

## Gardom Lake Planning Committee – meeting notes

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January 20, 2015

### Welcome

The meeting started at 10:10 AM. Tracy Thomas and Mike Simpson welcomed everyone to the meeting and recognized Secwepemc and Syilx traditional territory. Everyone attending introduced themselves. Committee membership and consensus was reviewed.

### Attendance

The meeting was attended by the following:

- Stuart Lee – Splatsin (to 2:00PM)
- Marge Sidney – Ministry of Environment/BC Lakes Stewardship Society
- Brian Turner – Ranchoero Deep Creek Community Association
- Susan Abbott – CSRD
- Jack Butula – Kalamalka Lake Fly Fishing Association
- Joy deVos – Agriculture sector
- Elizabeth Winter – Friends of Gardom Lake
- Rikk Kieft – Gardom Lake Bible Camp
- Nesa7 White - Neskonlith
- Doug Hearn – Gardom Lake Community Park Society
- Dennis Einarson – Ministry of Environment (guest speaker)
- Tracy Thomas (facilitator) – Fraser Basin Council
- Mike Simpson (facilitator) – Fraser Basin Council

### Purpose

Tracy and Mike reviewed the purpose of the meeting including the following objectives:

- Learn about lakes and related natural systems
- Learn about water quality
- Develop water quality goals and objectives for the Gardom Lake Management Plan

### Dennis Einarson Presentation

Dennis presented on limnology, water quality and lake processes based on water quality data collected by the Ministry of Environment (MoE) and the BC Lake Stewardship Society (BCLSS). Some key points are listed below. The presentation will be posted at [www.gardomlakeplan.ca](http://www.gardomlakeplan.ca) in the resources section.

- Toxic blue-green algae is only one type of algae – there has been very few toxic blue-green blooms in BC
- Clarity (tested with a secchi disk) tells us about water quality (there is more than one reason for a lake to be turbid, may be sediments from stream inflow, not algae)

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- Nutrients is a simple term but it is more complex, there are many types for example, carbon is a nutrient, a requirement of life along phosphorus and nitrogen.
- Nutrient management plans are usually aimed at preventing late summer blue-green algae blooms. The spring 2008 and 2010 algae blooms on Shuswap Lake were Golden-brown algae, not blue-green algae. These blooms indicate early spring nutrients and organic inputs that also impact the lakes
- Dennis first sampled at Gardom in 1990
- Detritus – everything that dies and excrement; it all ends up in the bottom of the lake
- Lake processes and limnology – algae growth in small areas of a lake is good; it shows that there is life in a lake
- There are lots of good resources available on limnology and lake productivity. Refer to the *Algal Bowl*, by Jack Valentine and later revised and updated by David Schindler
- Littoral - depth to which sunlight will penetrate water
- Lake productivity - Eutrophic = nutrient rich or shallow, oligotrophic = nutrient poor, usually deep, steep sided and surrounded by rock; oligotrophic lakes usually have small amount of littoral zone. Mesotrophic = nutrient medium, between eutrophic and oligotrophic
- We need to understand how each of the measured factors influence water quality and lake productivity.
- Water at 4°C is at its densest; colder water is less dense, that's why ice floats. More solids can dissolve in higher temperatures. Hard water (Ca, Mg) confounds the issue of dissolving "crud." (White Lake and Paul Lake are hard water)
- Productivity of the lake – aquatic plants produce O<sub>2</sub> in day and consume O<sub>2</sub> at night
- To take water from liquid to steam/gas takes a lot of energy. 79.3 cal/g water. To turn water to ice it takes 340 cal/g water
- Solar heating warms the surface of water changing the density; cool water is most dense so it sinks to the bottom. Water in a lake mixes using wind energy causing the lake to be one temperature "isothermal". As summer approaches, the warm layer on the top of the lake becomes warmer where the bottom stays cold; this is stratification. The epilimnion is the top layer and the hypolimnion is the bottom. The epilimnion influenced by atmosphere (warm air/long sunny days); the hypolimnion is separated from atmospheric input. In early fall, the epilimnion is the biggest. Then with the formation of ice, there is no circulation.
- Lake turnover (wind mixing) - Gardom is dimictic (two turnovers per year), and Shuswap is monomictic (one turnover per year). In Gardom Lake the spring turn over tends to be incomplete. This is good as there is less nutrients being stirred up from the bottom into the surface waters.

