BC Lake Stewardship and Monitoring Program

Bednesti Lake

1998-2000, 2007, 2008, 2010

A partnership between the BC Lake Stewardship Society and the Ministry of Environment

The Importance of Bednesti Lake & its Watershed

British Columbians want lakes to provide good water quality, aesthetics and recreational opportunities. When these features are not apparent in recreational lakes, questions arise. People begin to wonder if the water quality is getting worse, if the lake has been affected by land development, and what conditions will result from more development within the watershed.

The BC Lake Stewardship Society (BCLSS), in partnership with the Ministry of Environment (MoE), has designed a program, entitled *The BC Lake Stewardship and Monitoring Program* (BCLSMP), to help answer these questions. Through regular water sample collections, we can begin to understand a lake's current water quality, identify the preferred uses for a given lake, and monitor water quality changes resulting from land development within the lake's watershed. The level for a particular lake depends on study objectives as well as funding and human resources available. This report provides the 1998 - 2000, 2007, 2008 and 2010 results of a Level 3 program for Bednesti Lake.

Through regular status reports, the BCLSMP can provide communities with monitoring results specific to their local lake and with educational material on lake protection issues in general. This useful information can help communities play a more active role in the protection of the lake resource. Finally, this program allows government to use its limited resources efficiently thanks to the help of area volunteers and the BC Lake Stewardship Society.

Bednesti Lake's monitoring program began in 1998 and was conducted by the Bednesti Volunteer Lake Water Testing Group (in partnership with the MoE). The Ministry of Environment supported the Level 3 sampling in 1998, 1999, 2000, 2007, 2008 and 2010. This report summarizes information derived from the program. Quality of the data has been found to be acceptable. Data quality information is available upon request.

A **watershed** is defined as the entire area of land that moves the water it receives to a common waterbody. The term watershed is misused when describing only the land immediately around a waterbody or the waterbody itself. The true definition represents a much larger area than most people normally consider. The watershed area of Bednesti Lake is 81.6 km^2.

Watersheds are where much of the ongoing hydrological cycle takes place and play a crucial role in the purification of water. Although no "new" water is ever made, it is continuously recycled as it moves through watersheds and other hydrologic compartments. The quality of the water resource is largely determined by a watershed's capacity to buffer impacts and absorb pollution.

Every component of a watershed (vegetation, soil, wildlife, etc.) has an important function in maintaining good water quality and a healthy aquatic environment. It is a common misconception that detrimental land use practices will not impact water quality if they are kept away from the area immediately surrounding a water body. Poor land-use practices anywhere in a watershed can eventually impact the water quality of the downstream environment.

Human activities that impact water bodies range from small but widespread and numerous *non-point* sources throughout the watershed to large *point* sources of concentrated pollution (e.g. waste discharge outfalls, spills, etc). Undisturbed watersheds have the ability to purify water and repair small amounts of damage from pollution and alterations. However, modifications to the landscape and increased levels of pollution impair this ability.

Bednesti Lake is located in the Omineca-Peace Region near Hwy 16, 50 km west of Prince George, B.C. The lake is roughly 5 km long, has a maximum width of 1 km and a maximum depth of 20.7 m. Its surface area is 261 hectares and it has a shoreline perimeter of 14,760 meters. The lake contains the following fish species: rainbow trout, lake trout, mountain whitefish, longnose sucker, largescale sucker, northern pikeminnow (formerly N. Squawfish), and peamouth chub (FISS, 2011). Historically, Bednesti Lake has been stocked with rainbow trout, however it has not been stocked since 2004 (FISS, 2011). Due to recent concerns over the changes in lake trout populations, the Ministry of Environment is currently assessing the amount of usable lake trout habitat by reviewing the dissolved oxygen constraints of the lake, and by monitoring changes in the lake trout population and behaviour patterns through tagging and hydroacoustic surveys (Pillipow 2011, Pers. Comm.).

The main inflow into Bednesti Lake is Kellogg Creek, located at the southwest end of the lake. Tachintelachick Creek flows out the southwest end. The 139-hectare Bednesti Lake Ecological Reserve, which borders the Bednesti Lake watershed, was established in 1978 to "preserve a representative wetland community and disjunct tamarack stands on the Interior Plateau" (BC Parks website, accessed Feb. 21, 2011). A shoreline survey was also conducted at 12 sites in 1978 by the Ministry of Environment. The flushing rate, a factor that affects water quality, is the rate of water replacement in a lake and depends on the amount of inflow and outflow of a lake. The higher the flushing rate, the faster excess nutrients can be removed from the system. The flushing rate for Bednesti Lake is 2.4 years (Carmichael, 1998), which indicates that Bednesti Lake has a moderate ability to assimilate nutrients.

