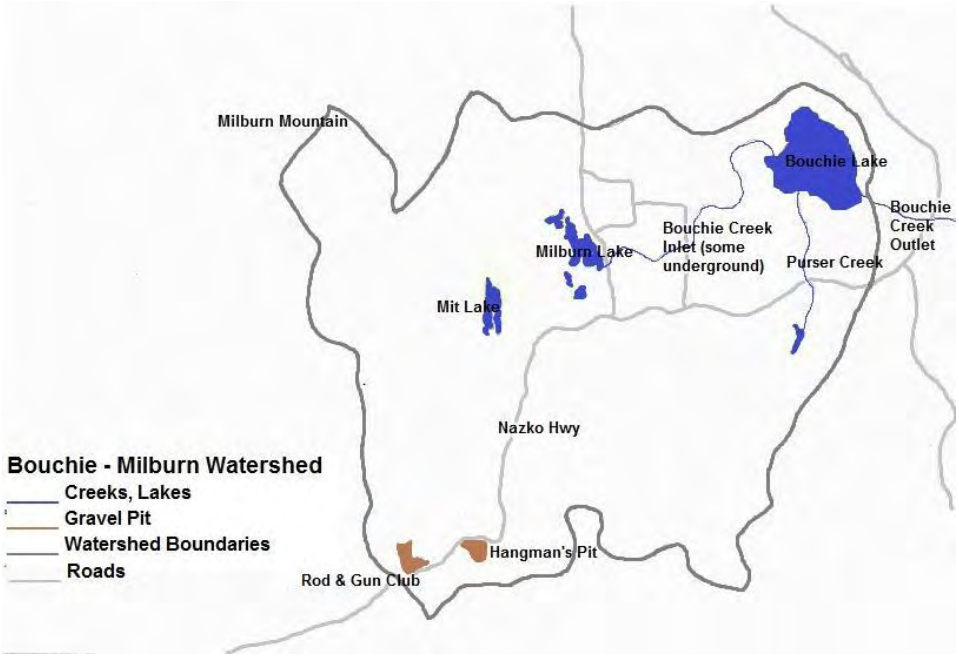
Bouchie-Milburn Watershed Management Plan 2009

Introduction and Background Information

The Bouchie-Milburn Watershed Management Plan is a collaborative effort from the Bouchie Lake Stewardship Committee (BLSC), Baker Creek Enhancement Society (BCES), the BC Ministry of Environment (MOE), and numerous experts and volunteers. The BLSC has been working for 14 years to improve Bouchie Lake. In 2008, there was a severe fish-kill in the lake due to an algal bloom and lake turn-over resulting in oxygen depletion. This created new motivation for the BLSC and residents to work together with provincial and local government as well as other stakeholders to prevent this from happening again.

A series of community meetings with government, residents and stakeholders were held to address the issues in the watershed and possible solutions. Phosphorus (P) is the primary nutrient of concern contributing to the algal growth that is resulting in poor water quality. Large algae blooms, excessive aquatic plant growth, and decreased water clarity have all been identified as concerns to residents. Two studies were conducted prior to 2007 looking at phosphorus inputs to the watershed.

The Bouchie-Milburn Watershed encompasses the west side of Milburn Mountain, Mit Lake, Milburn Lake, Bouchie Lake, and all associated creeks. There is a sub-surface water connection between the outlet of Milburn Lake and the Inlet of Bouchie Lake. The main water bodies in the watershed are Milburn Lake and Bouchie Lake.



Both lakes have development on the lakeshore to varying degrees.

An analysis was completed in 2002 by J.S. Hart and Associates to examine the phosphorus sources in the Bouchie-Milburn watershed. Annual phosphorus input to Bouchie Lake from the watershed is broken down as follows.

Phosphorus source	**Annual phosphorus input to Bouchie Lake from the watershed**	
	Amount (kg)	**% of total**
Agriculture land (including hobby farms)	190.2	42.2
Lakeshore sewage disposal systems	70.0	15.5
Livestock wintering areas	60.2	13.4
Crown land (excluding lakes and ponds)	37.6	8.3
Lakeshore residential land	36.0	8.0
Rural residential land	28.2	6.3
Atmospheric contributions to lakes and ponds	28.2	6.3
Total	**450.3**	**100.0**

The above table represents inputs from lakeshore and upland sources only. Hart estimates an increase of 30.9% input from lakeshore sewage systems (to 91.6 kg/year) by 2027 assuming no further development and no upgrades to sewage systems.

Internal phosphorus loading is also a significant source of nutrients to Bouchie Lake. Internal phosphorus loading is estimated to be 52% of the entire annual phosphorus load (C. Perrin 2005). Recent sampling indicates this percentage may be higher. This internal loading is a result of build-up of lakeshore and upland sources over time and was estimated using Phosphorus levels in the water column throughout the year.

Watershed Issues and Concerns

Through a series of community meetings and public consultations, the Bouchie Lake Stewardship Committee came up with a list of Issues and Concerns for stakeholders in the watershed.

