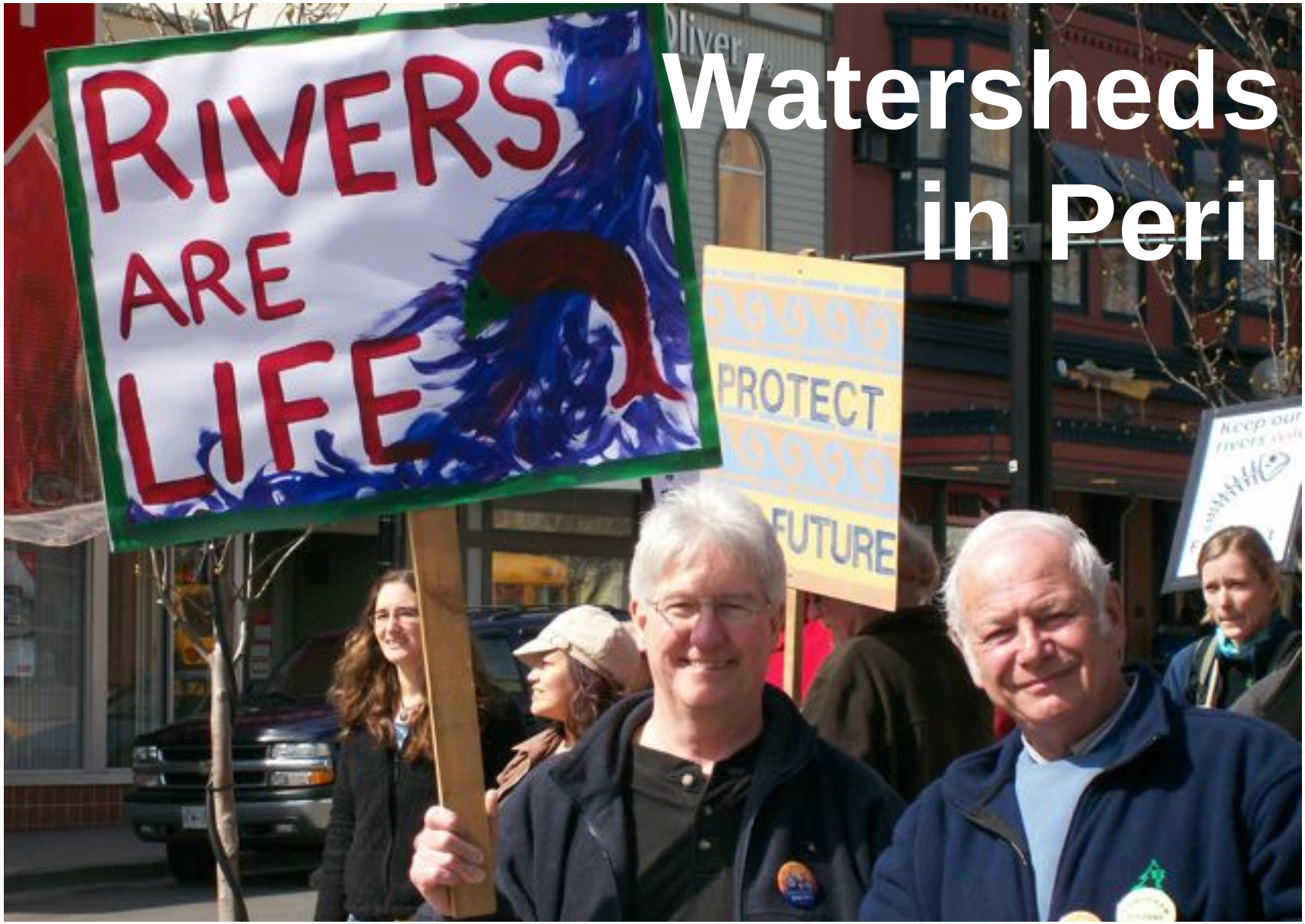
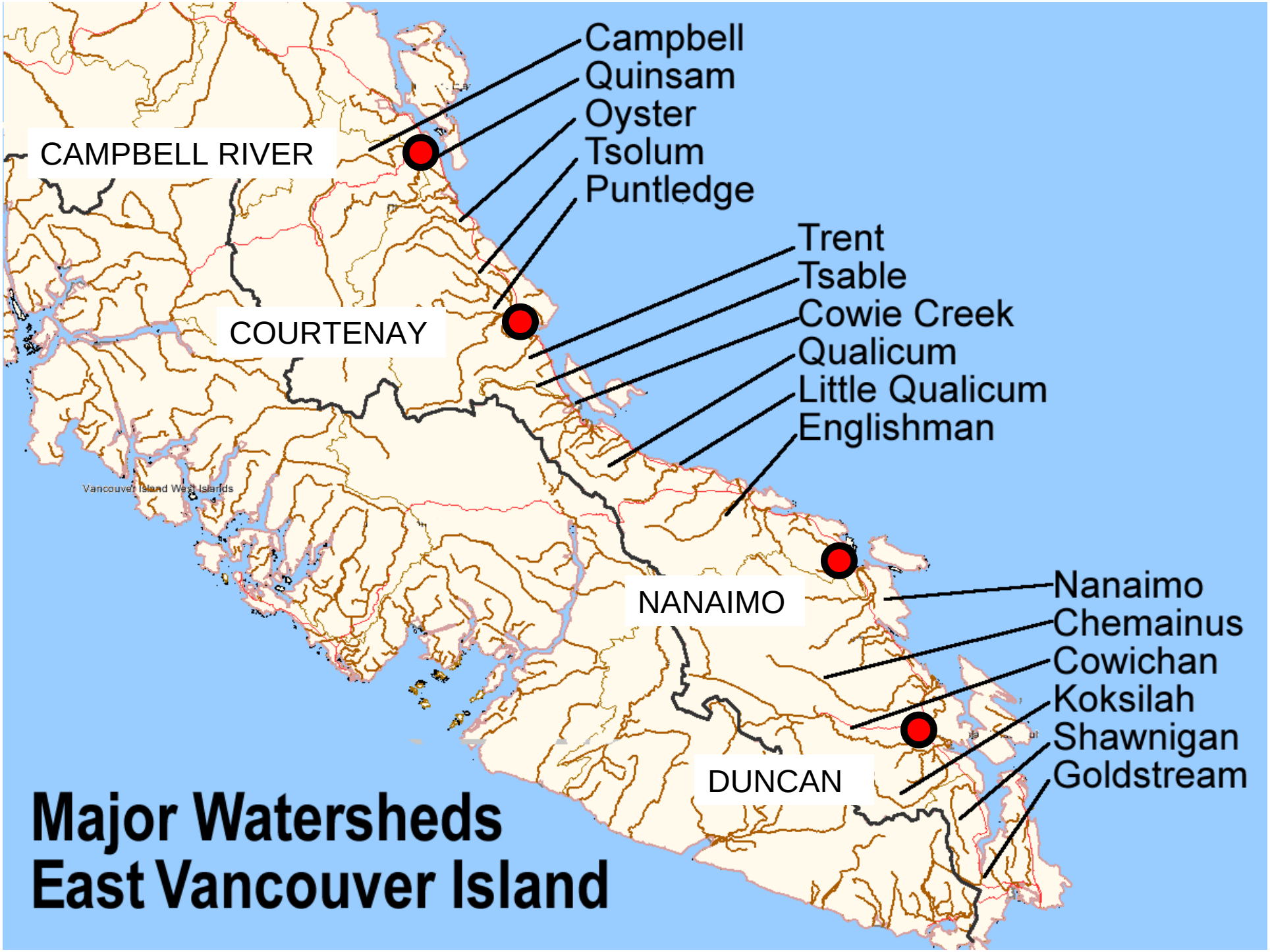
Watersheds in Peril



NANAIMO, May 30, 2010

Arthur Caldicott

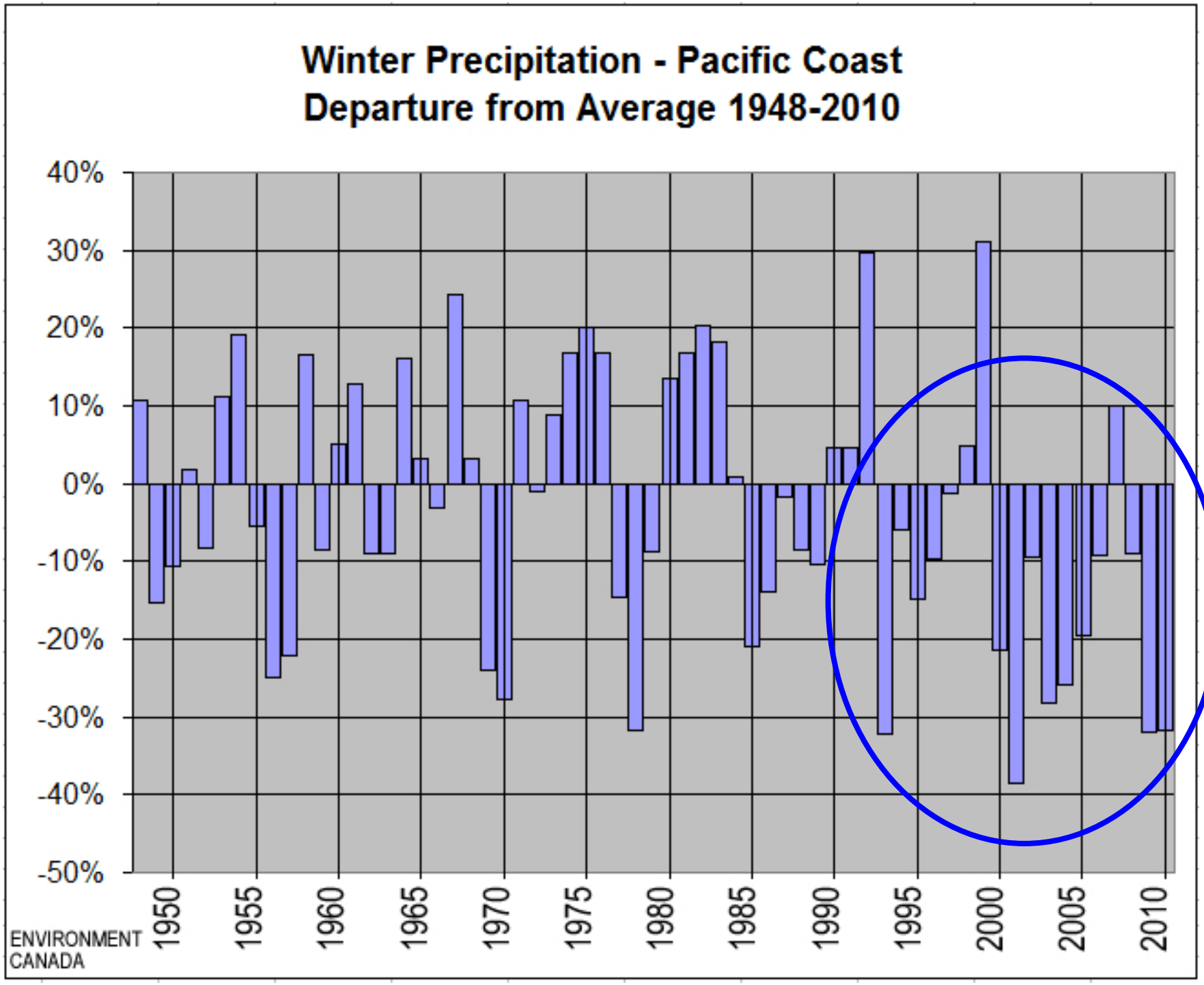

Campbell
Quinsam
Oyster
Tsolum
Puntledge
CAMPBELL RIVER
Trent
Tsable
Cowie Creek
Qualicum
Little Qualicum
Englishman
COURTENAY
Vancouver Island West Islands
NANAIMO
Nanaimo
Chemainus
Cowichan
Koksilah
Shawnigan
Goldstream
DUNCAN
Major Watersheds
East Vancouver Island