Land use in the watershed includes roughly 103 lakeshore residences, all of which are zoned for full time living, forest harvesting and one restaurant/motel/camping facility. The lake is used for general recreational purposes, however public access to the shoreline is limited. Some residents use surface water as a potable supply. The greatest challenges to the lake are phosphorus (nutrient) loading and declining fish stocks (specifically lake trout) (Jacklin 2011, Pers. Comm.). This loading may promote summer algal blooms and the spread of aquatic plants. Canadian pondweed (*Elodea canadensis*) was first reported in Bednesti Lake in 1968, and more recently it has been identified as a problem in the lake's west end.

Bednesti Lake Watershed and Land Use Map

Integrated Land Management Bureau

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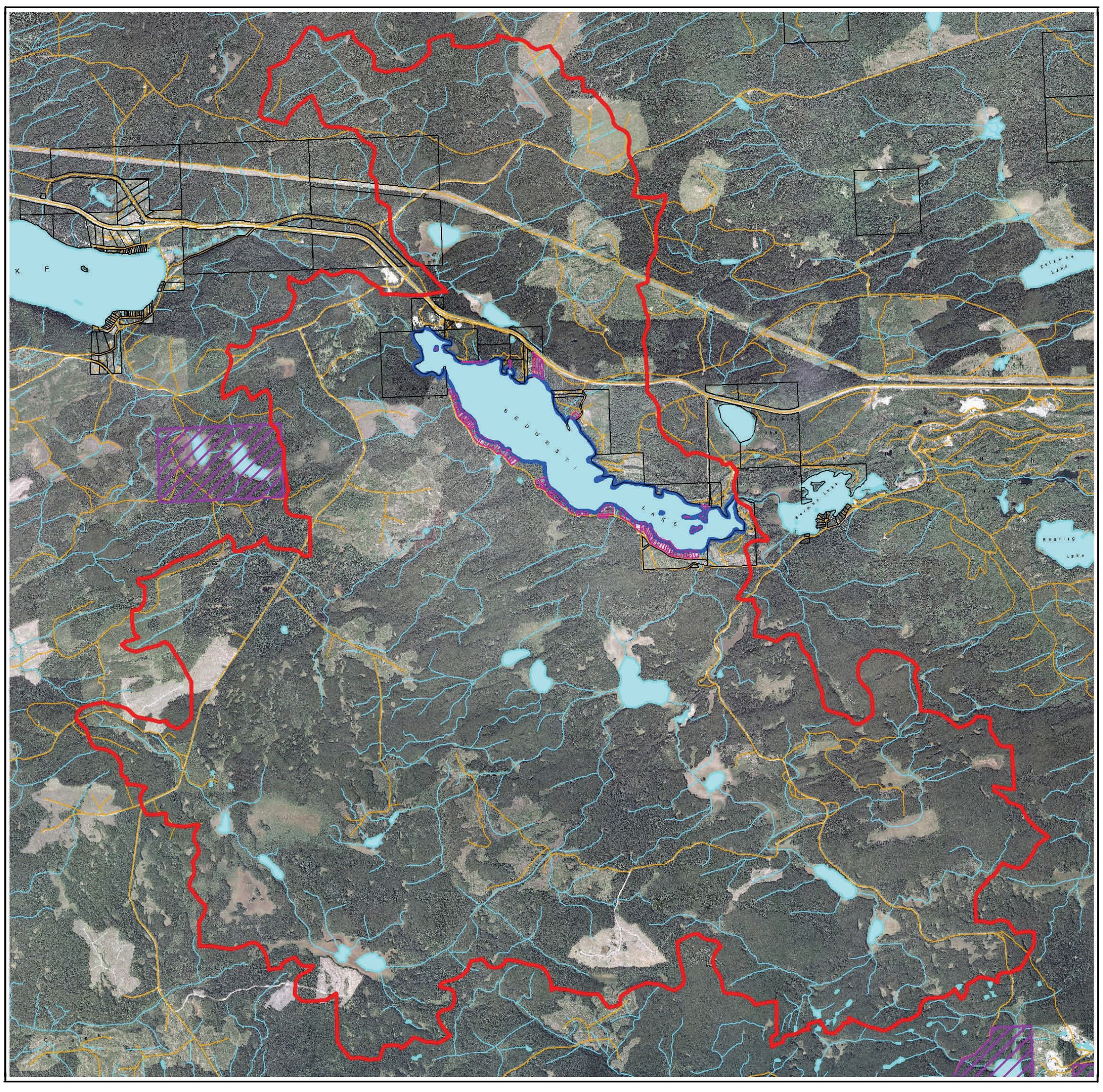
Watershed Boundary
Residential <= 1ha within 100m of Lakeshore
Private Land
Grazing Leases
Parks and Protected Areas



WATERSHED CHARACTERISTICS

Watershed Area: 81.6 sq. km

<u>Percent Land Use (approximate)</u>

Residential (<= 1ha within 100 m of lakeshore):	**0.5%**
Private land (watershed total):	**4.6%**
Agriculture:	**0.6%**
Forestry:	**17%**

Non-Point Source Pollution and Bednesti Lake

Point source pollution originates from municipal or industrial effluent outfalls. Other pollution sources exist over broader areas and may be hard to isolate as distinct effluents. These are referred to as non-point sources of pollution (NPS). Shoreline modification, urban stormwater runoff, onsite septic systems, agriculture, and forestry are common contributors to NPS pollution. One of the most detrimental effects of NPS pollution is phosphorus loading to water bodies. The amount of total phosphorus (TP) in a lake can be greatly influenced by human activities. If local soils and vegetation do not retain this phosphorus, it will enter watercourses where it will become available for algal production.

