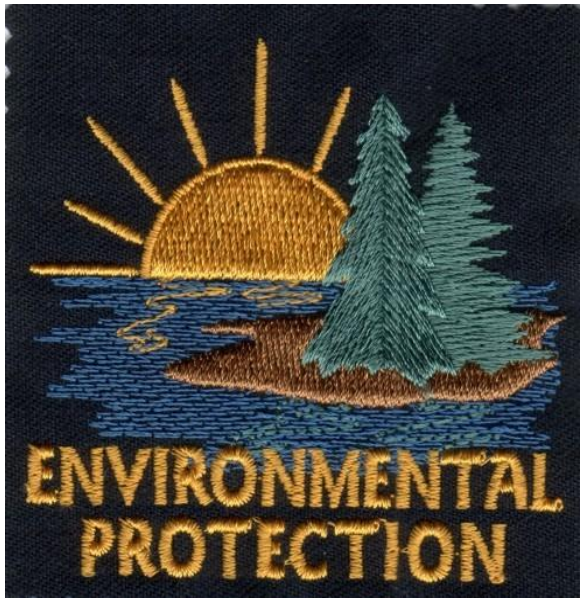
MOE Water Quality Monitoring Network: Projects in the Cowichan Watershed



May 5, 2011

Deborah Epps and John Deniseger
Environment Protection Division
MOE, Nanaimo

Guiding Principles

- Embracing shared stewardship through partnerships – far more effective
- Ecoregion approach – understanding fundamental water quality across multiple watersheds – Water quality objectives

Making the Connections

- Cumulative effects of multiple land uses on streams, lakes, marine embayed areas
- Point sources and Non Point Sources
- Path forward – linking land use to water quality

Outline

- Background
  - Water Quality objectives
  - Ecoregion Approach
- Cowichan Lake – new wqo's
- Cowichan River – attainment monitoring
- Cowichan Bay – develop wqo's
- Other areas of interest

What are water quality objectives?

- Provincial water quality guidelines
- Watershed/Site specific water quality objectives
- 3 years of monitoring and assessment
  - Grab samples, continuous and biological
- Write up with input from partners
  - Partnership approach integrates consultation throughout rather than as final step

How do we get this done?

- Partnerships established within each watershed
- Partners do bulk the sampling
- We train, provide supplies, do QA/QC and safety audits
- Cost sharing
- Data sharing

Deliverables – Now and for the Future

- Establish present state of water quality in the watershed
- Establish a baseline for long term trends and planning processes
- Establish water quality objectives for the watershed focusing on all users of the resource
- Objectives which make sense for that water body – help guide management decisions

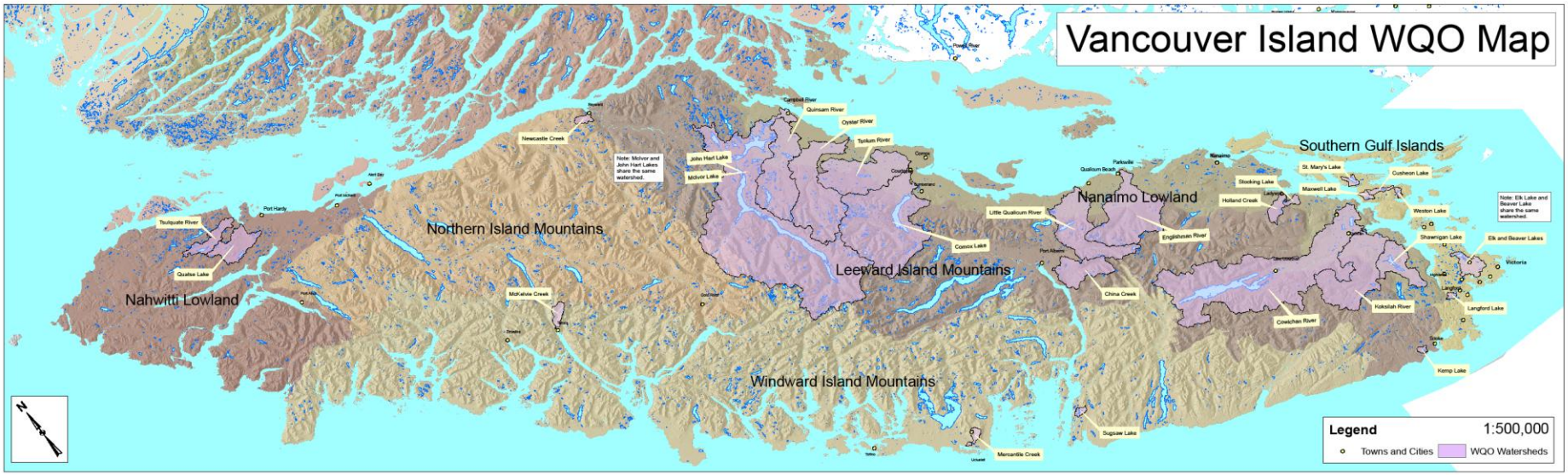
Objectives – now what?