1. Access
    a. Improving access to the lake for the public
    b. Ensuring that public access points are restored and/or remain public
    c. Increase recreational usage of the lake by the public

2. Riparian Zone/Surrounding Area
    a. Protection of natural stream banks and lakeshores (riparian)
    b. Aquatic and terrestrial invasive plants
    c. Decrease in forest cover in surrounding area
    d. Resale value of homes/properties

3. Water Quality and the Lake
    a. Need for continued testing on water quality of the lake, inputs, and output
    b. Improve/eliminate algae and cyanobacterial blooms
    c. Shoreline erosion
    d. Phosphorus loading and sources

4. Enforcement
    a. Little or no action to prevent slides and sediment from Purser Creek going into Bouchie Lake
    b. Existing infrastructure not maintained (ie. Purser Creek culverts)
    c. No prevention of shoreline erosion at public access points

Objectives and Recommended Actions

The primary goal for the Bouchie Lake Watershed Management Plan is to **restore the watershed to conditions that improve aesthetic, habitat, and recreation values**. Reducing nutrient loading – primarily phosphorus – will be the critical strategy to achieving this goal.

The goal will be considered to be met when the following conditions have occurred:

1. Phosphorus levels in the lake will be reduced by the maximum extent possible
2. Reduction of large-scale cyanobacteria blooms
3. The lake will be desirable for swimming and other recreational activities.

Actions that will be undertaken to accomplish our goal include:

1. Determine sources of Phosphorus entering the lake
2. Investigate strategies to reduce nutrient (Phosphorus) loading
3. Implement strategies to reduce Phosphorus loading
4. Provide residents with tools and strategies to restore the watershed
5. Improve access to Bouchie Lake
6. Continue monitoring water quality, quantity, and Phosphorus levels

Action 1 – Determine sources of Phosphorus entering the lake and conduct water quality/quantity research

1.a) BC Ministry of Environment will summarize all recent secchi and water temperature data. This will provide us with additional background information on trends over time.

1.b) BC Ministry of Environment will investigate P inputs from livestock operations. In other watersheds where P loading is a leading contributor to nutrient problems in a lake environment, commercial livestock operations have been identified as a significant source. In Bouchie Lake, livestock wintering areas and agriculture land contribute 13.5% and 42.2% of total annual Phosphorus exports to sub-basins, respectively (J.S Hart & Associates, 2002). Winter feeding area management often is relatively easy to modify to reduce nutrient flow into the watershed.

1.c) BLSC will investigate doing further assessment on the sources of P going into the creeks and upper watershed.

1.d) BC Ministry of Environment will conduct further sediment sampling to better understand the variability of Phosphorus in the lake.

Action 2 – Investigate strategies to reduce nutrient loading

2.a) BC Ministry of Environment conducted a preliminary review of dredging lakes as a potential strategy to reduce the amount of P in the lake, which was completed in October of 2006. It was the determined that this would likely be an expensive option with potential negative impacts.

2.b) A Dredging Task Force will further investigate dredging as an option to remove P currently in the lake. They will look into a company that provides this service and will report back with information on cost, benefits, risk, etc.

2.c) BC Ministry of Environment will research permitting requirements for dredging of Bouchie Lake and will forward to the Dredging Task Force.

2.d) A committee of the BLSC will request that CRD conduct a feasibility study on a public sewage system. One option to control P deposition in the watershed is a public sewer system. Many current systems in the watershed are outdated and contribute a great deal to the nutrient loading in the lake. Even improved systems may be contributing, as they are more efficient at removing pathogens, but still allow the P to reach the watershed. A public sewage management system could potentially remove a great deal of P before it has a chance to reach the watershed. Results will be made available to Bouchie Lake Stakeholders.

2.e) BC Ministry of Environment will provide a copy of the limnologists report to BLSC for review by Bouchie Lake stakeholders. A limnologists report was completed in November of 2006. This report was a review of studies of Bouchie Lake and contains recommendations for water quality improvement.

Action 3 – Implement strategies to reduce Phosphorus loading

3.a) BLSC with BCES and BC Ministry of Environment will continue restoration work in the watershed. Restoration work on Purser Creek Road was started in October of 2009. This work will continue pending further funding opportunities. A portion of the road was identified as a nutrient source due to a sloughing bank draining into Purser Creek. A wattle fence was constructed to hold back sediment, and vegetation was planted.

3.b) BLSC will request CRD implement the development of a community sewage system pending the outcome of a feasibility study. There are several options for this. One of these is a comprehensive system with complete infrastructure: collection pipes and a treatment facility. Alternatively, sewage tanks may be left in place, with collection and removal to a waste treatment facility, where effluent can be released at an appropriate location.

3.c) BLSC will identify further projects that will reduce nutrient loading.

Action 4 – Provide residents with tools and strategies to restore the watershed

4.a) BLSC, in partnership with BCES will conduct workshops to teach riparian protection and enhancement. Residents have expressed a desire to take actions on their own properties to improve the near-shore habitat.