Agriculture

Agriculture including grains, livestock, and mixed farming, can alter water flow and increase sediment and chemical/bacterial/parasitic input into water bodies. Potential sources of nutrients (nitrogen & phosphorus) include chemical fertilizers and improperly situated winter feeding areas.

Onsite Septic Systems and Greywater

Onsite septic systems effectively treat human waste water and wash water (greywater) as long as they are properly located, designed, installed, and **maintained**. When these systems fail, they become significant sources of nutrients and pathogens. Poorly maintained pit privies, used for the disposal of human waste and greywater, can also be significant contributors.

Properly located and maintained septic tanks do not pose a threat to the environment, however, mismanaged or poorly located tanks can result in a health hazard and/or excessive nutrient loading to the lake. Excessive nutrients such as phosphorus can cause a variety of problems including increased plant growth and algal blooms.

Stormwater Runoff

Lawn and garden fertilizer, sediment eroded from modified shorelines or infill projects, oil and fuel leaks from vehicles, snowmobiles and boats, road salt, and litter can all be washed by rain and snowmelt from properties and streets into watercourses. Phosphorus and sediment are of greatest concern, providing nutrients and/or a rooting medium for aquatic plants and algae. Pavement prevents water infiltration to soils, collects hydrocarbon contaminants during dry weather and increases direct runoff of these contaminants to lakes during storm events.

Forestry

Timber harvesting can include clear cutting, road building, and land disturbances, which alter water flow and potentially increase sediment and phosphorus inputs to water bodies.

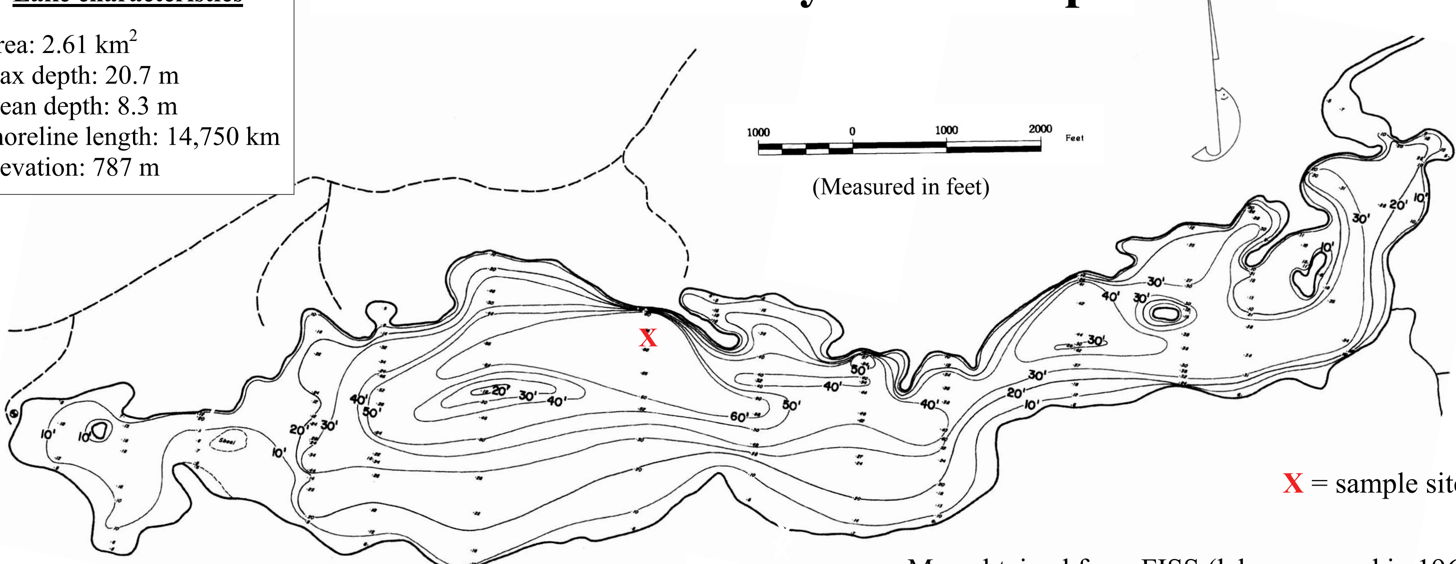
Boating

Oil and fuel leaks are the main concerns of boat operation on small lakes. With larger boats, sewage and greywater discharges are issues. Other problems include the spread of aquatic plants and the dumping of litter. In shallow water operations, the churning up of bottom sediments and nutrients is a concern.