- If objectives are met – following up attainment monitoring every 3 – 5 years
- If objectives are not met – follow up to determine why they are not being met
- Provincial reporting of objectives attainment monitoring results – significant public and media scrutiny – also reported out on the web

Ecoregion Approach

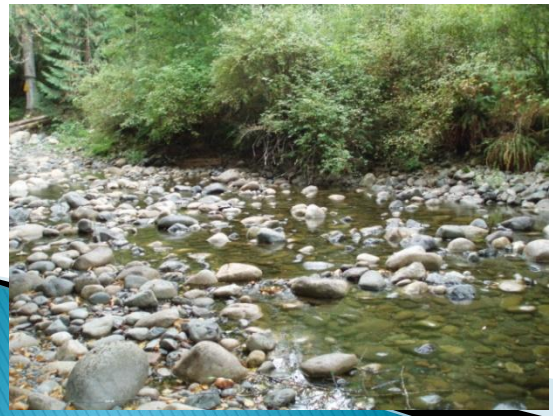
- Developed in 2002
- 6 ecoregions on Vancouver Island
- Fundamental baseline water quality similar in all watersheds within each ecoregion
- 1 representative watershed chosen for each ecoregion

Currently have at least one lake or stream WQO report completed for each ecoregion (in some ecoregions more than one)