4.b) BCES, with Ministry of Environment, Ministry of Agriculture and Lands, BC Cattleman's Association, and BC Horse Council, will develop and implement a targeted public education campaign to watershed residents. Residents of the greater watershed area have a significant impact on Bouchie Lake. There will be a Watershed Awareness Program aimed at reducing P inputs into the watershed. Specific information for ranchers, homeowners, landowners, forestry workers, and other users will be developed and disseminated.

4.c) BCES will develop a Bouchie Lake webpage on the BCES website. This will be a central location for residents and stakeholders to find information and documents relating to the Bouchie-Milburn Watershed.

4.d) BCES, in partnership with BC Ministry of Environment, will develop a Bouchie-Milburn Watershed Fact Sheet. This will be distributed via a door-to-door campaign and will also be made available on the Bouchie Lake webpage.

4.e) BCES will survey residents on their willingness to have watershed restoration done on their property. This information will be used to show residents what can be done to prevent erosion and filter phosphates and sediments from the water entering the lake. It will also demonstrate that the cost and effort is affordable.

4.f) BC Ministry of Environment and BLSC will investigate programs available from BC Ministry of Agriculture and Lands. For residents interested in more in-depth or specific solutions to their property, there should be a program in place so that landowners can

receive prescriptions specific to their properties. This might include, but is not limited to: planting prescriptions (species, location, density), methods to reduce erosion, sewage management, and livestock management. This may be tied in to workshops.

4.g) BLSC will develop information packages for new lakeshore residents. New lakeshore residents often are not aware of the issues around the Bouchie Lake watershed or lakeshore living in general. The information package will contain background information on the watershed, current issues related to water quality, options for reducing impacts, and improving riparian habitat. This package will be distributed to new residents via real estate agents or a neighbour-to-neighbour system.

4.h) BLSC will continue to identify projects, programs and resources for implementation of this plan.

Action 5 – Improve access to Bouchie Lake

5.a) BLSC will request that CRD investigate improved and restored access to Bouchie Lake. At least one public access point is inaccessible and this needs to be remedied.

5.b) BLSC will work with CRD and MOE to improve the current boat launch and it's impacts on the shorelines.

5.c) BLSC will work with CRD and other partners on to further develop the boat launch site for better access and protecting adjacent properties

Action 6 – Continue monitoring water quality, quantity, Phosphorus levels, and riparian habitat

6.a) Ministry of Environment, BLSC, BCES, and volunteers will continue to monitor water quality, quantity, and phosphorus levels. This will give a measure of success as projects to improve the watershed and reduce phosphorus loading are implemented.

6.b) BLSC will investigate opportunities for riparian habitat assessment and monitoring.

Action to be carried out	Lead group	Funding	Comments	Timing
1.a) Summarize all secchi and temperature data	MOE	MOE	Data from 1999 – 2009 show no statistically significant trend, ie. The water quality is not getting worse nor improving	Updated yearly
1.b) Further investigation into commercial livestock operations (winter feeding of livestock)	MOE, MOAg			
1.c) Further studies of P sources in upper watershed	BLSC			
1.d) Further sediment sampling	MOE			
2.a) Preliminary review of dredging	MOE			Completed
2.b) Review of dredging as a lake treatment option	Dredging Task Force		Preliminary review by MOE that this was an expensive option (Oct 2006).	
2.c) Research permitting requirements for dredging	MOE			
2.d) Request public sewage system feasibility study	Task force, CRD		Roberta Faust to bring to CRD meeting	
2.e) Finalize and distribute limnologist's report	MOE	MOE	Expert review of studies of Bouchie Lake and recommendations for water quality improvement. Send to BLSC.	Completed Nov 2006
3.a) Restoration work on Purser Creek Rd	BLSC, MOE			
3.b) Implementation of public sewage system	CRD		Pending feasibility study	
3.c) Investigation of further projects to reduce nutrient loading	BLSC			
4.a) Workshops for residents on best practices in riparian zones	BLSC, BCES			
4.b) Public education campaign targeted to specific audiences	BLSC, BCES			
4.c) Bouchie Lake webpage on BCES website	BCES			
4.d) Develop a Bouchie-Milburn Watershed Fact Sheet	BCES, MOE			

4.e) Survey of residents for willingness to have restoration work done	BCES			
4.f) Find out what is available for smallholders (riparian management)	MOE, BCES			
4.g) Develop and distribute information packages to new homeowners	BLSC			
4.h) Continue to investigate strategies to implement this plan	BLSC			
5.a) Improve and restore public access to Bouchie Lake	BLSC, CRD			
5.b) Update and improve boat launch	BLSC, MOE, CRD			
5.c) Further develop boat launch site	BLSC, CRD			
6.a) Continue to monitor water and habitat values (birding counts, ortho-photo analysis, etc)	MOE, BLSC, BCES, volunteers			On-going
6.b) Investigate opportunities for riparian habitat assessment and monitoring	BLSC