Bednesti Lake Bathymetric Map

Lake characteristics

Area: 2.61 km^2
Max depth: 20.7 m
Mean depth: 8.3 m
Shoreline length: 14,750 km
Elevation: 787 m



Map obtained from FISS (lake surveyed in 1968)

Trophic Characteristics	1998	1999	2000	2007	2008	2010
Max. Surface Temp. (°C)	22	19	19	20	20	21
Min Near-bottom Oxygen (mg/L)	0	1	0	1	0	1
Spring Overturn TP (µg/L)	**17**	**22**	**25**	**18**	**19**	**9**
Avg. Chlorophyll *a* (µg/L)	3.5	3.4	2.3	2.9	2.8	3.3
Avg. Secchi Depth (m)	3.8	3.6	4.0	3.1	3.6	3.6

What's Going on Inside Bednesti Lake?

Temperature

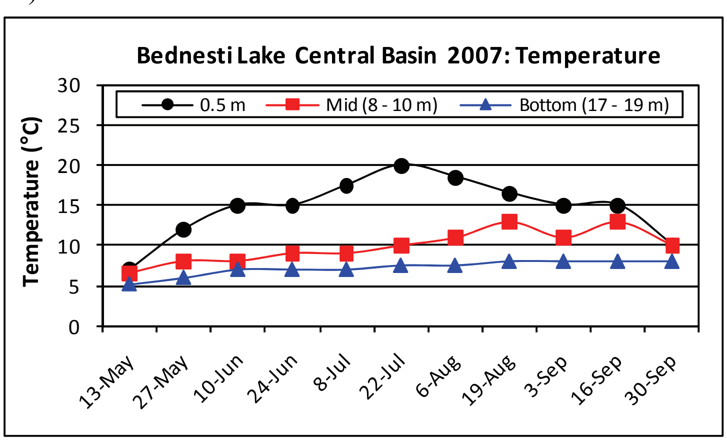
Lakes show a variety of annual temperature patterns based on their location and depth. Most interior lakes form layers (stratify), with the coldest summer water near the bottom. Because colder water is more dense, it resists mixing into the warmer, upper layer for much of the summer. In spring and fall, these lakes usually mix from top to bottom (overturn) as wind energy overcomes the reduced temperature and density differences between surface and bottom waters. In the winter, lakes re-stratify under ice with the most dense water (4°C) near the bottom.

Lakes of only a few metres depth tend to mix throughout the summer or layer only temporarily, depending on wind conditions. In winter, the temperature pattern of these lakes is similar to that of deeper lakes.

Temperature stratification patterns are very important to lake water quality. They determine much of the seasonal oxygen, phosphorus and algal conditions. When abundant, algae can create problems for most lake users.

The review of ice-on and ice-off dates is important to the growing issue of climate change, particularly with how it is affecting B.C. lakes.

Temperature was measured on Bednesti Lake from 1998 to 2000, 2007, 2008 and 2010. Maximum surface temperature ranged between 19ºC and 22ºC. The graph below shows the 2007 temperature data for Bednesti Lake. Data from May 13th 2007 and May 9th 2010 show similar surface, mid and bottom temperatures (i.e. isothermal), indicating recent spring overturn. Temperature graphs from 1998 - 2000 and 2008 show similar trends, though surface warming had already begun, suggesting the lake was sampled after overturn in those years. In all sampling years, the lake generally stratified immediately following spring overturn through to fall overturn (as seen in 2007), with the exception of some surface and mid depth mixing between August 15th and August 29th, 2010. Based on temperature data, fall overturn occurred on October 11th, 1999 and October 11th, 2010. Fall temperature profiles in 2000, 2007 and 2008 show similar temperatures from the top to the bottom, whereas data from 1998 indicate that mixing only extended down to 10 m depth, suggesting that fall overturn occurred after the last sample date of the season (September 29th).

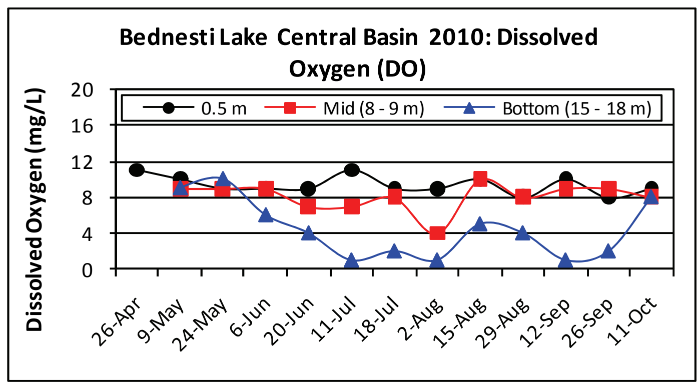


Dissolved Oxygen

Oxygen is essential to life in lakes. It enters lake water from the air by wind action and plant photosynthesis. Oxygen is consumed by respiration of animals and plants in summer, including the decomposition of dead organisms by bacteria. A great deal can be learned about the health of a lake by studying oxygen patterns and levels.