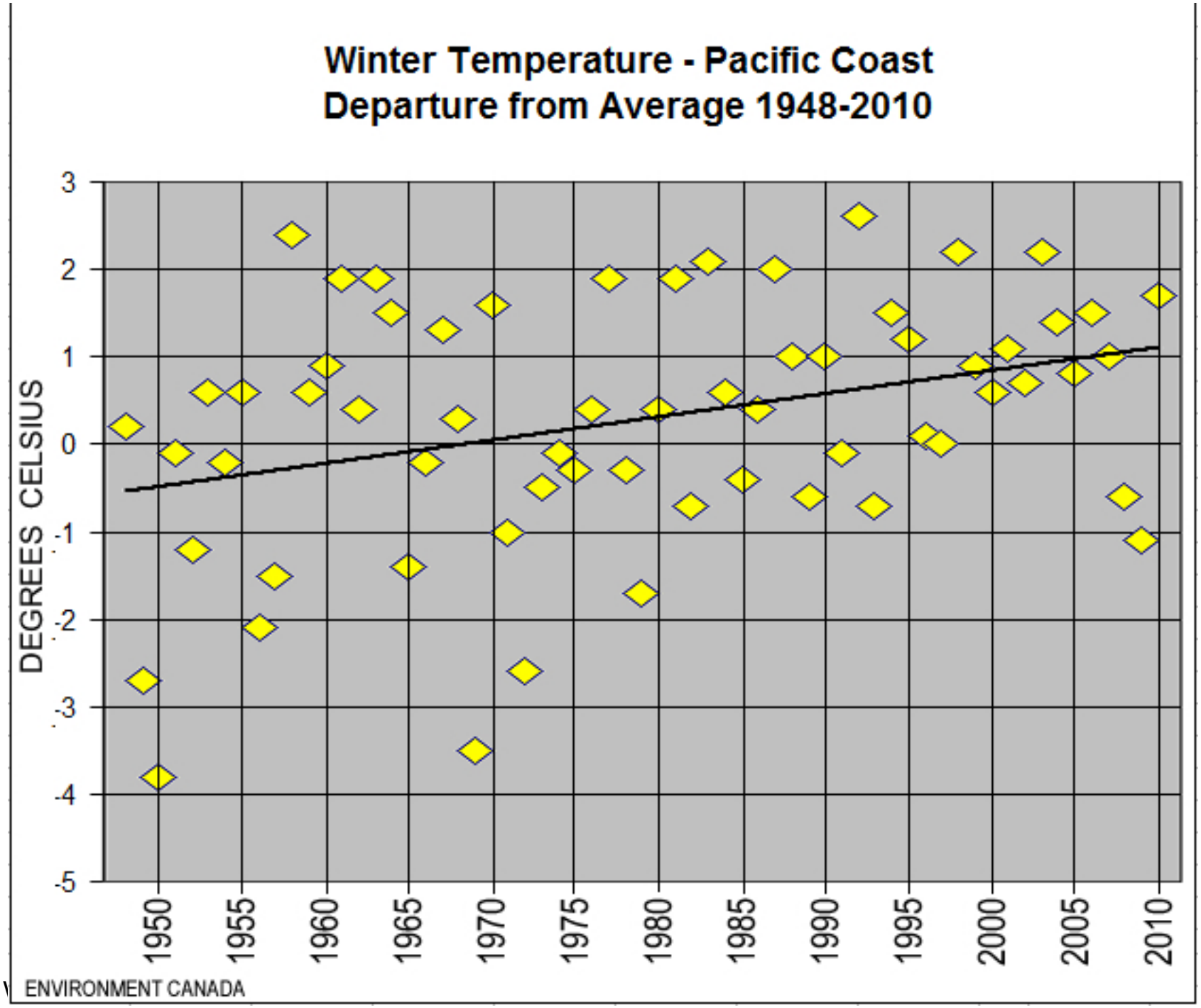
Tapped Out

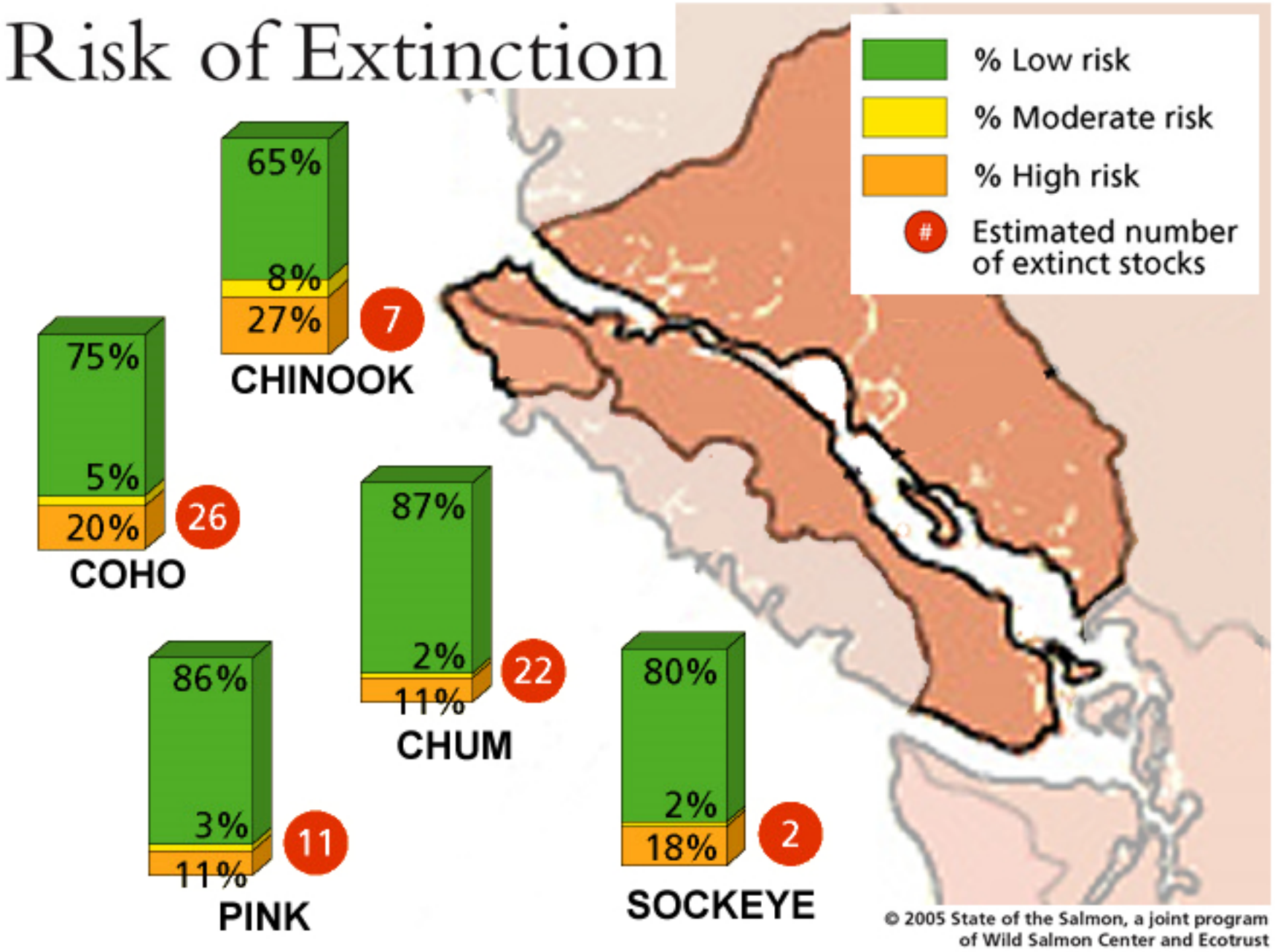
- all major and most minor sources of surface water in coastal areas are licensed to their full capacity.
- additional sources of fresh water supplies must come from
  - distant inland lakes,
  - damming of more streams and rivers, or from
  - underdeveloped or unused ground water aquifers.

Tapped Out
Todd Butler

Water Stewardship
BC Ministry of Environment


Winter Precipitation - Pacific Coast
Departure from Average 1948-2010
40%
30%
20%
10%
0%
-10%
-20%
-30%
-40%
-50%
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
ENVIRONMENT CANADA


Winter Temperature - Pacific Coast
Departure from Average 1948-2010
DEGREES CELSIUS
3
2
1
0
-1
-2
-3
-4
-5
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
ENVIRONMENT CANADA


Risk of Extinction
% Low risk
% Moderate risk
% High risk
# Estimated number of extinct stocks
65%
8%
27%
7
CHINOOK
75%
5%
20%
26
COHO
87%
2%
11%
22
CHUM
86%
3%
11%
11
PINK
80%
2%
18%
2
SOCKEYE
© 2005 State of the Salmon, a joint program of Wild Salmon Center and Ecotrust

COWIE CREEK

Year	Chinook Run 1	Chum Fall Run	Coho Fall Run	Pink Run 1	Sockeye Run 1
2009	No Data	NOT INSPECTED	NOT INSPECTED	No Data	No Data
2008	No Data	NOT INSPECTED	NOT INSPECTED	No Data	No Data
2007	No Data	NOT INSPECTED	NOT IN	No Data	No Data
2006	No Data	NOT INSPECTED		No Data	No Data
2005	No Data	NOT INSPECTED		No Data	No Data
2004	No Data			No Data	No Data
2003	No Data		430	No Data	No Data
2002	NOT INSPECTED		481	NOT INSPECTED	NOT INSPECTED
2001	NOT INSPECTED		427	NOT INSPECTED	NOT INSPECTED
2000	NONE OBSERVED	500	617	NONE OBSERVED	NONE OBSERVED
1999					
1998					
1997					
1996					
1995					
1994					