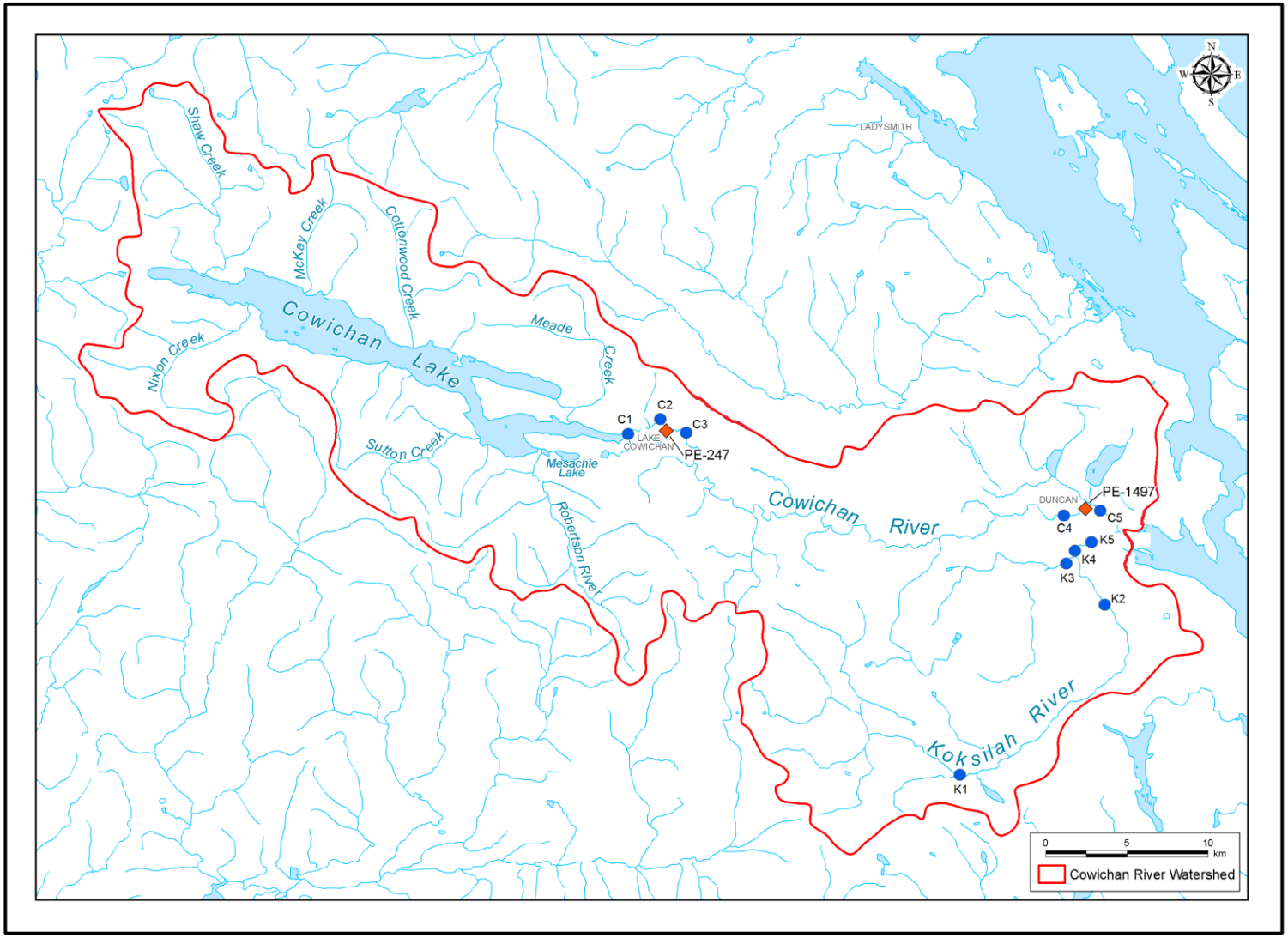


Cowichan River

- Watershed:
  - Primarily private land
  - NPS –forestry, agriculture, urbanization, rural residential , recreation
  - STP discharges
  - Uses: domestic, aquatic life, recreation, wildlife, irrigation
- WQOs developed in 1989



Cowichan River sites



Attainment monitoring

- Cowichan/Koksilah – 2002, 2003 and 2008
- Summer and fall (5 weekly samples in 30 days)
- Biomonitoring – 2010 in partnership with CVRD
- Attainment report and updated objectives
  - Fecals, e. coli, TSS, turbidity, DO
  - Nutrients – P and chlorophyll *a*
  - Update objectives- using ecoregion concept (i.e. applying Englishman River background sites)

Updated WQOs – Cowichan and Koksilah Rivers

Variable	Objective Value
Escherichia coli	≤ 10 CFU/100mL (90th percentile) (Cowichan River upstream of hwy bridge, Koksilah River) ≤ 77 CFU/100mL (geometric mean) (Cowichan River downstream of hwy bridge)
Dissolved Oxygen	≥ 11.2 mg/L (Oct to May) ≥ 8 mg/L (June to Sept)
Non-filterable Residue (Total Suspended Solids)	Oct to Dec: ≤ 33 mg/L (maximum) ≤ 13 mg/L (mean based on 5 weekly samples in 30 day period) Jan to Sept: ≤ 26 mg/L (maximum) ≤ 6 mg/L (mean based on 5 weekly samples in 30 day period)
Turbidity	Oct to Dec: ≤ 5 NTU (maximum) Jan to Sept ≤ 2 NTU (maximum)
Ammonia*	Summer: ≤ 0.49 mg/L (mean based on 5 weekly samples in 30 day period) ≤ 3.61 mg/L (maximum) Fall: ≤ 1.31 mg/L (mean based on 5 weekly samples in 30 day period) ≤ 6.83 mg/L (maximum)
Chlorophyll-*a*	≤ 5.0 μg/m^2 (applies to downstream of PE-247 and PE-1497)
Total Copper*	≤ 0.002 mg/L (mean based on 5 weekly samples in 30 day period) ≤ 0.004 mg/L (maximum)
Total Lead*	≤ 0.004 mg/L (mean based on 5 weekly samples in 30 day period) ≤ 0.011 mg/L (maximum)
Total Zinc*	≤ 0.0075 mg/L (mean based on 5 weekly samples in 30 day period) ≤ 0.033 mg/L (maximum)
Temperature	≤ 17 °C (mean weekly temperature)