Lakes that are unproductive (oligotrophic) will have sufficient oxygen to support life at all depths through the year. But as lakes become more productive (eutrophic), and increasing quantities of plants and animals respire and decay, more oxygen consumption occurs, especially near the bottom where dead organisms accumulate.

In productive lakes, oxygen in the isolated bottom layer may deplete rapidly (often to anoxia), forcing fish to move into the upper layer (salmonids are stressed when oxygen levels fall below about 20% saturation) where temperatures may be too warm. Fish kills can occur when decomposing or respiring algae use up the oxygen. In the summer, this can happen on calm nights after an algal bloom, but most fish kills occur during late winter or at initial spring mixing because oxygen has been depleted under winter ice.



The figure above shows the 2010 oxygen pattern for Bednesti Lake, which shows the lake in spring overturn on May 9th and fall overturn on October 11th. This is also supported by the 2010 temperature profile. Seasonal DO profiles for Bednesti Lake generally show bottom waters becoming oxygen deprived between early July through September, with a small amount of mixing and DO replenishing at surface and mid depths likely due to wind events (as seen on the graph above on July 18th and from August 15th through fall overturn). The 2010 DO graph is generally representative of the other sampling years, however bottom DO was not replenished during the fall sample date in 1998, 2000, 2007 and 2008, indicating that fall overturn had not yet occurred (though top, mid and bottom fall temperatures were similar). A full conductivity profile may help determine why bottom DO stayed stratified despite similar temperatures from top to bottom (Nordin 2011, Pers. Comm.).

DO in bottom waters were generally less than 2 mg/L (also called *anoxic*) throughout the summer and would not likely support fish. Extended periods of anoxia in the bottom waters resulted in the internal release of phosphorus from the bottom sediments in all sampling years (to be discussed further in the phosphorus section of this report).

Trophic Status and Phosphorus

The term "trophic status" is used to describe a lake's level of productivity and depends on the amount of nutrients available for plant growth, including tiny floating algae called phytoplankton. Algae are important to the overall ecology of the lake because they are food for zooplankton, which in turn are food for other organisms, including fish. In most lakes, phosphorus is the nutrient in shortest supply and thus acts to limit the production of aquatic life. When in excess, phosphorus accelerates growth and may artificially age a lake. As mentioned earlier (page 3), ***total phosphorus (TP)*** in a lake can be greatly influenced by human activities.

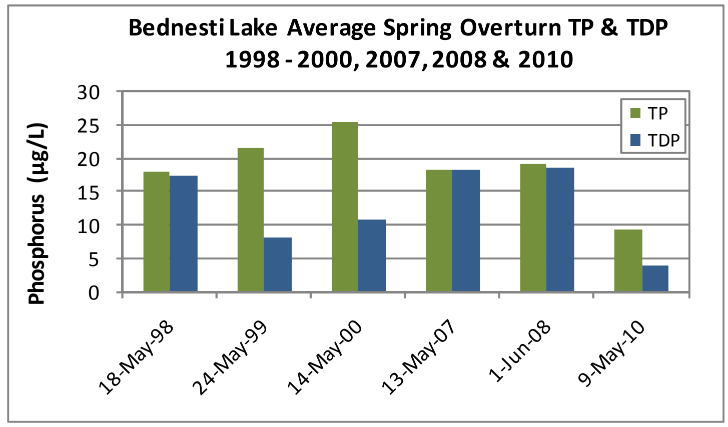
The trophic status of a lake can be determined by measuring productivity. The more productive a lake is the higher the algal growth and therefore the less clear the water becomes. Water clarity is measured using a ***Secchi disc***. Productivity is also determined by measuring nutrient levels and ***chlorophyll*** (the green photosynthetic pigment of algae). The concentration of chlorophyll *a* in lake water is an indicator of the density of algae present in that same water and is directly related to the Secchi depth. Phosphorus concentrations measured during spring overturn can be used to predict summer algal productivity.

Lakes of low productivity are referred to as ***oligotrophic***, meaning they are typically clear water lakes with low nutrient levels (1-10 µg/L TP), sparse plant life (0-2 µg/L chl. *a*) and low fish production. Lakes of high productivity are ***eutrophic***. They have abundant plant life (>7 µg/L chl. *a*) including algae, because of higher nutrient levels (>30 µg/L TP). Lakes with an intermediate productivity are called ***mesotrophic*** (10-30 µg/L TP and 2-7 µg/L chl. *a*) and generally combine the qualities of oligotrophic and eutrophic lakes.

