

Updating the Osoyoos Lake water quality objectives

reference points for water resource management



Vic Jensen
Mike Sokal
Dan St. Hilaire
Kevin Rieberger
Don McQueen

Acknowledgements

- Okanagan Nation Alliance
- Fisheries and Oceans Canada
- Osoyoos Lake Water Quality Society
- Water Survey Canada
- Environment Canada
- UBC Okanagan
- Okanagan Basin Water Board
- Town of Osoyoos
- Lake Osoyoos Association



Outline

- What are water quality objectives
- What is considered when setting the objective values
- Which measures are proposed as objectives
- Illustrate the process with phosphorus
- Next steps

What are water quality objectives

- Objectives are numerical water quality measurement targets set specific to a waterbody.
- Based on BC Water Quality Guidelines: generic safe limits of the physical, chemical or biological characteristics of water, biota or sediment which protect a water use.
- Set only for parameters expected to be influenced by human actions

What are water quality objectives

- Water quality objectives have no legal standing, however, they do provide direction for resource managers for the protection of water uses of a specific waterbody.
- Objectives, and their attainment, can guide the issuance of permits, licenses and liquid waste management planning.
- Provide a reference against which the state of water quality in a particular waterbody can be checked, and help determine whether basin-wide water quality studies or actions should be initiated.

How are Objectives set

- Derived by considering how local water quality variation is influenced by processes such as hydrologic variation and non-point or point source waste discharges.
- Based on the best available science, however, professional judgment and public expectations may also influence how the objectives are expressed

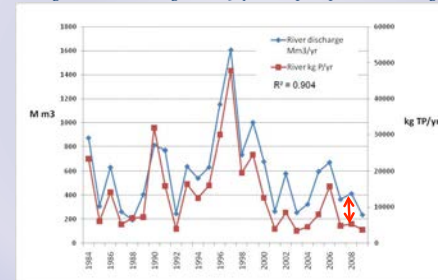
Which parameters are proposed as objectives

- Phytoplankton chlorophyll A
 - Secchi depth (water clarity)
 - Dissolved oxygen
 - Phosphorus
- Osoyoos Lake 1985 spring TP objective
 - New data
 - More parameters => improved tracking of water quality status change over time

Phosphorus

- Consider sources, historical trends, seasonal patterns
 - Sources: upstream point sources
 - Penticton 14,000 kg TP => 500 kg Oliver 500kg => 0 kg Osoyoos ~ 0 kg

Okanagan River discharge (M m³/yr) and phosphorus load (kg P/yr)

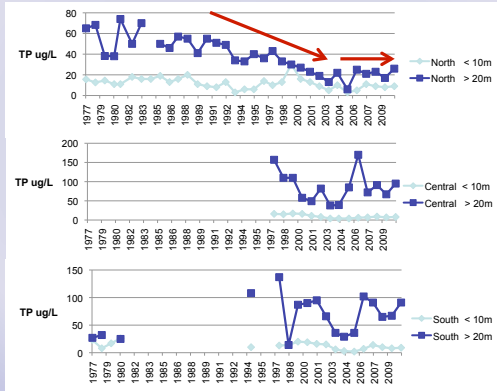


- more flow = more phosphorus load
- decrease in load relative to flow in 2000's vs 1980's

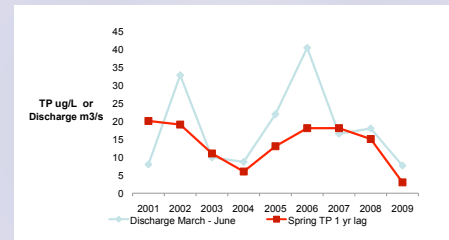
Phosphorus

- Sources: internal

Osoyoos Lake surface and deep water phosphorus in September

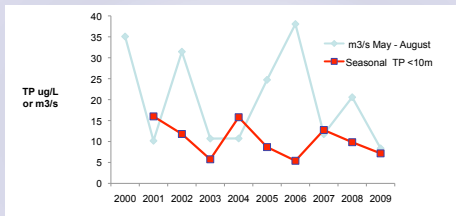


Okanagan River spring discharge versus Osoyoos Lake spring TP (1 yr lag) in north basin



- > lake buffers phosphorus inputs during high spring flows across a number of years

Okanagan River summer average discharge versus Osoyoos Lake north basin growing season TP



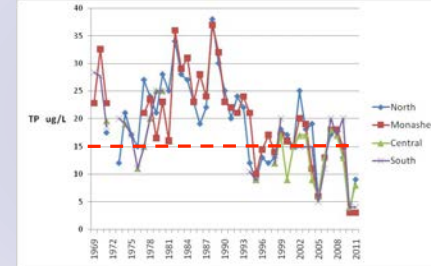
- > flushing of north basin surface waters 0.4 to 3 x in 4 months
- > high clear flows in summer decrease seasonal TP; low summer flows allow internal loading to be recorded

Phosphorus

- long term trends

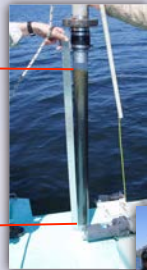
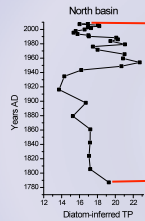
- > reduced external and internal loading to north basin

Osoyoos Lake spring phosphorus relative to the spring Objective



- > The BC water quality guideline to protect aquatic life for phosphorus: 5 ug/L to 15 ug/L
- > Decadal rate of recovery from upstream nutrient loading

Osoyoos Lake Sediment Coring Project, 2008



- Sediment core from the north basin (90 cm) is approximately **220 years old**, with a basal date of AD 1787.



- Osoyoos Lake moderate in phosphorus (~ 17 to 19 µg/L) before European settlement
- Osoyoos Lake spring TP 2000-2010 ~ 14 µg/L

Phosphorus summary

- wet years increase spring TP; load is largely external for N basin
- Spring values integrate multiple years and estimate potential seasonal algal production.
- 2000-2010 spring surface water average TP = 14 µg/L
- Sediment core work suggests existing spring TP objective of 15 µg/L is realistic
- **Proposed that the spring TP of 15 µg/L be retained as the objective for Osoyoos Lake**
- Recent data suggests objective will be met half of the time
- Failure to do so without increased frequency of higher flow years would be a flag for further assessment.



Next Steps

- Review data for phytoplankton chlorophyll, water clarity, and dissolved oxygen
- Explore the potential of a water quality index for Osoyoos Lake
- Provide draft document for comment by end 2011
- Adopt Objectives in 2012
- Maintain collaborative partnerships with ONA, DFO, OLWQS and others to determine status and trends in Osoyoos Lake relative to the updated Objectives



Questions?

