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An introduction to the Okanagan Large Lakes water quality monitoring program: successes, discoveries and opportunities ahead.

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Large lake values


- Drinking water for ~100,000 people
- Disposal of treated wastewater
- Economy \$ MM - tourism, recreation, property values
- Aquatic ecosystems
- Aesthetics




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MoE Large Lake Monitoring Goals

- Work *collaboratively* with others to provide water quality data to decision makers within government, user groups, and to inform the public.
- These data are used to:
 - determine the status and trends of lakes in response to
 - waste management issues
 - watershed change
 - climate change
- Longest continuous multi-lake monitoring program in western North America (~35-40 yrs).
- \$12,000/yr for basic testing of 15 sites 2x/yr



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Key Water Quality Measures

Total Phosphorus (P)


Sources

- watershed soils
- urban stormwater run off
- seepage from septic tanks
- fertilizers and manures
- sewage discharge



Consequences of elevated P load

- increased algal blooms (phytoplankton chlorophyll a)
- reduced water clarity (Secchi depth)



Secchi disc sampling


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Okanagan Large Lakes Water Quality Monitoring Program

Outline



Successes


- Phosphorus load reduction -Skaha and Osoyoos lakes

Discoveries

- Phosphorus and climate -Okanagan Lake

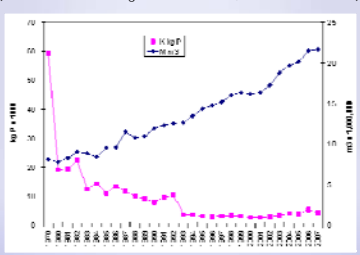
Challenges and opportunities

- Shared responsibility



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Success Story: Phosphorus load reduction

Municipal Effluent Volume (Mm³/yr) and Phosphorus Loading (Kg/yr), to Surface Waters of Okanagan Basin 1970 to 2007
 (~16.5Mm³ to Okanagan Lake in 2007: 7% of 2003 inflow)

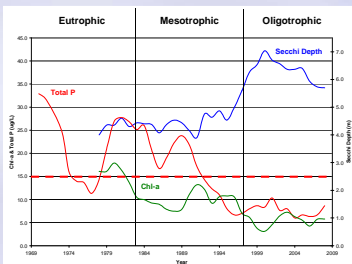


Year	Phosphorus Loading (Kg/yr)	Municipal Effluent Volume (Mm ³ /yr)
1970	~100	~1.0
1980	~100	~1.0
1990	~100	~1.0
2000	~100	~1.0
2003	~100	~1.0
2007	~16.5	~1.0



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Success Story: Skaha Lake Trophic Status 1970-2008

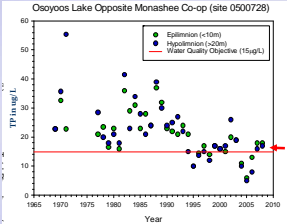
Pentiction STP P load	Year	P load (kg)	% Reduction
	1970	13,500	
	1980	2,700	80%
	2007	550	96%



Three-year running means of spring total phosphorus, chlorophyll-a and secchi depth in Skaha Lake

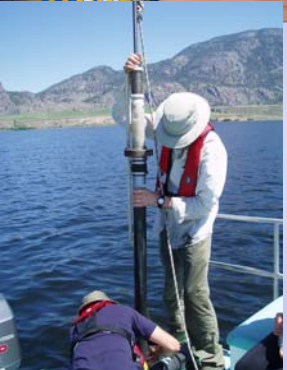

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Osoyoos Lake Opposite Monashee Co-op (site 0500728)



Take Home Messages

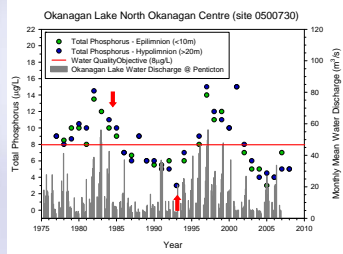
- P reduction worked - continued P load control important
- Skaha (to some extent Osoyoos) recovering but it takes more than a decade to see results





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Discovery: Lake phosphorus variation driven by climate

- STP P load reduction to Okanagan Lake
 - 1970 42,000 kg
 - 1985 7,800 kg 82%
 - 1985 - OK Basin declared Environmentally Sensitive Area
 - 1993 1,410 kg 97%
 - 2007 3,680 kg 92%



*Water Survey of Canada hydrometric data

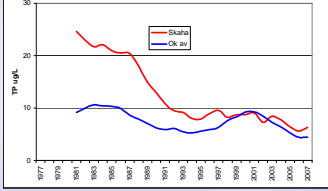

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Discovery: phosphorus variation and climate

- Similar patterns for other lakes e.g. Kalamalka, Mabel, Shawnigan.
- Spring TP driven by watershed runoff (NPS, stormwater and erosion).
- Regionalized understanding of P trends

Take Home Messages

- Low nutrient lakes sensitive to climate variation/change.
- Importance of watershed stability/condition.
- Waste management planning = cumulative effects e.g. LWMP stormwater important - multiple benefits




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More information @

- http://www.env.gov.bc.ca/kootenay/epd/pdf/water_quality/ok_large_lakes_wq.pdf
- Or contact Michael Sokal at: mike.sokal@gov.bc.ca or 250-490-2284

Partners

- BC Lake Stewardship Society (www.bcsls.org)
- Osoyoos Lake Water Quality Society (www.olwqs.org)
- Okanagan Nation Alliance (www.sylx.org)
- Greater Vernon Water and District of Lake Country (www.greatervernon.ca)




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Challenges


- Population growth
 - Increasing reliance drinking water / effluent disposal
 - New contaminants/ issues or information gaps?
 - pharmaceuticals
 - sediment quality at STP diffusers
- Climate change and variation
 - Precipitation more variable?
 - Warmer waters and more algal blooms?
- Mountain Pine Beetle
 - Changing hydrographs and soil erosion
- Sharing information

Opportunities

- "Coordinating framework"
 - Support research on emerging water contaminant issues
 - Support and foster collaboration through partnership agreements
 - Collect and disseminate scientific information




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Opportunities ⇒ *Examples*

- Coordinating framework
 - Support research on emerging water contaminant issues

OBWB funded research: EDC, sediment core, algal and other projects

- Identify gaps and priorities?
- Application of findings?
 - Links to LWMP (STP and Stormwater) and OCs?
- “passive vs active”


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Opportunities ⇒ *Examples*

- Coordinating framework
 - Support and foster collaboration through partnership agreements

STP Outfall lake monitoring

- monitoring requirements in OC's
- better data integration
- economies-of-scale?

“The City is required to undertake lake sampling and monitoring as specified ... the Director may waive this requirement if the City contributes to a lake-wide collaborative monitoring program”

- need mechanism to foster agreement, determine level of contribution, and provide scientific and administrative support


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Opportunities ⇒ *Example*

Coordinating framework

- Collect and disseminate scientific information

Reporting

- host or link to lake-status web site?


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Summary

- Continued phosphorus control important
- Climate variation affects our lakes, therefore P control needs to include NPS such as urban storm-water
- A more formalized approach to shared responsibility of large lakes is suggested to ensure sustainability


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Thank you


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