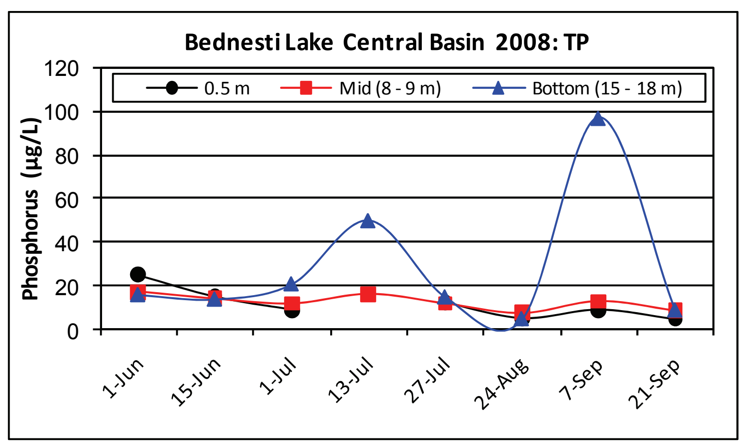
Lake sediments can themselves be a major source of ***ortho-phosphorus (OP)***, a form of ***total dissolved phosphorus (TDP)***. If deep-water oxygen becomes depleted, a chemical shift occurs in bottom sediments. This shift causes sediment to release ortho-phosphorus to overlying waters. This *internal loading* of phosphorus can be natural but is often the result of external phosphorus addition. Lakes displaying internal loading have elevated algal levels and generally lack recreational appeal.

Bednesti Lake's historical spring TP values are shown in the Trophic Characteristics table on page 3. The average TP values from 1998 - 2000, 2007, 2008 and 2010 ranged between 9 µg/L and 25 µg/L, likely as a result of natural variation. Since sampling occurred after spring overturn from 1998 - 2000 and in 2008, the average spring TP values may not represent the actual spring overturn TP values. Average spring TP values from 1998 - 2000, 2007 and 2008 classify Bednesti Lake as mesotrophic, whereas 2010 data classify the lake as marginally oligotrophic (Nordin, 1985). The following graph summarizes the average spring overturn TP and TDP for all sampling years. Though the decrease in spring TP between 2000 and 2010 implies increasing water quality, summer internal phosphorus loading events and related algal blooms also need to be considered.

The 1999, 2007, 2008 and 2010 data show similar phosphorus cycling patterns throughout the summer, whereas TP in 1998 increased steadily from August 3rd (24 µg/L) until September 29th (340 µg/L), the last day sampled in the fall. Similar to 1998, 2000 bottom TP increased from August 13th (22µg/L) until October 8th (77 µg/L), the last day sampled in the fall. The 1999, 2007, 2008 and 2010 bottom TP data show a relatively small peak of TP in mid July, followed by a larger peak of TP in mid to late September. The major peaks in TP occurred on September 26th, September 16th, September 7th and September 12th of 1999, 2007, 2008 and 2010, respectively. OP followed similar cycling patters in these years. This suggests that the lake experienced a release of phosphorus (to varying degrees each year) from the bottom sediment under anoxic conditions.

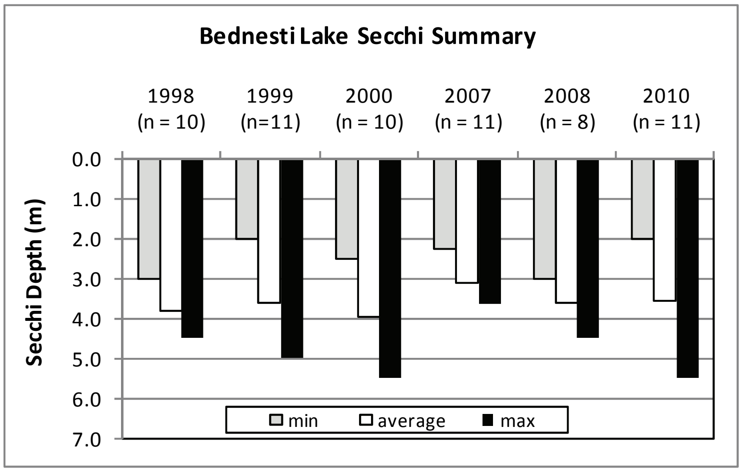


The following graph displays the 2008 phosphorus cycling in Bednesti Lake. Phosphorus samples from July 13th were excluded from the dataset as the values were erroneous, likely due to contamination during sampling. A small peak in bottom TP on July 13th and a larger peak in TP on September 7th indicate that Bednesti Lake experienced a release of phosphorus from the bottom sediments under low DO conditions (3 mg/L and 0.6 mg/L DO, respectively). TP near the bottom (sampled at 18 m on September 7th) reached 97 µg/L and OP, the form released from bottom sediments, spiked to 91 µg/L (94% of the TP). High OP levels at bottom coincide with extremely low DO levels, further supporting the premise of internal phosphorus release from sediments.



