

## Getting Inside Source Water Protection Zones



## Getting Inside Source Water Protection Zones

### Acknowledgements:

My thanks to  
DWK RDNO DLC BMID GEID for data  
OBWB for funding several projects




*Purpose of this presentation*

*The 80% rule*

- Intake Protection Zone
- Protect the area a contaminant could travel in 2 hours under 80% of the wind events expected in a year
- Exclude new stormwater outfalls, multi-slip marinas, houseboat boon docking, floating commercial space, etc.
- Riparian Protection Zone
- Create default 85 m vegetated protection zone around reservoir lakes and their transmission creeks to protect against 80% of nutrient and sediment contribution
- Zone should be “no build no disturb no machine”
- Burden of proof for exemption lie with proponent
- Full cost-accounting for proposed activities in watersheds. Buy-back policy on key properties should be considered

BC is seriously  
behind the rest  
of the world



Do we have a problem  
already??

*What does source protection look like?-urban low elevation*

*Not everyone sees source water the same way...*



THE BEACH HOUSE

*What does source protection look like?-urban low elevation*

*Incremental losses of riparian integrity*





## What does source protection look like?-urban low elevation

### Incremental losses of riparian integrity



## What does source protection look like?-urban low elevation

### What does source protection look like?-urban low elevation

www.kelownacapnews.com

NEWS

Wednesday, June 23, 2010 capital news A3

▼ KELOWNA

## Authorities quick to control gasoline leak into lake



**JENNIFER SMITH**  
STAFF REPORTER

A gasoline leak from a land-based tank had the City of Kelowna, the fire department and Petro-Canada staff hopping Monday morning as fuel spilled into Okanagan Lake.

It is not known exactly how much gasoline leaked into the water, but city staff say they believe they caught it early and are hoping the damage is minimal.

"We discovered a very small leak, actually in the wall taking the shore," said Todd Cashin, City of Kelowna's environment director.

To the point where city officials were called in, Cashin said he believes the spill only contained about a water bottle's worth of gasoline, perhaps 200 millilitres, although, all of the levels are still under investigation.

The municipality was contacted by concerned citizens who smelled gas in the downtown area at approximately 8 a.m., and city crews were on scene almost immediately.

The Integrated Land Management Bureau, the provincial Ministry of Environment and the federal Ministry of Environment were all contacted as fire crews set up a boom and absorbent pads to contain the spill.

While the exact source of the leak is under investigation, the city could say the spill's source is traced to a fuel tank used

by Kelowna Marina that Kerry Park. Details on why the tank is not so forth have yet to be confirmed by Cashin.

The site is complicated by an intricate network of docks, so the crews would need to go slowly to ensure they don't damage the most sensitive areas.

A Petro-Canada truck is being used to remove the remains of the tank Monday morning, early, but crews are still to ascertain whether fuel has leaked into the ground and caused the leak.

Fire crews used a cement to stem the leak spill since arrival.

Unfortunately, gasoline is not absorbent, does drift by, meaning a clean-up is required.

Kerry Park sits right next to Stuart Park where the shoreline is being restored. Tuesday was that it entirely protected.

City officials said they would be following up on the exact source of the leak.

www.kelownacapnews.com

NEWS

▼ POPLAR POINT JULY 15 2009

## Waste oil dumped into Okanagan Lake

The Kelowna Fire Department was called early Monday morning to respond to an apparent oil spill in the city's north end.

The oil spill was first spotted at 7:30 a.m. at the Poplar Point area of Okanagan Lake.

On arrival of the initial response crew, the fire department discovered that vandals had taken oil containers and spilled the contents on a barge and in the water around the barge.

With the assistance of the fire department and the Marine Rescue spill response trailer, oil booms and spill pads were distributed along the 200-foot area of the shoreline.

The provincial ministry of environment and the RCMP were also alerted.

Assistant fire chief Bryan Collier said it appears that 20 litre pails of hydraulic oil and motor oil were taken to the area and dumped.