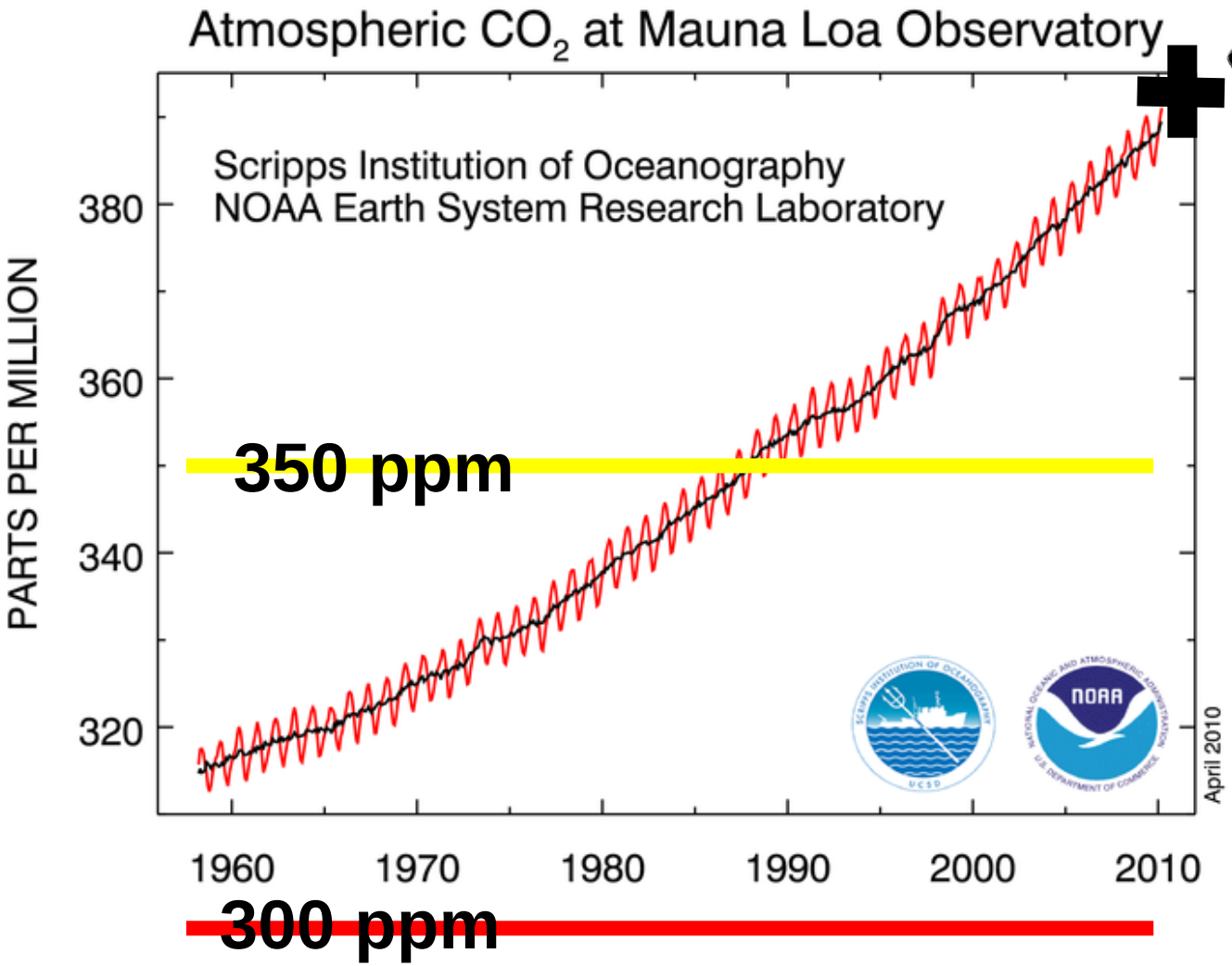
NANAIMO RIVER

Year	Chinook Summer Run	Chinook Fall Run	Chum Fall Run	Coho Fall Run	Pink Fall Run	Sockeye Fall Run
2009	No Data	2100	No Data	No Data	No Data	No Data
2008	No Data	4096	No Data	No Data	No Data	No Data
2007	No Data	4341	No Data	No Data	14519	No Data
2006	No Data	4725	No Data		No Data	No Data
2005	No Data	2025	36100		2400	NONE OBSERVED
2004	No Data	1998	70300		NOT INSPECTED	No Data
2003	532	2330			35	NONE OBSERVED
2002	652	2030		769	NONE OBSERVED	NONE OBSERVED
2001	446			7000	262	6
2000	618		1000	7000	12	8
1999	700		45000	4000	NONE OBSERVED	NONE OBSERVED
1998	295	1	65000	2000	NONE OBSERVED	NONE OBSERVED
1997	741	887	27000	3000	NONE OBSERVED	NONE OBSERVED

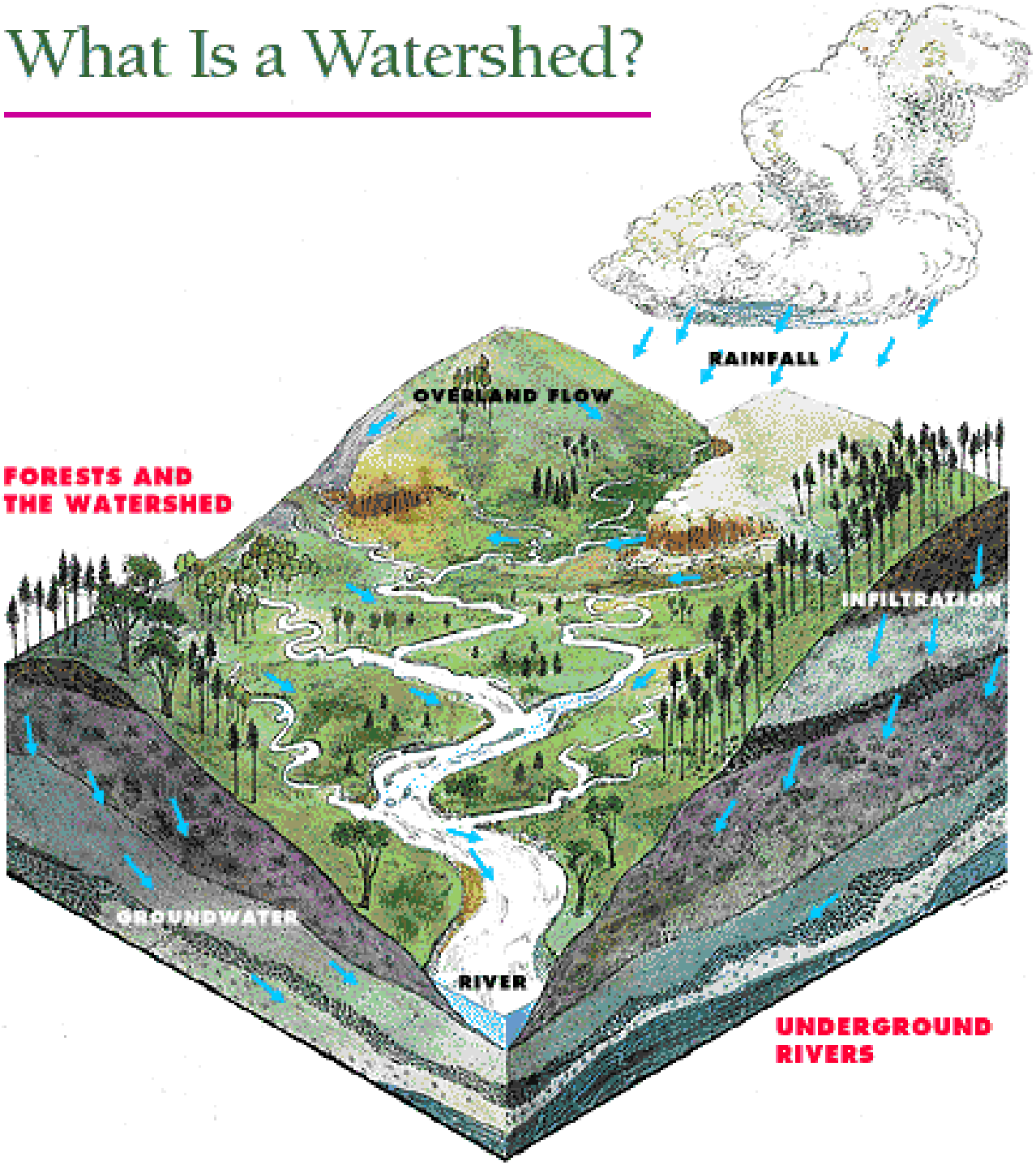
CHEMAINUS RIVER

Year	Chinook Summer Run	Chinook Fall Run	Chum Fall Run	Coho Fall Run	Pink Fall Run	Sockeye Run 1
2009	No Data	No Data	No Data	No Data	NOT INSPECTED	No Data
2008	No Data	No Data	No Data	No Data	NOT INSPECTED	No Data
2007	No Data	No Data	No Data	No D	NOT INSPECTED	No Data
2006	No Data	No Data	No Data		NOT INSPECTED	No Data
2005	No Data	529	4400		NOT INSPECTED	No Data
2004	No Data	287			NOT INSPECTED	No Data
2003	No Data	108		RESENT	NOT INSPECTED	No Data
2002	475	No Data		PRESENT	NONE OBSERVED	No Data
2001	72			200	NONE OBSERVED	NONE OBSERVED
2000	66		9620	60	50	NONE OBSERVED
1999	160		2500	NONE OBSERVED	4	NONE OBSERVED
1998	47		5500	NONE OBSERVED	NONE OBSERVED	NONE OBSERVED
1997	200	NONE OBSERVED	5650	150	NONE OBSERVED	NONE OBSERVED
1996	800	NONE OBSERVED	15000	200	NONE OBSERVED	NONE OBSERVED
1995	400	NONE OBSERVED	3000	200	NONE OBSERVED	NONE OBSERVED