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- Lakes don't turn over in July; the water can be pushed by wind, tilting the thermocline. Shuswap Lake "burps" where the thermocline tips, cold water discharged "seich"
- Gardom, April 27, 2009 – sampling water two weeks after ice-off. Measure spring and fall over-turn; **Strong thermocline in place right after ice-off**, very unusual. Some years the lake is already stratified under ice; according to textbooks, this should not happen.
- The ice "rots" or becomes deeply pitted as there is no wind to break it up – this rotting creates candles or lenses that seem to concentrate light.
- The lake cools quickly in fall (cold rain, short days, long nights). Temperature 7°C at bottom; ground water could be influencing temperature, but there are other things going on. There is actually algae production under ice, using nutrients and O<sub>2</sub> under the ice (no new inputs).
- Water samples are taken in the deep portion of lake because everything ends up in deepest part eventually. Sampling since 1990 has been minimum 12 times per year, at most 30 times per year. (more samples is not better, cannot use too many samples in statistical analysis)
- Current conditions (all off deepest part of lake; just off aerator platform):
  - pH good for fish
  - metals including Manganese, around the aesthetic drinking water guideline
- Water inflow – one creek flows into Gardom Lake year round
- Definitions of Trophic status – Eutrophic - very productive (3m secchi)  
mesotrophic – moderately productive (6m secchi), oligotrophic is low productivity
- Gardom Lake doesn't always turn over in spring, and "that's a good thing" (DE). Anoxic (no oxygen) conditions at the bottom makes the P in the bottom sediments, soluble. Changes in O<sub>2</sub> levels make difference in P availability in the bottom water. Detritus on bottom is less available due to colder temperatures and lack of sunlight; better to turn over in fall, not spring.
- Aerator – there has been an aerator in Gardom Lake since the 70s. Aeration is used to bring up O<sub>2</sub> levels of lake; otherwise there would be winter kill. The aerator is placed between 12m and 16m from the bottom of the lake to maximize oxygenation and prevent pulling detritus up from the bottom. The aerator keeps the lake alive by preventing anoxic conditions in the water.
- Generally, Gardom Lake is mesotrophic. Bottom of the lake acts as a nutrient sink. If we did a lake core in bottom, can look at how fast lake is filling in (sedimentation rate). Marg – lakes have a life span; mesotrophic is middle-aged; more nutrients in, the lake ages faster. A fen is a very, very, very old lake. Lakes start deep, steep sided, and end up as swamp, then bog, then fen over time.
- Nutrients – internal vs. external loading. N and P, example of external loading is fertilizer used on lawns; P is different than N, N is very dissolvable in water; P binds to sediments and isn't as available.

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- NEXT STEPS: blank slides, on purpose. – the next steps for Gardom Lake are to be decided as part of the lake management planning process
- Management suggestions (from Dennis)
  - Minimize disturbance of shoreline areas, keep natural vegetation (riparian) intact
  - Limit use of fertilizers and pesticides, particularly not during rain
  - Manage septic systems

### Review of Draft Plan Outline

Tracy outlined the table of contents of the draft plan outline. The committee members agreed with the table of contents. The committee then moved into planning mode, taking on developing a vision for Gardom Lake and goals, objectives and action items in the water section of the plan.

### Planning

Each of the committee members had a sample vision statement and a list of values from Nov 24 public meeting, and the online survey. In addition, they were given sample goals, objectives and action items to help them move through the planning process.

The committee succeeded in drafting a vision statement, goals, objectives and action items. Tracy will draft all of this work into the draft Gardom Lake Management Plan and circulate it to committee members prior to the next planning meeting.

### Feedback

The committee members were asked to provide feedback on the planning process to date. The following suggestions were made:

- We should have longer meetings – 9:30-3:30
- The committee should continue to meet in the CSRD boardroom

### Action Items

- Distribute Mallory Creek paper (from Gene Dodd) to GLPC.
- Post updated map on website – need permission from Erica, Susan
- Post Dennis Einarson presentation on website
- Explore some language around watershed in the Plan
- Identify agencies/groups/individuals responsible for each action item in the plan
- Post CSRD septic survey on website
- Doug Hearn – share unofficial history and lake data with Tracy

Meeting adjourned at 3PM.

Next Meeting: Thursday February 12, 2015, 9:30AM-3:30PM in CSRD boardroom  
(tentative based on speaker availability)

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