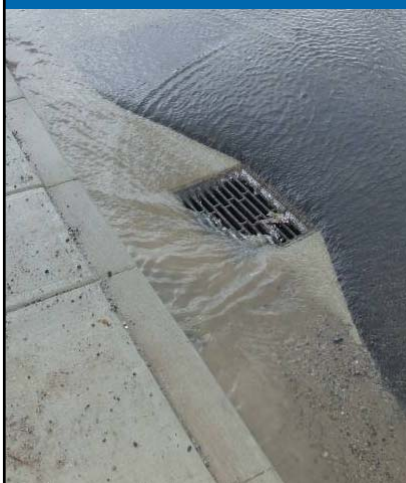
**What does source protection look like?-urban low elevation**

**Flying cows and dump-gulls**



**What does source protection look like?-urban low elevation**

**Questions and Hypotheses**



*What does source protection look like?-urban low elevation*

*Creek plumes (stormwater)*



*What does source protection look like? – upper elevation*

*Dirt bike damage L and “fixed” R*





*What does source protection look like? – upper elevation*

*Dirt bike trail failure*



*What does source protection look like? – upper elevation*

*Multiple-use reservoir shorelines*



*What does source protection look like? – upper elevation*

*Multiple-use watersheds – human vector for disease*



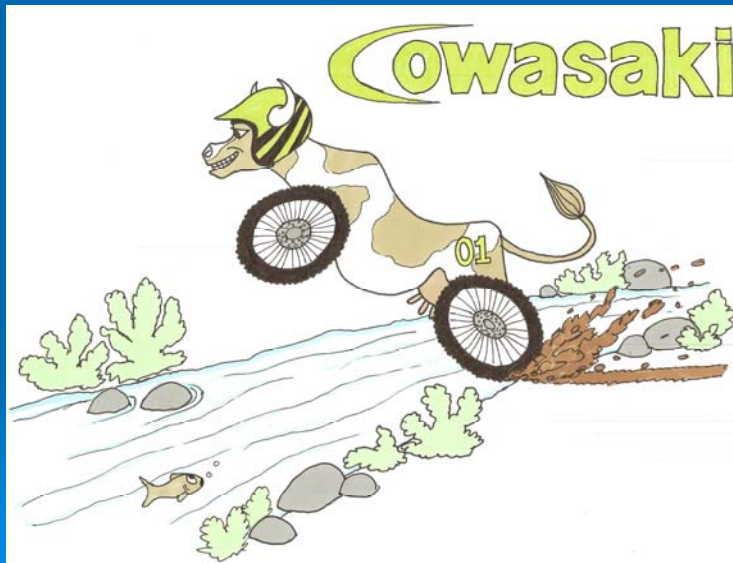
*What does source protection look like? – upper elevation*

*Imported scat and attitude*





*What does source protection look like? – upper elevation*



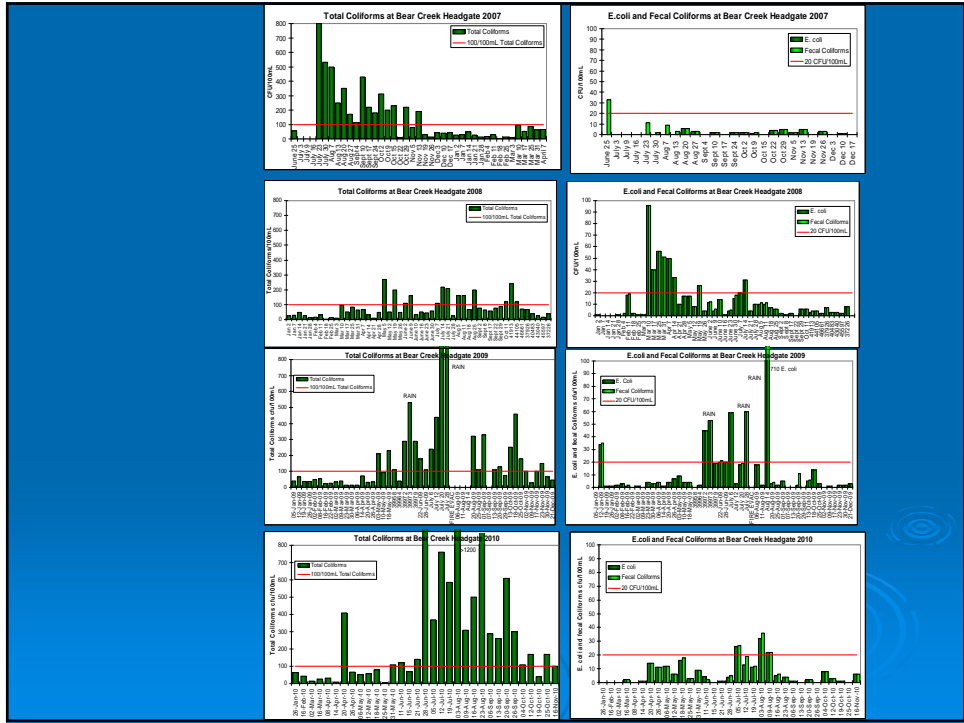
*What does source protection look like? – upper elevation*