Atmospheric Carbon

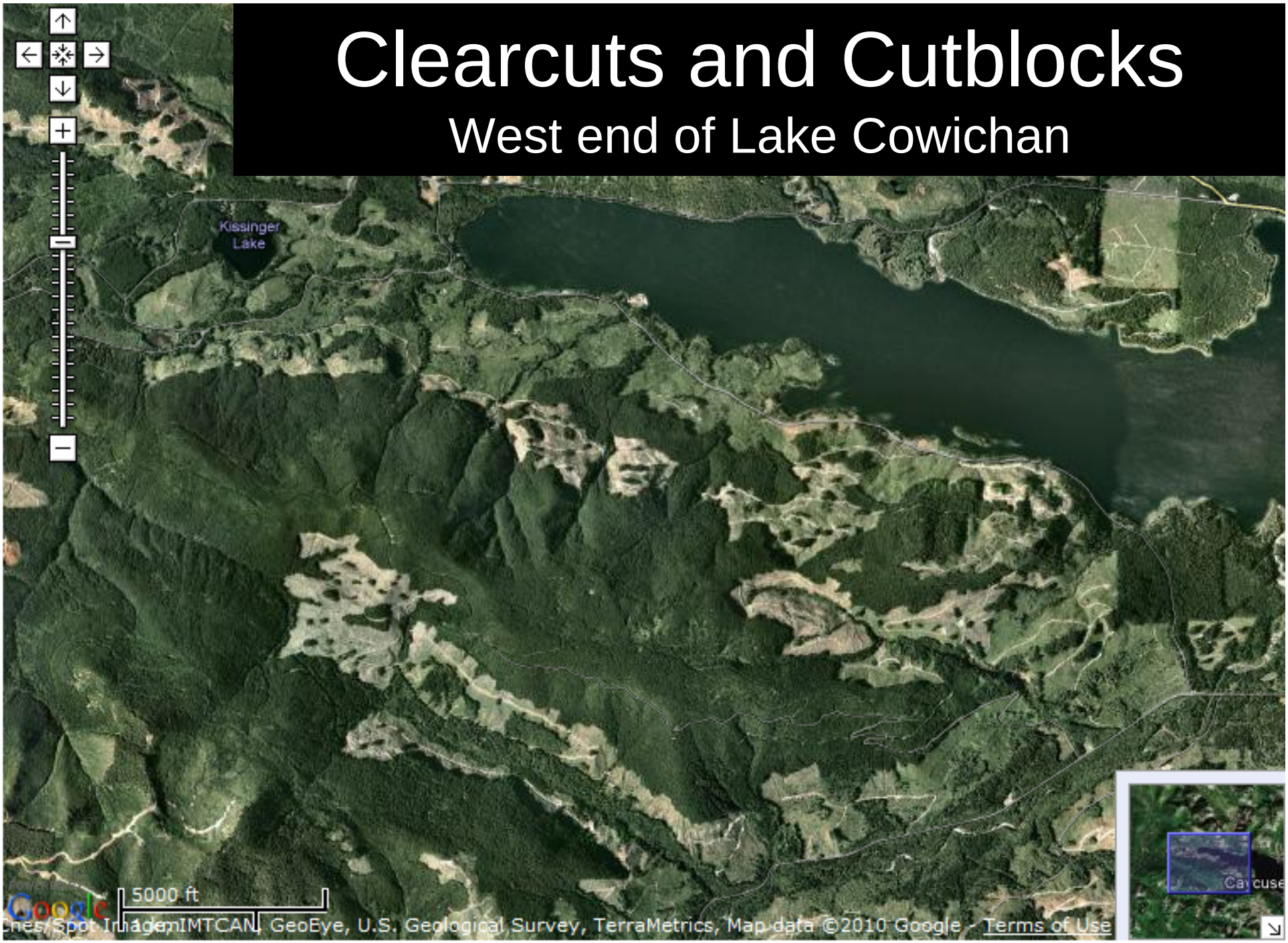


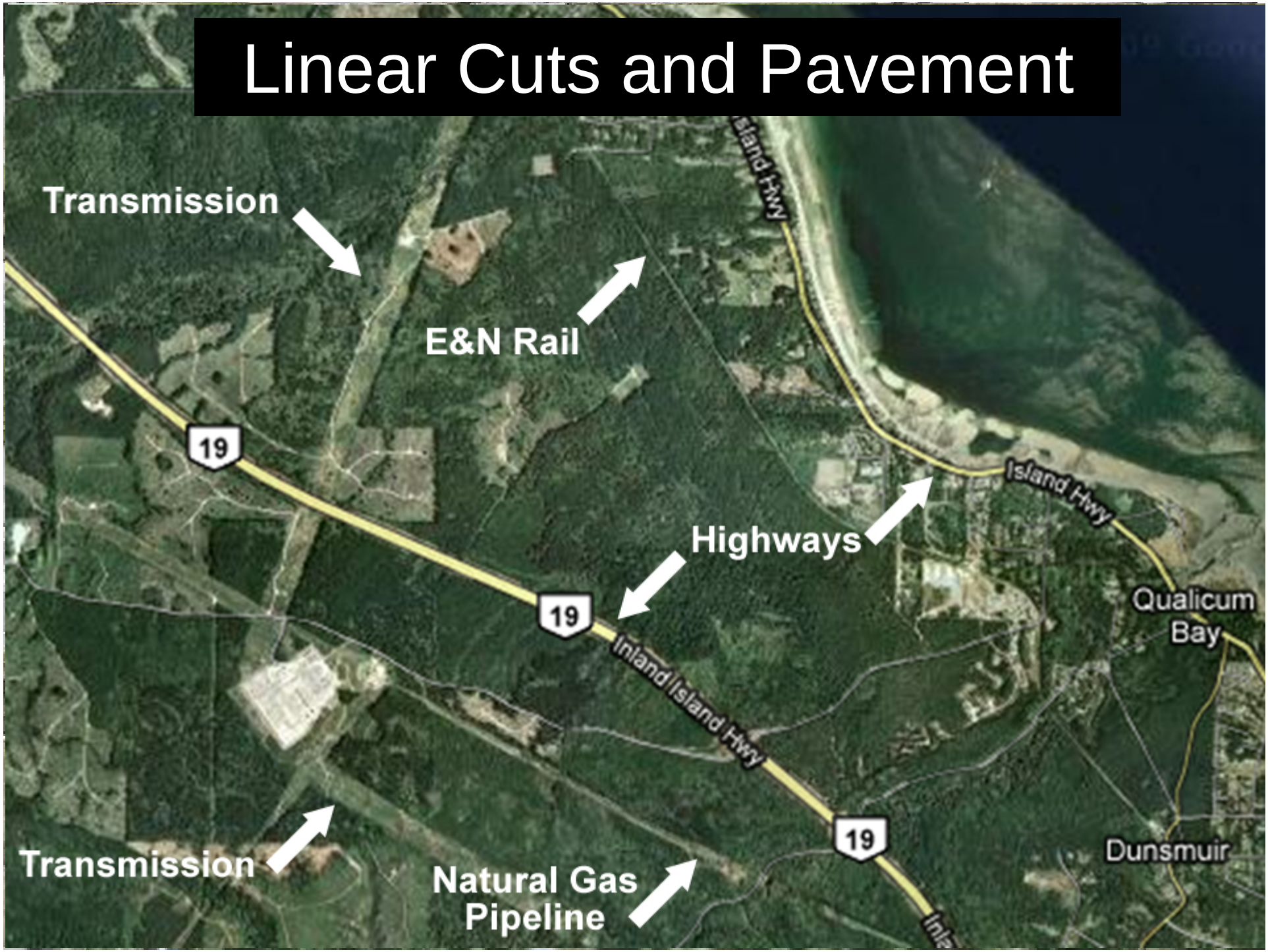
What Is a Watershed?



Clearcuts and Cutblocks

West end of Lake Cowichan




Linear Cuts and Pavement
Transmission
E&N Rail
Highways
Transmission
Natural Gas Pipeline
19
19
19
Island Hwy
Island Hwy
Inland Island Hwy
Qualicum Bay
Dunsmuir

Industry

Fertilizers, Herbicides, Pesticides

Wastes

- Sewage
- Garbage
- Incineration

CHEMAINUS - Halalt First Nation holding blockade for the water. *"This is a last stand for our water. Our traditional lands have been taken away. Our fish have disappeared. Our clams are polluted. We are drawing the line. No one is going to take away our water,"*

COBBLE HILL Angry residents hammer officials

"*Every home and business in this area relies on the aquifer. Impacts may take years to appear.*"

"Water is the issue”

Indigenous Peoples are defending their territory and the health of their communities. **Grand Chief Stewart Phillip**:

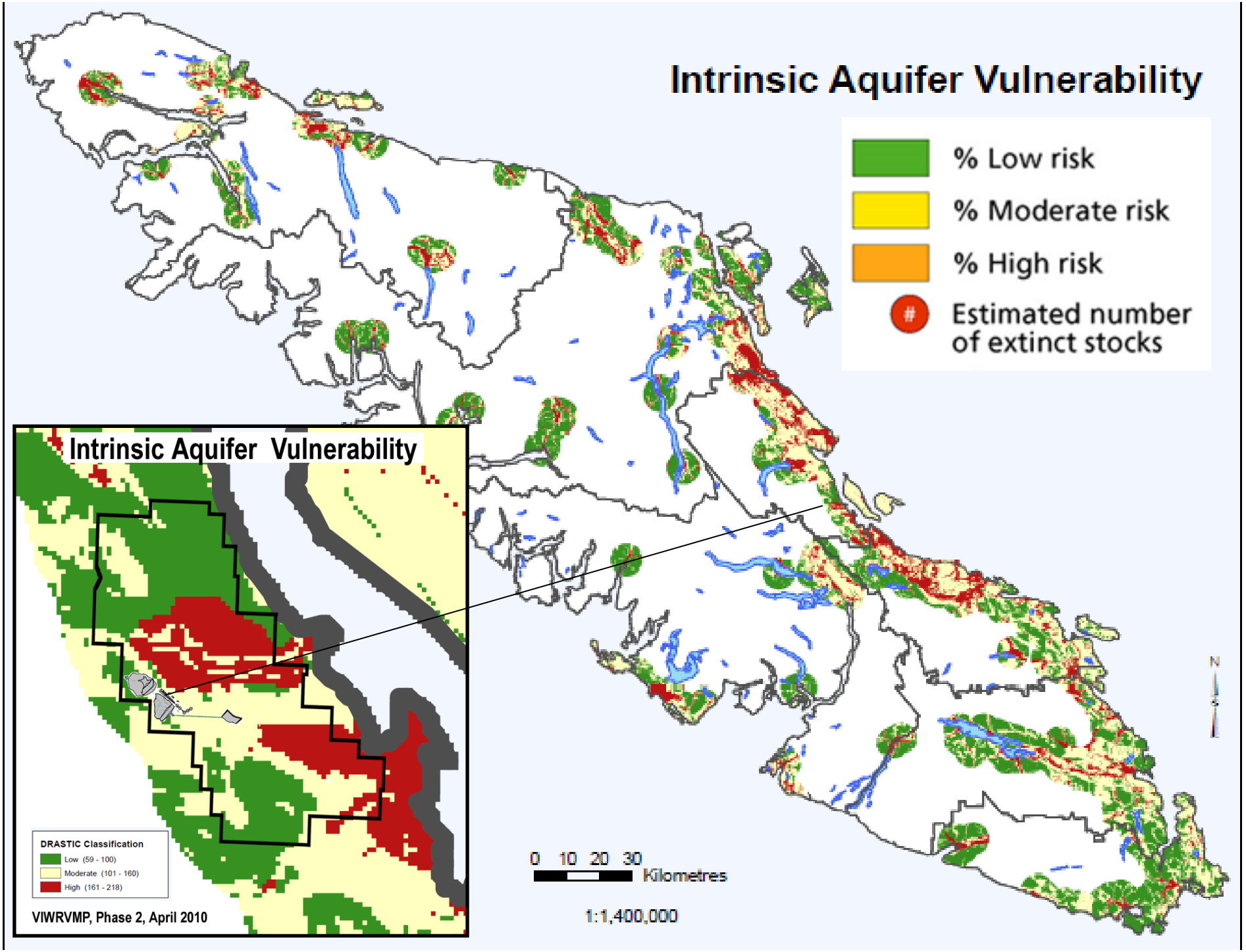
- The Halalt First Nation are standing up to protect their water.
- The Okanagan Indian Band is protecting Browns Creek watershed, the source of their drinking water.
- The Tsilhqot'in are fighting to protect their territory by opposing the draining of Teztan Biny by Taseko Mines
- The Tsay Keh Nay prevented the destruction of Amazay Lake from the proposed Kemess North project
- First Nation actions are for the health of their children's children

Some BC Water Initiatives

- waterbucket.ca, water sustainability in BC
- livingwatersmart.ca, provincial gov't initiatives with respect to BC Water Act modernization
- livingrivers.ca, provincial gov't watershed recovery initiative
- BC Lake Stewardship Society, www.bclss.org
  → Conference, June 5 & 6, Duncan
- Pacific Streamkeepers Federation, www.pkfs.ca
- Vancouver Island Water Resource Vulnerability Mapping Project, web.viu.ca/groundwater/

Intrinsic Aquifer Vulnerability

- Vancouver Island Water Resource Vulnerability Mapping Project
- Uses DRASTIC model for vulnerability factors
  - D Depth to water
  - R net Recharge
  - A Aquifer medium
  - S Soil medium
  - T Topography
  - I Impact of the vadose zone
  - C hydraulic Conductivity


Intrinsic Aquifer Vulnerability
% Low risk
% Moderate risk
% High risk
# Estimated number of extinct stocks
Intrinsic Aquifer Vulnerability
DRASTIC Classification
Low (59 - 100)
Moderate (101 - 160)
High (161 - 218)
VIWRVMP, Phase 2, April 2010
0 10 20 30
Kilometres
1:1,400,000
N

Rivers & Flows
Cowichan River

Campbell: 1755
Nanaimo: 821
Tsable & Trent: 82
Black Creek: 81
Goldstream: 49

Watershed: 930 sq. km.