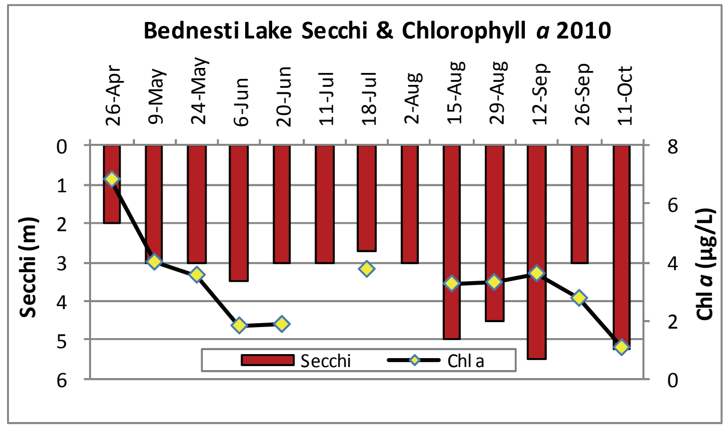
Internal phosphorus loading occurs when the bottom sediments release OP into the bottom waters, generally under anoxic conditions (Nordin 2011, Pers. Comm.). In the case of Bednesti lake, internal loading likely occurred from 1998 -

2000, 2007, 2008 and 2010, as the lake was generally anoxic from mid July through fall overturn. It is difficult to determine the amount of internal loading in each sample year without first calculating the overall phosphorus budget for a lake.



The graph above shows the minimum, average and maximum Secchi readings on Bednesti Lake from 1998 - 2000, 2007, 2008 and 2010, as well as the number of readings in each year (n). Average Secchi depth between 1998 and 2010 ranged from 3.1 m in 2007 to 3.95 m in 2000, indicating that the clarity of Bednesti Lake has remained relatively stable since 1998. Based on the average Secchi values, Bednesti Lake was exhibiting mesotrophic conditions (3 - 6 m Secchi depth) for all years measured (Nordin, 1985).

The following graph shows the correlation between Secchi and chlorophyll *a* in Bednesti Lake. The 2010 Secchi depths for Bednesti Lake ranged from 2.0 m (April 26th) to 5.5 m (September 12th). As algal concentrations (measured as chlorophyll *a*) increase between June 6th and July 18th, Secchi readings decrease slightly, suggesting Secchi values in Bednesti Lake are a reasonable indicator of chlorophyll *a*, however additional Secchi and chlorophyll *a* data may help confirm this. It is important to note that the minimum data requirements (12 evenly spaced samples between ice-off and fall overturn) were not attained. A minimum of 12 samples are required in order to more clearly understand the seasonal Secchi and chlorophyll *a* trends.



The average chlorophyll *a* values for each year were: 3.5 µg/L (1998), 3.4 µg/L (1999), 2.3 µg/L (2000), 2.9 µg/L (2007), 2.8 µg/L (2008) and 3.3 µg/L (2010). These values confirm the mesotrophic condition of the lake. In general, the highest chlorophyll *a* values are in July and August, indicating the greatest growth during these months. Early in the sampling season (May and June) greater Secchi depths correspond to lower chlorophyll *a* levels.

A Historical Look at Bednesti Lake

The Bednesti Lake monitoring program was initiated well after local land development and possible impacts to the lake began. While this program can accurately document current lake water quality, it cannot reveal historical baseline conditions or long term water quality trends. Here lies the value in coring lake sediments. Past changes in water quality can be inferred by studying the annual deposition of algal cells (in this case diatoms) on the lake bottom.

Diatoms are a type of algae commonly found in lake environments. Their glass-like shell (known as a frustule) is composed of silicon. This frustule leaves a permanent record of diatom history in lake bottoms. There are two main types of diatoms, the Centrales, which have radial symmetry (e.g. *Cyclotella stelligera* seen in the left photo) and the Pennales, which have bilateral symmetry (e.g. *Navicula miniscula* seen in the right photo).

The deepest point in Bednesti Lake was cored on October 5, 1999 by Ministry of Environment staff. The 39 cm core, which represents approximately 200 years in the lake's history, was analyzed by Dr. Brian Cumming of Queen's University.

Historical changes in relative diatom abundance were measured directly by microscopy. By knowing the age of various core sections and the phosphorus preferences of the specific diatom in each section, historical changes in lake phosphorus concentrations, chlorophyll, and water clarity can be estimated. The microscopy work on Bednesti Lake appears to provide the best analytical results.

The Bednesti Lake core contained approximately 150 diatom taxa. The core data show a small change in the diatom community around 1915, as well as very small increases in organic carbon deposition from 1915 to approximately 1950. This may be due to increased in-lake production and increased inwash of organic matter, or decreases in the load of inorganic matter of the lake. Overall, the data show few changes over the last 200 year record, indicating a relatively stable history for Bednesti Lake. (Nordin 2011, Pers. Comm.)

Cumming (2000) states that based on the diatom community, as well as a small increase in organic matter, the lake became slightly more nutrient rich around 1915, placing Bednesti Lake in the mesotrophic range.

Should Further Monitoring Be Done on Bednesti Lake?