*Recreational activities are a disease vector*



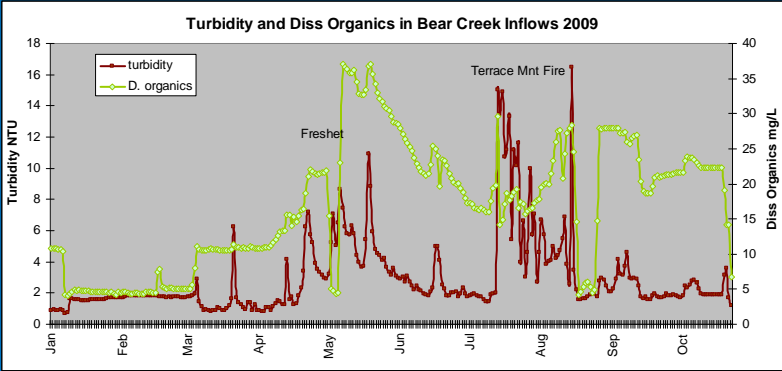
Experts in waterborne disease in B.C. identified recreational activities in watersheds as the main sources of human fecal contamination of community water sources. Beavers and muskrat were most often identified as wildlife sources of waterborne disease. From there disease transmission between animals, erosion sedimentation and altered runoff patterns accelerate the spread of waterborne diseases once they are introduced.

(Influence of Range Practices on Waterborne Disease Organisms in Surface Water of B.C. Newman et al, 2003)



*What does source protection look like? – upper elevation*

*Wildfire fall-out*



*What does source protection look like? – upper elevation*

*Extent of Rose Valley Wildfires 2005 (L) and 2009 (R)*





*Rose Valley Wildfire 2005*



*Rose Valley Wildfire 2005*



*Rose Valley Wildfire 2009*



*Rose Valley Wildfire 2009*





## Source Protection Zones Provides:

-Safer water for all uses:

- drinking water
- Habitat
- Recreation
- Residential
- Less cost to run advanced treatment
- Reduced health risk to consumers
- More aesthetic value as drinking water
- Supports filtration deferral
- SAVES MONEY

➤ BUT: How BIG should they be?



*How big should a source protection zone be?*

*What to measure*

water currents

potential contaminants

fall rates

1 minute settling



12 hours settling



150 hours settling



Okanagan Lake Drogue Trials 2009



White Line = 5 m drogue  
Blue Line = 10 m drogue  
Yellow Line = 20 m drogue  
Circle = start point

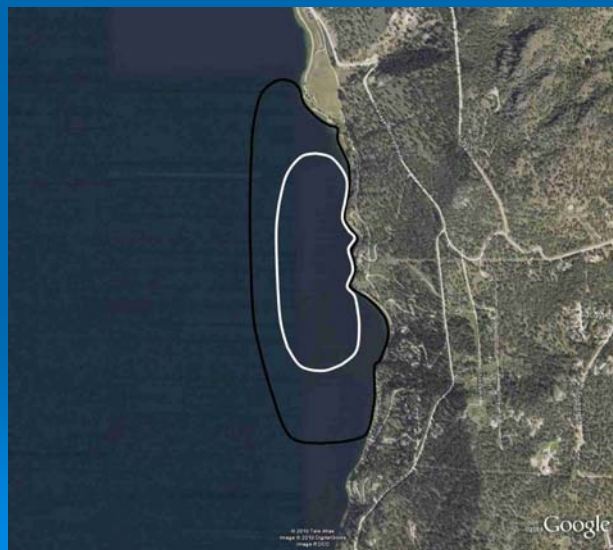
*How big should a source protection zone be?*

*Intake Protection Zone Criteria*

The IPZ includes the area water currents can travel in **2 hours**, under **80% of the wind events** expected in 1 year (NOT storms)