Mean Annual Discharge (MAD): 55 m3/s

Summer: 15.7% of MAD, or 8.64 m3/s

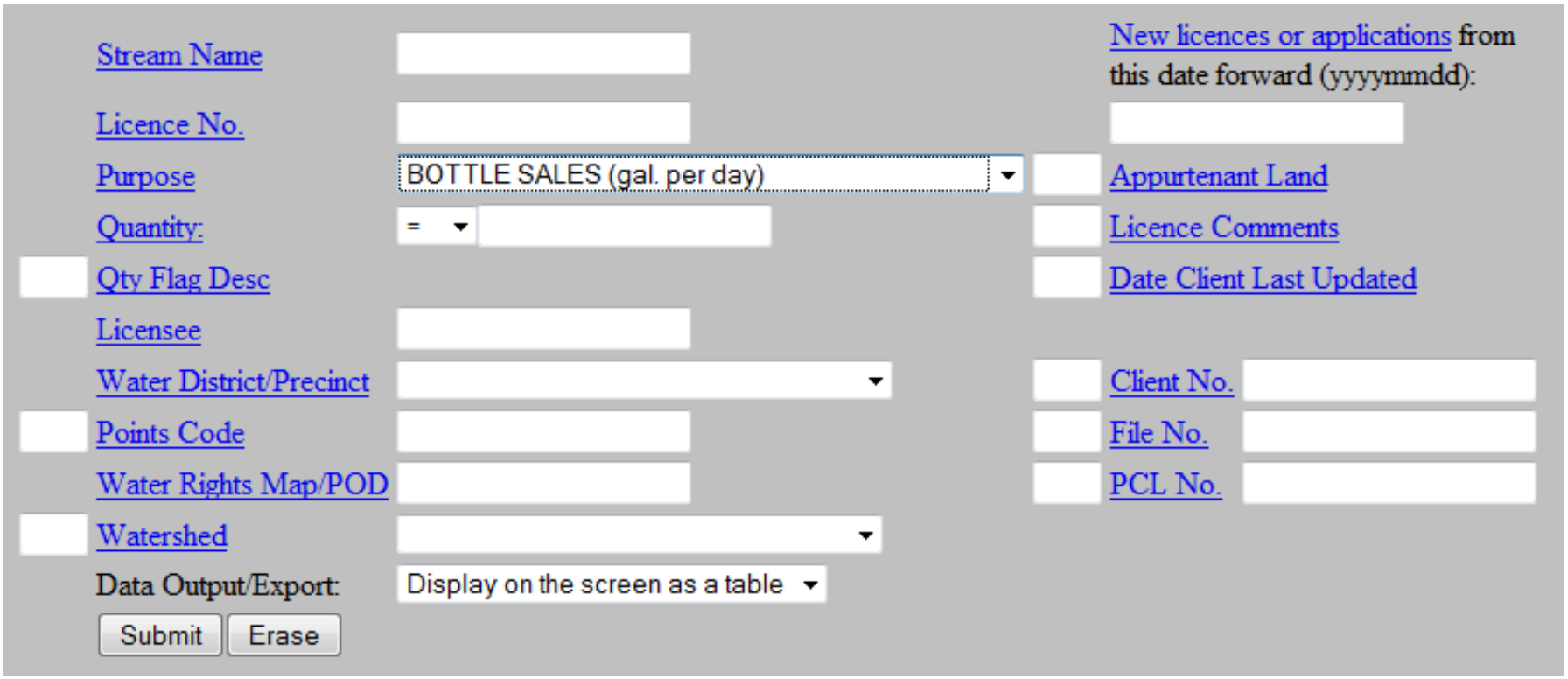
Recent summer flow: 2.77 m3/s, 15Aug2004

Catalyst permitted to remove 2.83 m3/s

Water Licenses

Water Stewardship Branch, Ministry of Environment

http://a100.gov.bc.ca/pub/wtrwhse/water_licences.input



Licence No	WR Map/ Point Code	Stream Name	Purpose	Quantity	Units	Qty Flag	Rediv Flag	Licensee	Water District/Precinct	Licence Status	Process Status	Priority Date	Issue Date
C067564	92.K.038 C (PD45328)	Alpine Creek	Bottle Sales	99726.027	GD	T	N	WATERMARK BEVERAGES INC. 8591 FRASER ST VANCOUVER BC V5X3Y1	VAN - JERVIS	Current	Sec. 18 Amendment	19870226	0
C069971	92.K.076 B (PD45336)	Mellersh Creek	Bottle Sales	10000	GD	T	N	CARTER WILLIAM R ET AL 134 V9					
C120164	92.K.038 B (PD45327)	Alpine Creek	Bottle Sales	60000	GD	T	N	ICE C/C ST					01
C120165	92.K.038 B (PD45327)	Alpine Creek	Bottle Sales	40000	GD	T	N	ICE C/C ST					01
"	"	Alpine Creek	Domestic	1000	GD	T	N	ICE C/C ST					01
Z124407	92.K.076 (PD82401)	ZZ Creek (67863)	Bottle Sales	24750	GD	T	N	CH 10 V1					
Z124408	92.K.076 (PD82404)	ZZ Creek (82403)	Bottle Sales	24750	GD	T	N	CH 10 V1					
Z124409	92.K.076 (PD82406)	ZZ Creek (62909)	Bottle Sales	24750	GD	T	N	CH 10					

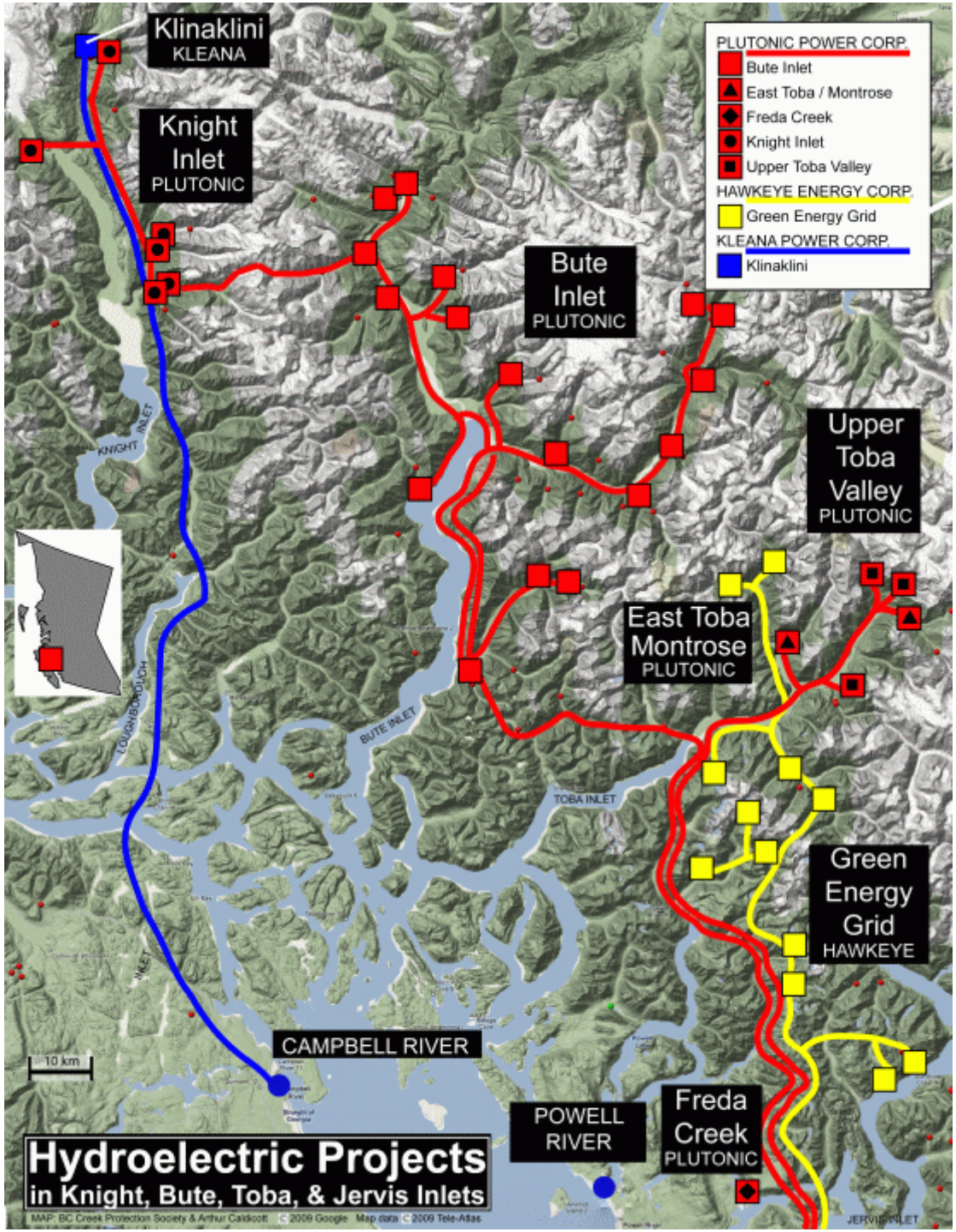
Bottle sales

- 61 applications or licenses
- 9,300,000 gallons per day =
- 35,000 m3/d or 0.4 m3/s