Based on average spring overturn TP, Bednesti Lake exhibited low mesotrophic conditions from 1998 - 2000, 2007 and 2008, and high oligotrophic conditions in 2010. Average chlorophyll *a* and average summer Secchi indicate that Bednesti Lake is mesotrophic in all sampling years. Core data also suggest the lake is mesotrophic. Strong summer stratification, extremely low DO in the bottom waters and spikes in bottom OP concentration indicate that Bednesti Lake experiences anoxic release of phosphorus (in the form of OP) from the bottom sediments generally in mid July and mid to late September.

It may be worthwhile taking an additional year of phosphorus samples to determine if the apparent decrease in average spring TP between 2008 and 2010 can be attributed to seasonal variation, or other factors. Also, full conductivity profiles, or testing for conductivity and/or total suspended solids in the bottom waters may be valuable in determining why the lake was simultaneously isothermal and oxygen deprived in the bottom waters, as seen during fall sampling in 1998, 2000, 2007 and 2008 (Nordin 2011, Pers. Comm.).

If volunteers are willing, continued collection of Secchi disc and surface temperature readings would be valuable for comparison to the data presented here. Additional Secchi and surface temperature measurements will also provide valuable long term records and help to identify early warning signs should there be a deterioration in water quality. Volunteers are also encouraged to continue recording ice on/off dates as these are valuable for climate change studies.

Tips to Keep Bednesti Lake Healthy

Yard Maintenance, Landscaping & Gardening

- Minimize the disturbance of shoreline areas by maintaining natural vegetation cover.
- Minimize high-maintenance grassed areas.
- Replant lakeside grassed areas with native vegetation.
- Do not import fine fill.
- Use paving stones instead of pavement.
- Stop or limit the use of fertilizers and pesticides.
- Do not use fertilizers in areas where the potential for water contamination is high, such as sandy soils, steep slopes, or compacted soils.
- Do not apply fertilizers or pesticides before or during rain due to the likelihood of runoff.
- Hand pull weeds rather than using herbicides.
- Use natural insecticides such as diatomaceous earth. Prune infested vegetation and use natural predators to keep pests in check. Pesticides can kill beneficial and desirable insects, such as lady bugs, as well as pests.
- Compost yard and kitchen waste and use it to boost your garden's health as an alternative to chemical fertilizers.

Agriculture

- Locate confined animal facilities away from waterbodies. Divert incoming water and treat outgoing effluent from these facilities.
- Limit the use of fertilizers and pesticides.
- Construct adequate manure storage facilities.
- Do not spread manure during wet weather, on frozen ground, in low-lying areas prone to flooding, within 3 m of ditches, 5 m of streams, 30 m of wells, or on land where runoff is likely to occur.
- Install barrier fencing to prevent livestock from grazing on streambanks and lakeshore.
- If livestock cross streams, provide graveled or hardened access points.
- Provide alternate watering systems, such as troughs, dugouts, or nose pumps for livestock.
- Maintain or create a buffer zone of vegetation along a streambank, river or lakeshore and avoid planting crops right up to the edge of a waterbody.

Onsite Sewage Systems

- Inspect your system yearly, and have the septic tank pumped every 2 to 5 years by a septic service company. Regular pumping is cheaper than having to rebuild a drain-field.
- Use phosphate-free soaps and detergents.
- Don't put toxic chemicals (paints, varnishes, thinners, waste oils, photographic solutions, or pesticides) down the drain because they can kill the bacteria at work in your onsite sewage system and can contaminate waterbodies.
- Conserve water: run the washing machine and dishwasher only when full and use only low-flow showerheads and toilets.

Auto Maintenance

- Use a drop cloth if you fix problems yourself.
- Recycle used motor oil, antifreeze, and batteries.
- Use phosphate-free biodegradable products to clean your car. Wash your car over gravel or grassy areas, but not over sewage systems.

Boating

- Do not throw trash overboard or use lakes or other waterbodies as toilets.
- Use biodegradable, phosphate-free cleaners instead of harmful chemicals.
- Conduct major maintenance chores on land.
- Use absorbent bilge pads to soak up minor leaks or spills.
- Check for and remove all aquatic plant fragments from boats and trailers before entering or leaving a lake. Eurasian milfoil is an aggressive invasive aquatic weed. Be sure to familiarize yourself with this plant and remove and discard any fragments.
- Do not use metal drums in dock construction. They rust, sink and become unwanted debris. Use polystyrene (completely contained and sealed in UV treated material) or washed plastic barrel floats. All floats should be labeled with the owner's name, phone number and confirmation that barrels have been properly emptied and washed.

Who to Contact for More Information

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Skye Dunbar (BCLSS)

Technical Review by:
James Jacklin & Kirsten Heslop (Ministry of Environment)

Report Produced by:
Skye Dunbar (BCLSS)

Photo Credits:
Len & Ayner Kersey

Land Use Map:
Chris Ens (Integrated Land Management Bureau, Thompson-Nicola Region)

Bathymetric Map:
Fisheries Information Summary System

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