Koksilah River

- Continually exceed WQOs
  - DO, non-filterable residue, turbidity
  - Fecal coliforms, E. Coli
- Identify and address sources
  - Bacterial source tracking
  - Land use activities
    - Timber harvesting, agriculture

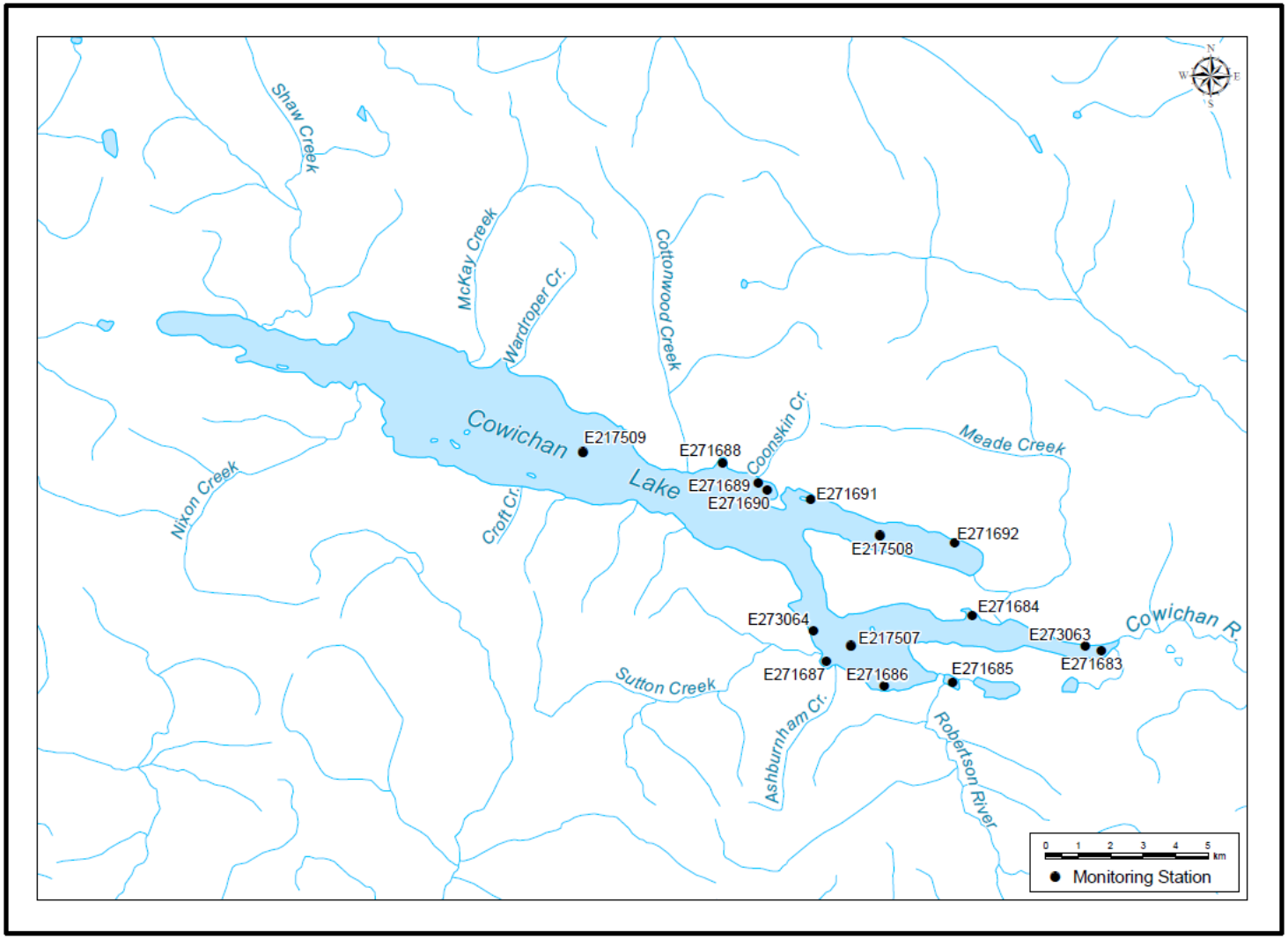
Trend Monitoring

- Federal/Provincial trend monitoring program
- Cowichan – approx 1km downstream the JUB discharge
- Samples collected biweekly
- Provincial report – annually