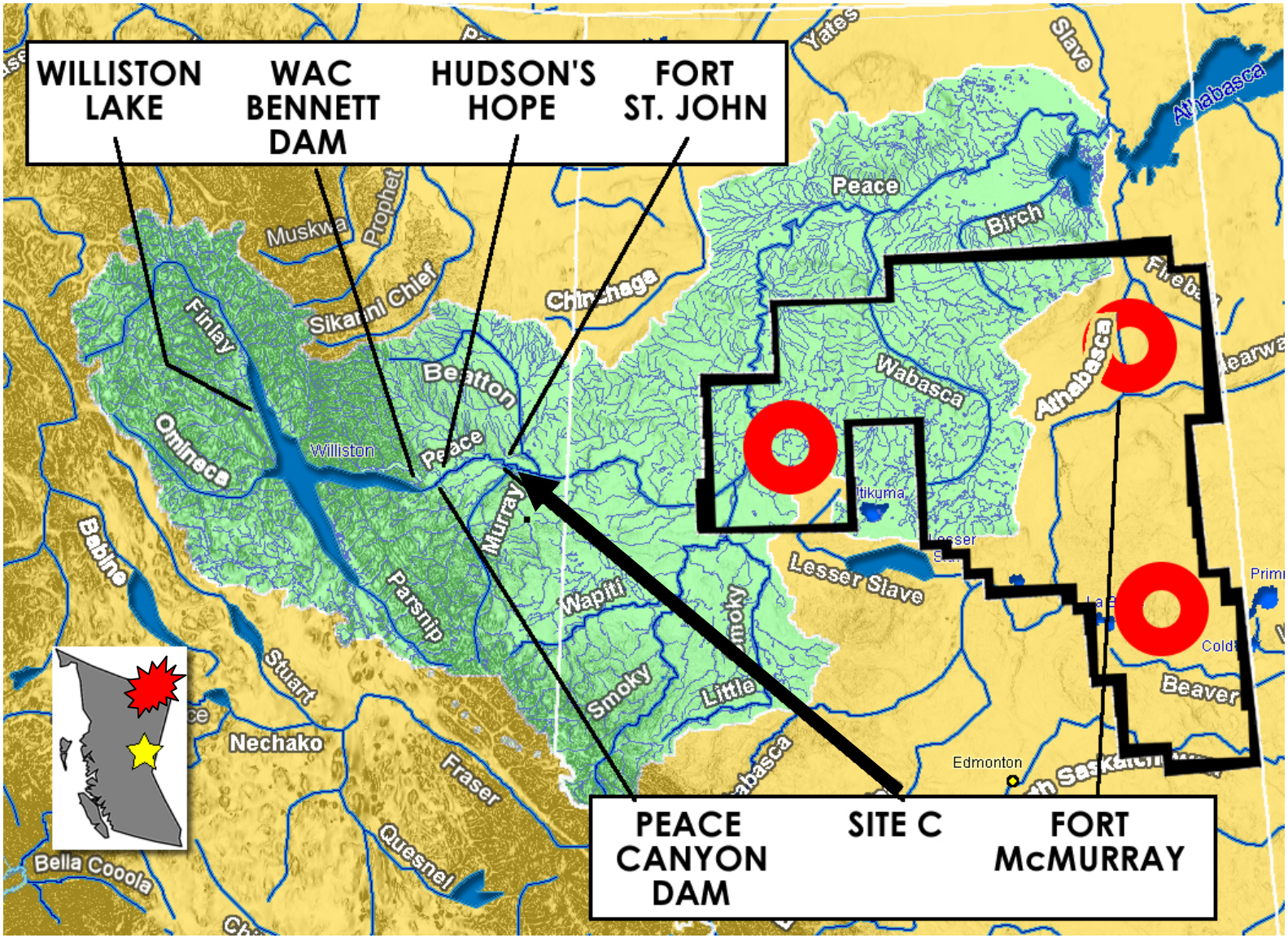
River Diversion Energy Projects

700+ applications for water power rights since 2000

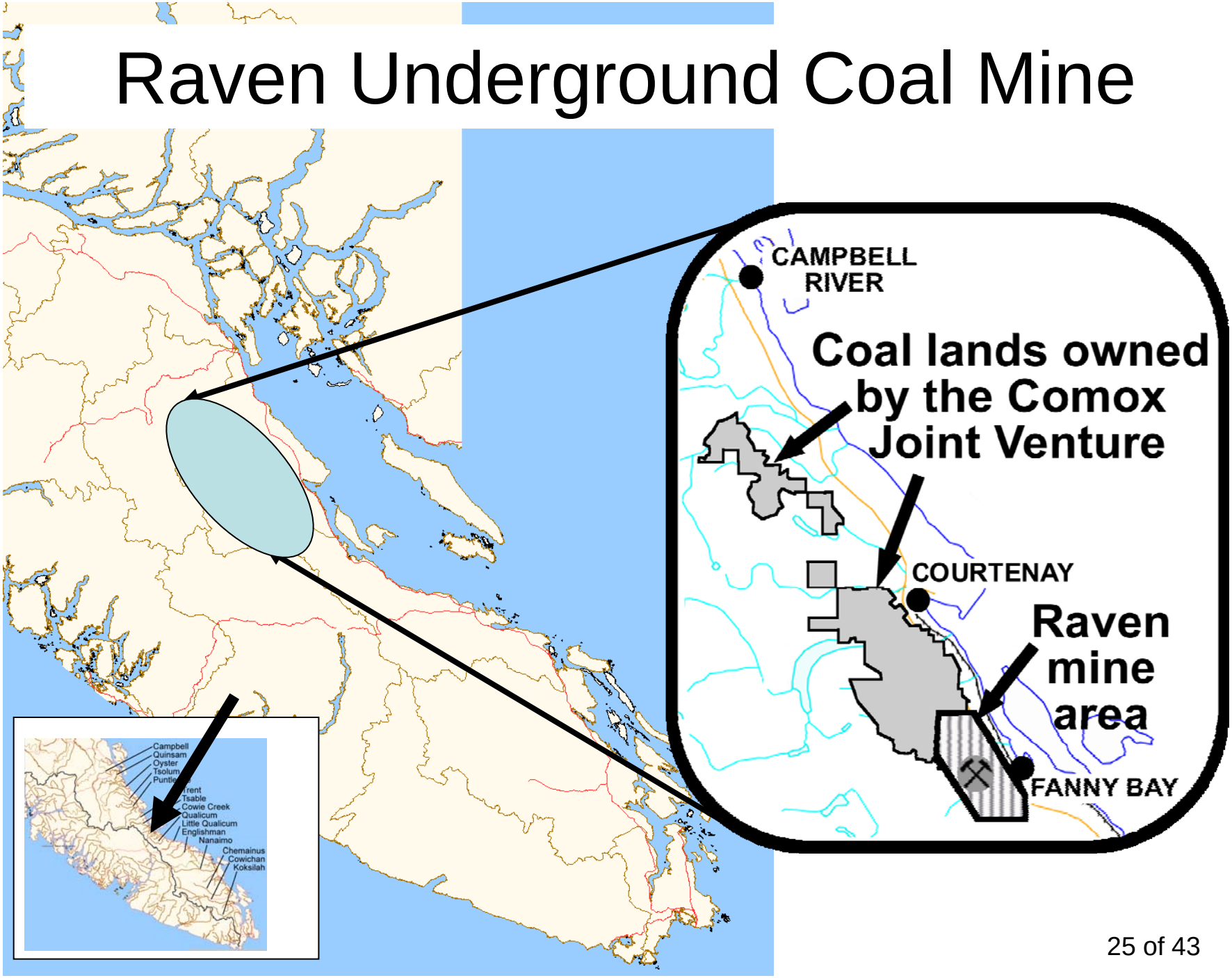
Watersheds in Peril



Williston Lake & Peace River

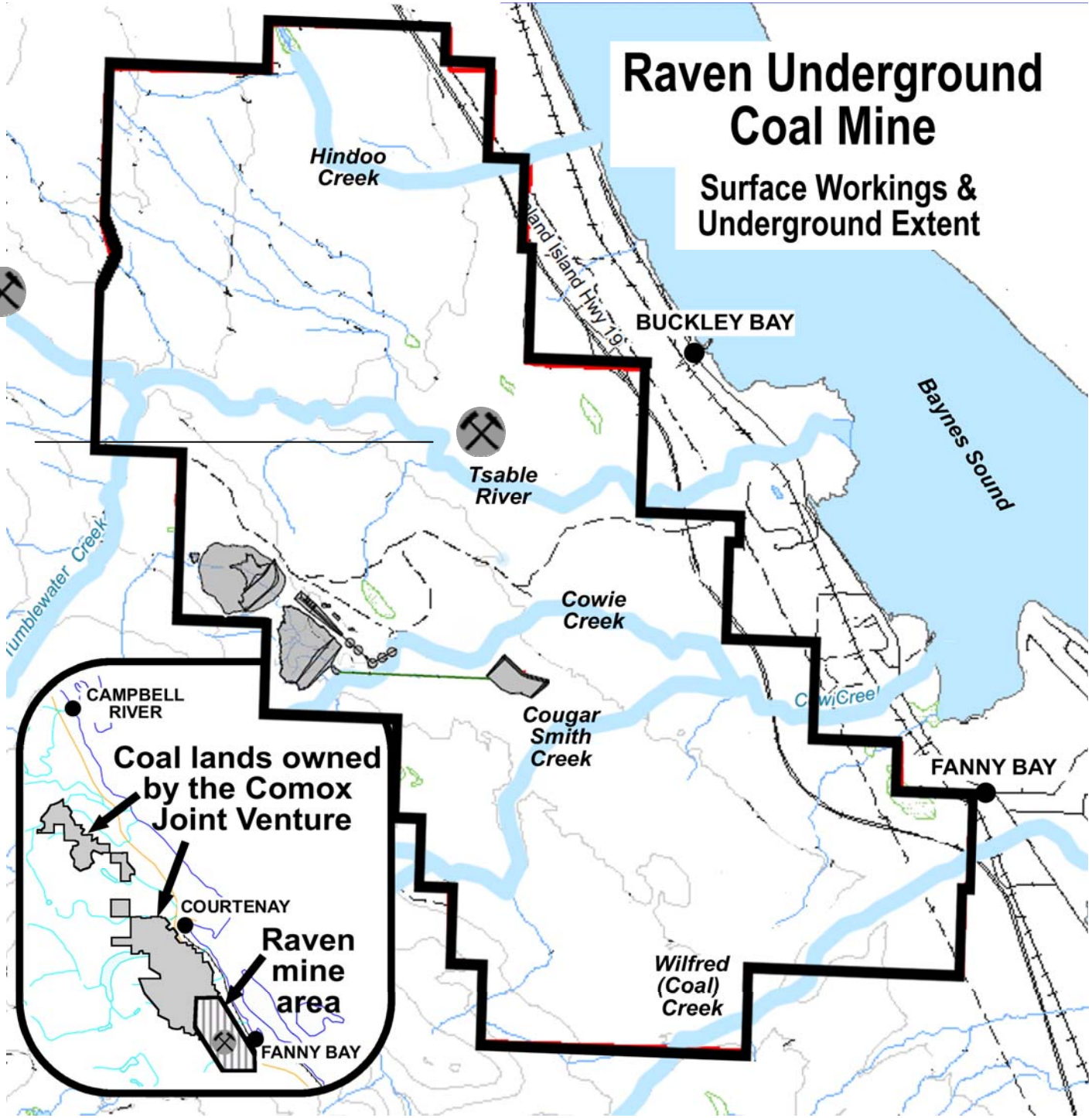


Raven Underground Coal Mine



Tsable River Coal Mine 1946-1966

Baynes Sound Coal Mine 1875-1877



Project Details

- 2.2 million tonnes (MT) per year for 20 years
- ground ore washed in magnetite bath