*How big should a source protection zone be?*

*Example Intake Protection Zone*



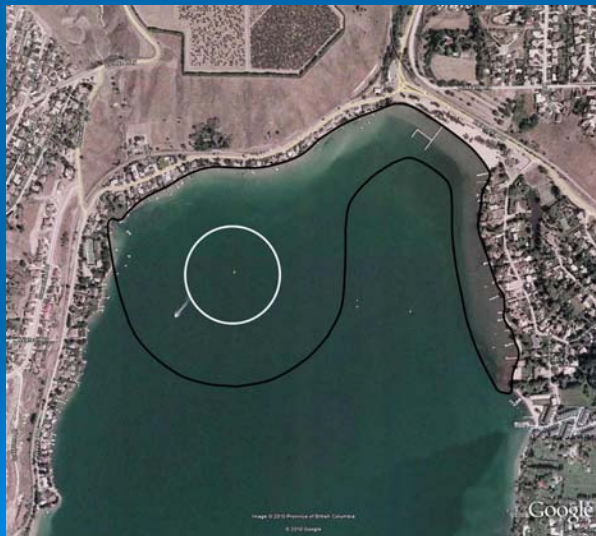
*How big should a source protection zone be?*

*Example Intake Protection Zone*



*How big should a source protection zone be?*

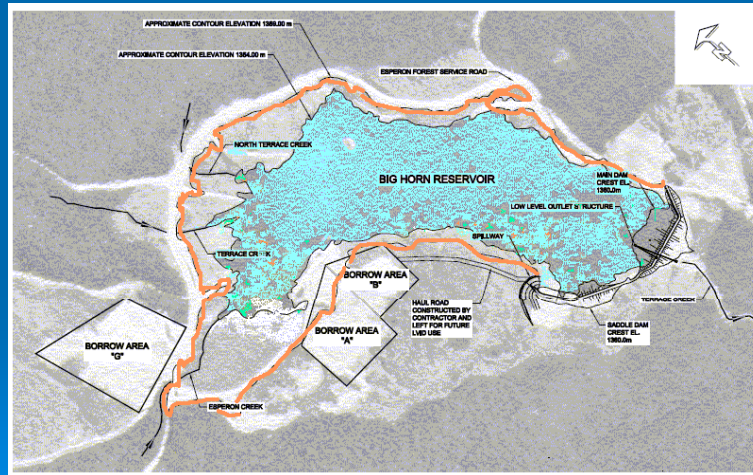
*Example Intake Protection Zone*





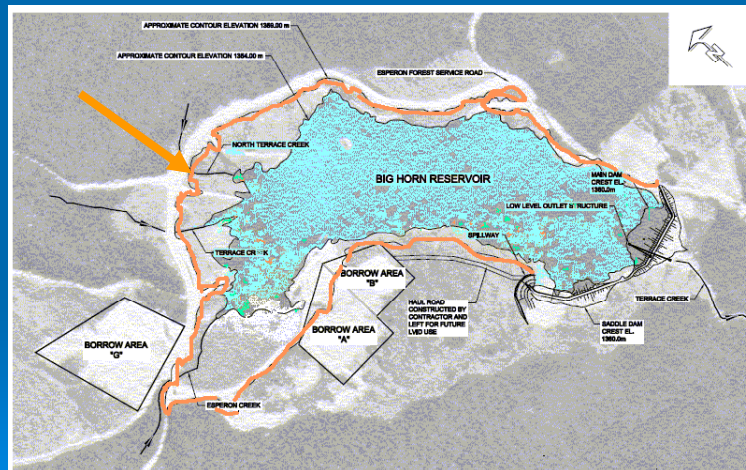
*How big should a riparian protection zone be?*

*Current protection zone = 1 m above high water*



*How big should a Reservoir Protection Zone be?*

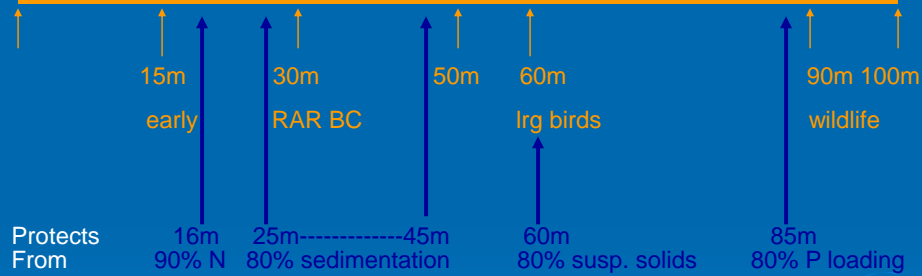
*Current Protection Zone*



## How big should a reservoir protection zone be?

### Reservoir (riparian) Protection Zones –Elsewhere

No build / no disturb /no equipment vegetated buffer along watercourses



(Depending on slope, soil type, climate, vegetation, regulators, etc. etc.)