Cowichan Lake

- WQO's report – 2011
  - Monitoring took place in 2008 and 2010
- Stewardship group and Living Rivers
- Quarterly lake sampling at three sites
- Bacteriological around lake – 2009 and 2010
- TSS inputs – fall stream sampling 2009
- BCLSS – biweekly sampling from April –Oct
  - Temperature and secchi disk

Cowichan Lake–sample sites



Proposed WQO's for Cowichan Lake

Variable	Objective Value
Water temperature	≤ 15°C summer maximum hypolimnetic temperature (> 10m depth)
Dissolved oxygen	≥ 5 mg/L at any depth throughout the year
Secchi Depth	≥ 6.0 m minimum, ≥ 8.0 m average
Turbidity – lake sites	≤ 2 NTU maximum
Turbidity - tributaries	Max of 5 NTU; average of 2 NTU with a minimum 5 weekly samples collected over a 30-day period
TSS - tributaries	Max 25 mg/L; average of 5 mg/L with a minimum 5 weekly samples collected over a 30-day period
Total organic carbon	≤ 4 mg/L maximum
***E. coli* bacteria**	≤10 CFU/100 mL (90^{th} percentile) with a minimum 5 weekly samples collected over a 30-day period
Chlorophyll *a*	≤ 2 µg/L

Cowichan Bay – 2000 MOE report

- Cowichan River
  - fecals, nutrients, TSS
- Cowichan Bay
  - Very high fecals throughout the Bay
  - Hot spots associated with STPs
  - Oil/grease and some metals – associated with terminal sites (Westcan and Doman)
- Storm water drains
  - High fecals, TSS

Follow up

- 2000 to 2005
  - 2000 – Doman/Westcan – installed oil/water separators
  - 2003 – JUB STP upgrade and alum addition
  - 2004 – Closure of Cowichan Bay STP
- Benefits to Environment
  - >80% reduction in phosphorus from JUB discharge – through alum addition
  - Reduced fecal coliforms

Additional Sampling 2004/05

- Cowichan Bay
  - Major hot spot addressed
  - Highlighted Lambourn
  - Fecals improved but remain significantly elevated
  - Event driven – winter storms

- Storm Water
  - Still really high fecal numbers
  - Event driven – winter storms

MORE Recent developments

- 2006 – Remediation of Stoltz Bluffs/clay bank in Cowichan River
  - Living Rivers – monitoring 2010/11
- 2010/11 – Lambourn STP upgrade – treatment and outfall extension
- 2011 – begin development of WQO's?
  - Partnership with Cowichan Water Board, First Nations, CVRD, local stewardship groups
  - Focus on bacteriological indicators, shellfish and human health
  - Use Turbidity as a surrogate – set watershed targets

Quamichan and Somenos Lakes

- Local stewardship groups
- Hosted BCLSS 2010 forum in June
- Quamichan
  - Watershed management plan- 2009
- Somenos
  - Stormwater sampling fall 2009/10

WHY? Cultural, Environmental and Economic

- Restore, maintain, protect the Cowichan ecosystem
- Part of region's cultural and environmental identity
- FN importance – cultural, salmon, shellfish
- Re-open shellfish harvesting opportunities
- Recreation, tourism

How can WQO's be used?

- Policy and bylaw development
  - Integration of land use and development within OCP
  - Link to WQO's and biomonitoring
  - Use TSS as surrogate
  - Bylaws tailored for Cowichan area – targeting TSS

Proactive approach to rainwater management

- Regional Liquid Waste Management Planning (LWMP) for wastewater and rainwater together
- Include site specific water quality objectives in LWMP
- Ultimately linking: water quality of marine waters to streams and land use, rainwater management, bylaws/zoning, shellfish

Questions?