THERMAL
- 1.5 MT “clean coal”
- 0.7 MT of waste

METALLURGICAL
- 0.88 MT clean coal
- 1.32 MT waste

- coal likely to be shipped out of **Port Alberni**, Duke Point, or Middle Point (Campbell River)
- **truck** (4 per hour 42 tonne B-train trucks, 7x24)
- rail is unlikely option because of cost

Some viability factors

- Coal quality
- High sulphur
- Poor markets for thermal coal
- Cost per tonne
- Feasibility study

- Cautionary case study: Willow Creek Mine

BC Environmental Assessment 1

BC Environmental Assessment Office (EAO)

http://tinyurl.com/ygls986

Pre-Application Stage

draft Application Information Requirements (CJV)
- submitted December 2009

- public comment period of draft AIR (40 days)
  - mid-June at earliest, more likely summer
  - at this stage, new issues can be introduced

- EAO issues final AIR
- Application & Environmental Impact Statement
  - could take months to years

BC Environmental Assessment 2

Application Stage

- once accepted by EAO, the EA Act specifies that the EA must complete in 180 days
- can be extended by EAO (& proponent)
- one public comment period up to 60 days
  - cannot introduce new issues, but can introduce evidence regarding statements, methods, proposal details in App.
- at end of 180 days, EAO issues report and recommendations
- ministers have 45 days to make decision
- most likely to be a harmonized assessment

BC Environmental Assessment 3

Rachel Shaw - Project Assessment Manager

(250) 387-2174, Rachel.Shaw@gov.bc.ca

What the EAO does NOT concern itself with:

- project economics
- coal markets
- “need” for the project
- greenhouse gas emissions from the coal
- permit conditions (not seeking concurrent review)

Other new BC coal mines

Pre-application stage at EAO

- **Gething**, 2006, NE BC, 2 mt/a, Naishun Liu
- **Horizon**, 2005, NE BC, 1.6 mt/a, Hillsborough Res.
- **Line Creek**, 2009, SE BC, 2.6 mt/a, TeckCominco
- **Lodgepole**, 2006, SE BC, 2 mt/a, Cline Mining
- **Mt. Klappan**, 2004, NW BC, 1.5 mt/a, Fortune Coal

Application stage at EAO

- **Roman**, 2007, NE BC, 2-4 mt/a, Peace River Coal

Approved

- **Brule**, 2006, NE BC, 2 mt/a, Western Canadian Coal
- **Hermann**, 2006, NE BC, 1 mt/a, WCC
- **Wolverine**, 2005, NE BC, 3.5 mt/a, WCC

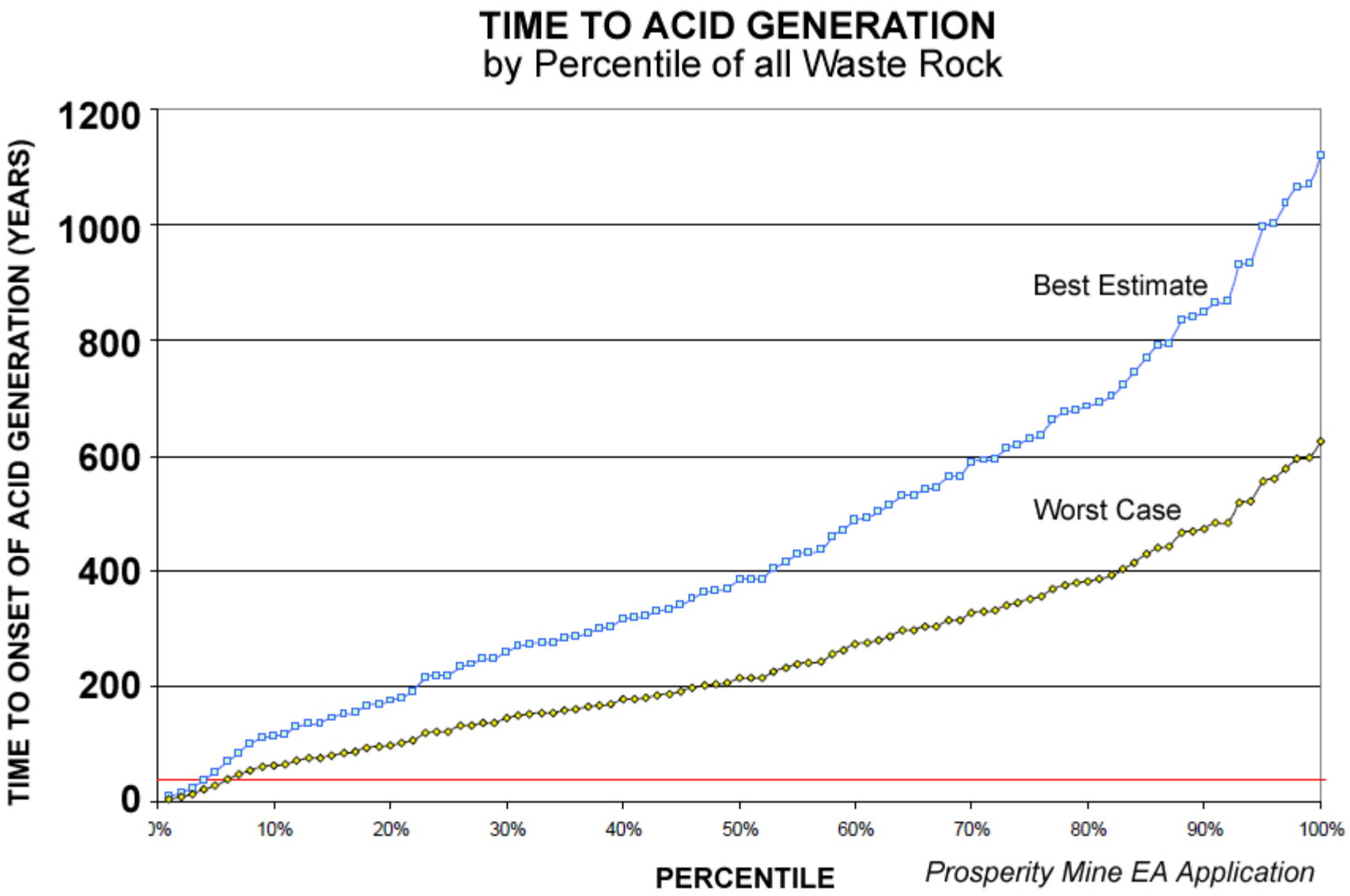
Operating | Active Process

Local & Regional Impacts

- operation noise (blasting, coal removal)
- trucks (3 per hour each way, 24 hours per day)
- dust and other airborne substances
- groundwater removal from coal
- methane removal
- water for washing coal
- waste/refuse/acid leaching & runoff
- salmon, esp. in Cowie Creek, Tsable River
- Baynes Sound shellfishery

Acid Mine Drainage (AMD)

- aka Acid Rock Drainage (ARD)
- sulphuric acid formed when sulphides in rock are exposed to air and water
- acidifies surrounding environment
- leaches toxic metals out of rock
- unleashes acidophilic bacteria
- most toxic legacy of mining
- a very long term problem


TIME TO ACID GENERATION
by Percentile of all Waste Rock
TIME TO ONSET OF ACID GENERATION (YEARS)
1200
1000
800
600
400
200
0
Best Estimate
Worst Case
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
PERCENTILE
Prosperity Mine EA Application

Quinsam Mine

An Environmental Investigation of the Quinsam Watershed, April 2010

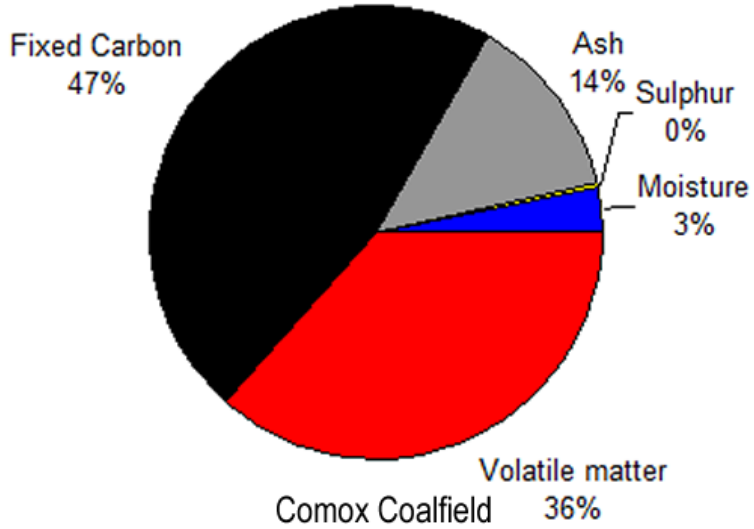
Dr. William R. Cullen and Vivian W.-M. Lai, UBC

"Arsenic concentrations are elevated in Long Lake as a result of acid rock drainage and other chemical process associated with mine waste.

	Arsenic	**Magnesium**
Guideline levels:	11-20 ppm	460 ppm
Long Lake level:	630 ppm	28,000 ppm

Global impacts
Atmospheric Carbon

1.5 million tonnes of Raven coal will produce approximately **3 million tonnes of CO2***



***Molecular weight**
- carbon = 12 g/mol
- carbon dioxide = 44.01 g/mol
- 1 tonne of carbon = 3.66 tonnes of CO2

Assuming coal is 83% carbon from fixed carbon + volatiles.

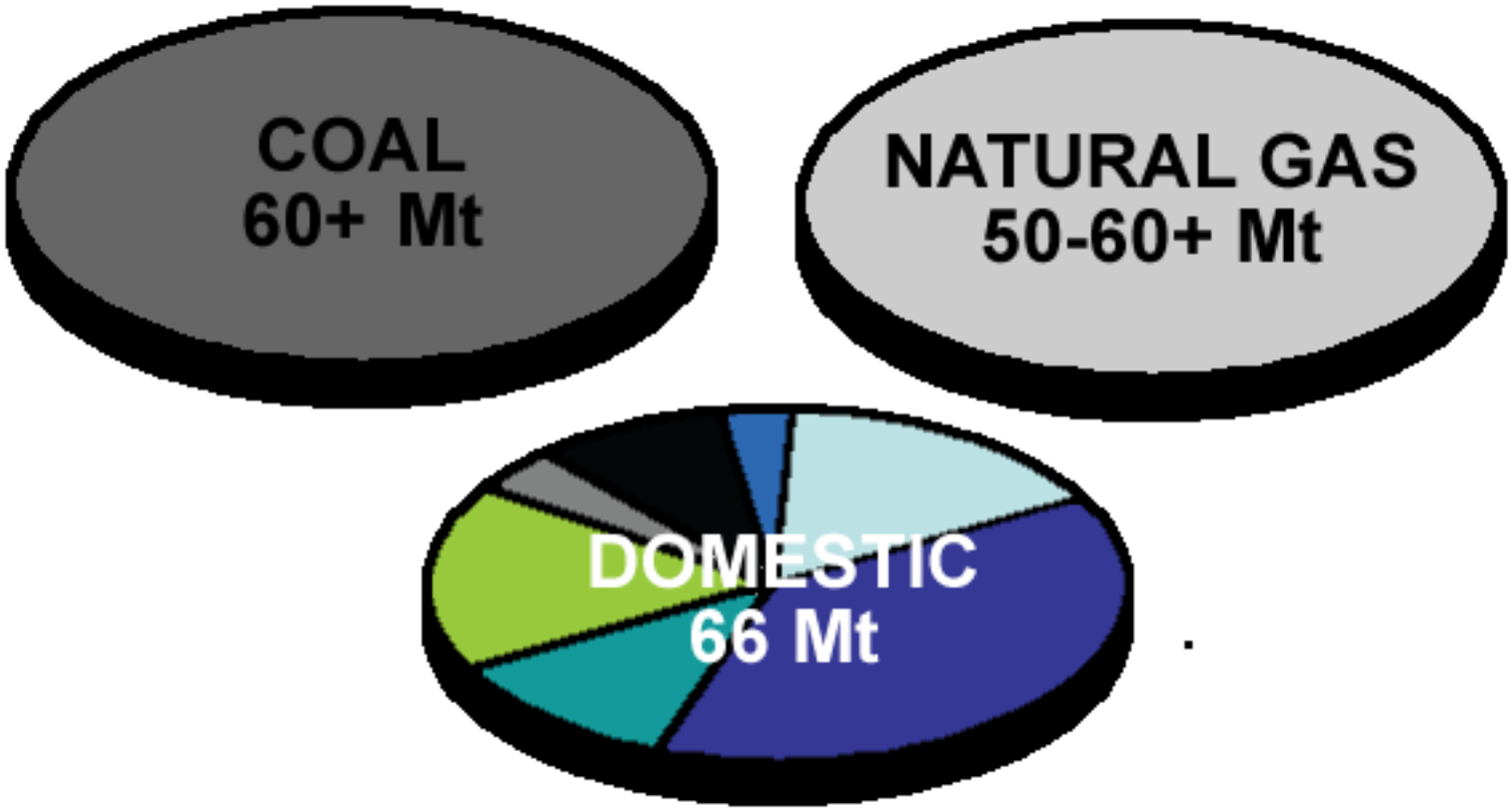
Strongest issue for other British Columbians

Phuket, Thailand, Dec 2004

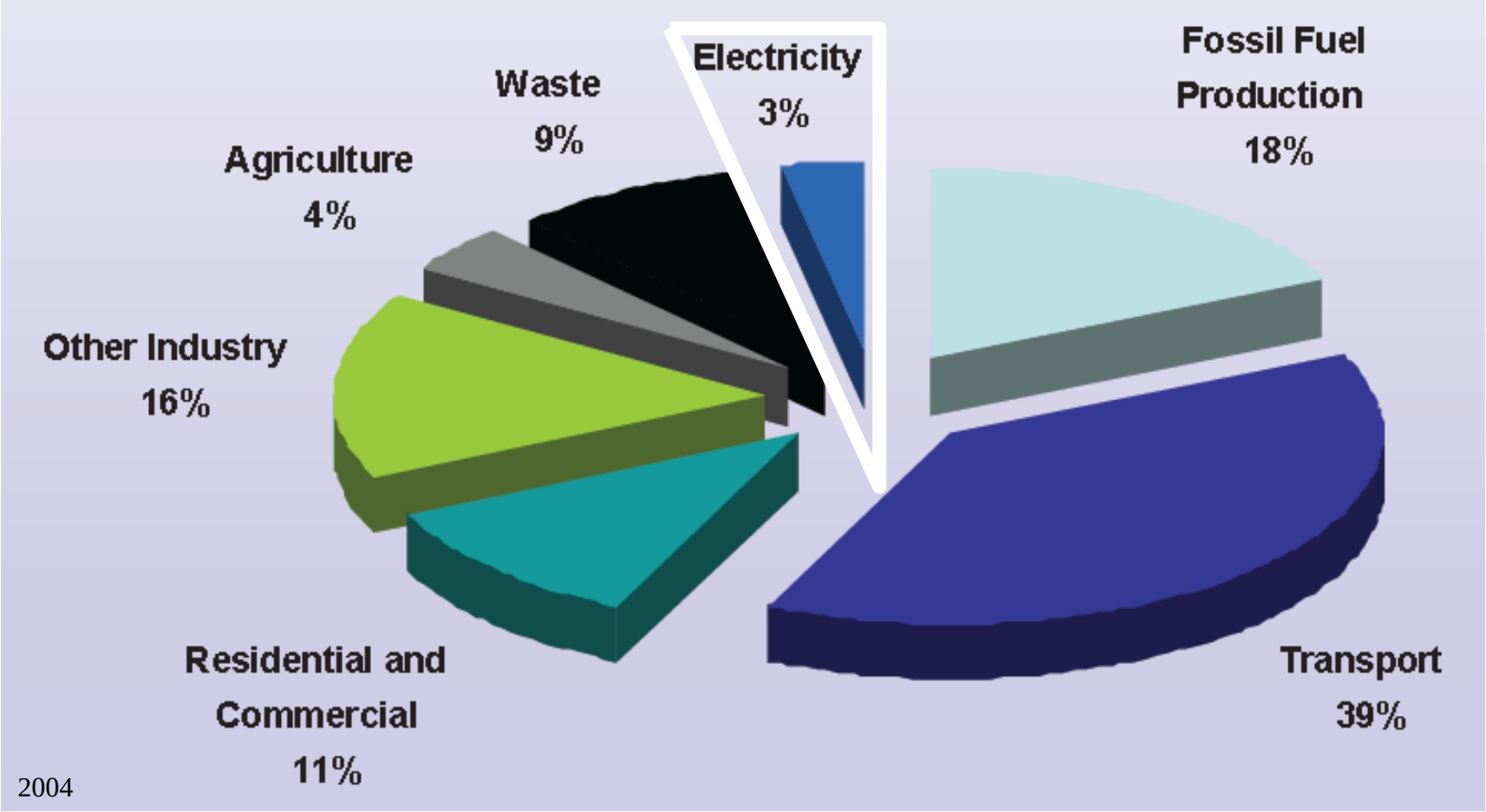

PACIFIC ECONOMIC SUMMIT
VANCOUVER, BRITISH COLUMBIA

BC's Global Carbon Contribution

175-200 million tonnes (Mt)



BC's Greenhouse Gas Emissions
2005 = 66 million tonnes




2
1

Thank-you

Arthur Caldicott

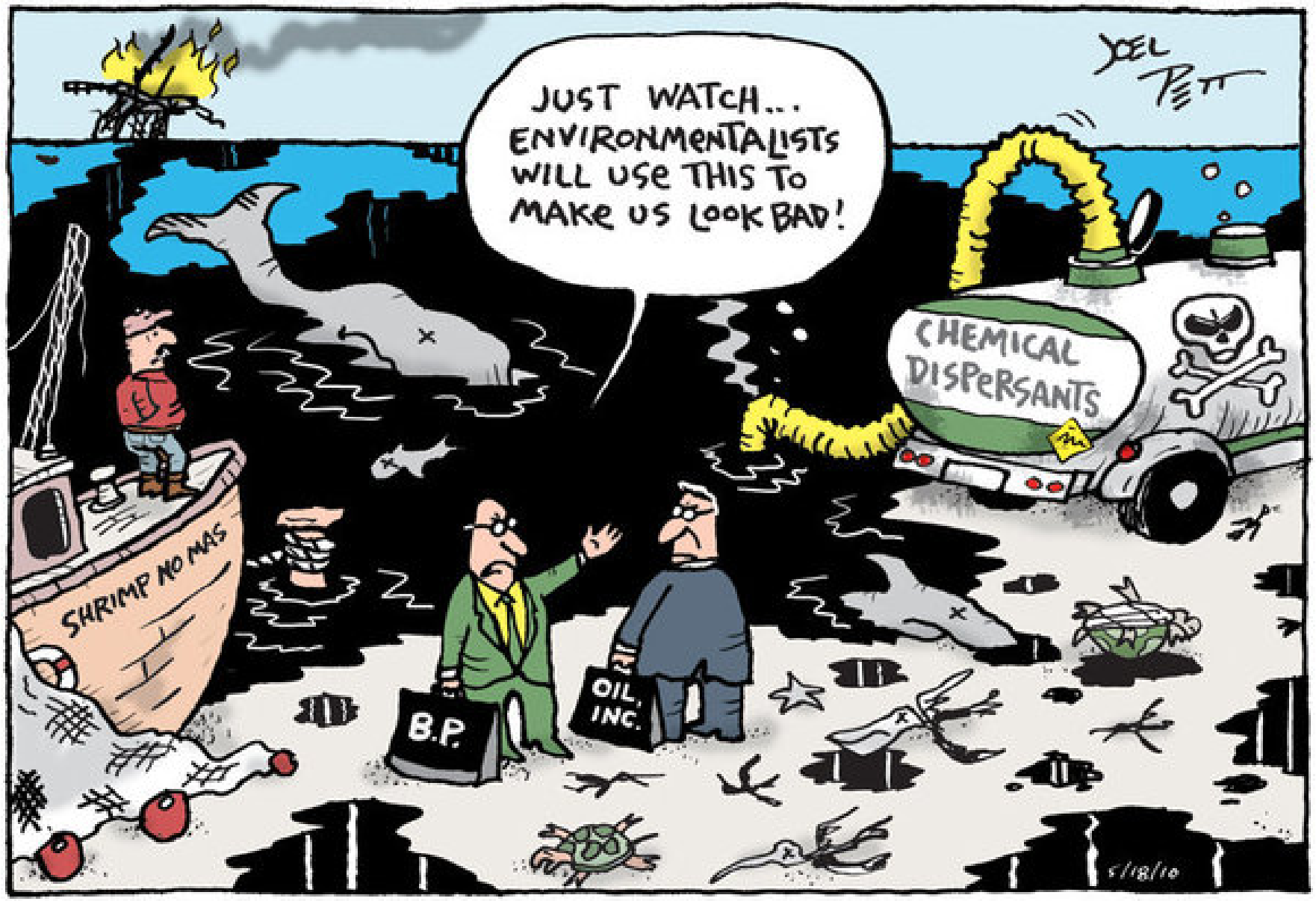
arthurcaldicott@sqwalk.com

www.sqwalk.com

250-384-5551

Tapped Out
Todd Butler

www.coalwatch.ca **info@coalwatch.ca**


JUST WATCH... ENVIRONMENTALISTS WILL USE THIS TO MAKE US LOOK BAD!
JOEL PETT
CHEMICAL DISPERSANTS
SHRIMP NO MAS
B.P.
OIL INC.
5/18/10