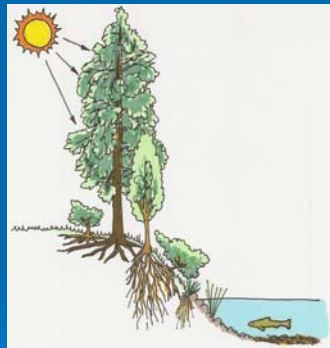
The effectiveness of riparian setbacks at removing sediments is directly related to their width.

Sources: Province of Alta, B.C., Wisconsin Forest Management guidelines, Delaware River Basin Commission, Chargin River Watershed Partners (Wong & McCuen, 1981 in Divilbiss, 1994.) (Jacobs & Gilliam, 1985.) (Desbonnet et al., 1994.)

## How big should a riparian protection zone be?

### Questions and Hypotheses

#### ➤ Riparian Zone



- Propose a default RPZ width...85m subject to QEP for expansion or contraction to not less than ....30 m
- Burden of proof for contraction lies with proponent
- No build No disturb  
No motorized recreation

## How big should a riparian protection zone be?

### True cost accounting –water treatment?

- Value of watershed forested lands “filtration” estimated at billions/yr in N America
- Research found that approximately 1/3 of the world's 105 largest cities obtain a significant portion of their drinking water from protected areas. “Well-managed natural forests provide benefits to urban populations in terms of high quality drinking water.”
- Payments to landowners for protecting water quality are gaining global popularity, especially in China, Latin America and the United States, with ecosystem service transactions totaling \$US 9.3 billion in 2008, according to a report by [Ecosystem Marketplace](#)
- New York in process of buying back 35% of its watershed, focused on lands around its upstate reservoirs. They will spend one billion. Their Health Authority agrees that protecting water at its source is the single most effective way to maintain high quality water AND accepts the watershed protection plan in support of NY filtration deferral. Filtration for NY city would cost 10-12 billion.
- Individual loss due to a confirmed case of giardiasis -\$3,800/case. Total cost of actions to avoid giardiasis during an episode of contaminated water supply - \$1,300/household. Loss of business income due to an outbreak of Giardiasis (restaurants and bars) - \$18,000/establishment –Walkerton Inquiry

Harrington, Krupnick and Spofford, 1991

## How big should a protection zone be?

### True cost accounting –Land value increases

- Buffers provide a critical “right of way” for streams during large floods and storms. When buffers contain the entire 100-year floodplain, they are an extremely cost-effective form of flood damage avoidance for both communities and individual property owners. As an example, a national study of 10 programs that diverted development away from flood-prone areas found that land next to protected floodplains had increased in value by an average of \$10,427 per acre (Burby, 1988).
- Homes situated near seven California stream restoration projects had a three to 13% higher property value than similar homes located on unrestored streams (Streiner and Loomis, 1996). Most of the perceived value of the restored stream was due to the enhanced buffer, habitat, and recreation afforded by the restoration.
- When managed as a “greenway,” stream buffers can expand recreational opportunities and increase the value of adjacent parcels (Flink and Searns, 1993). A greenway in Boulder, Colorado, was found to have increased aggregate property values by \$5.4 million, resulting in \$500,000 of additional tax revenue per year (Chesapeake Bay Foundation, 1996a).
- Effective shoreline buffers can increase the value of urban lake property. For example, a recent study of Maine lakes found that water clarity was directly related to property values. Specifically, a three-foot improvement in water clarity resulted in \$11 to \$200 more value per foot of shoreline property, potentially generating millions of dollars in increased value per lake (Michael *et al.*, 1996).
- TOURISM LOSS or GAIN

## How big should a protection zone be?

### Source Protection planning tools are already developed

#### RURAL

- Buy back key watershed areas
- License of Occupation or License for Community Purposes
- Grants to private land owners
- **EXAMPLE** Notice of Intention to Apply for a Disposition of Crown Land  
Take notice that **Columbia Shuswap Regional District of Salmon Arm BC**, intends to make application to Integrated Land Management Bureau (ILMB), Southern Service Region – Thompson Okanagan Service Centre, Crown Land Adjudication office, for a license for community purposes covering **unsurveyed Crown land being the bed of Mara Lake fronting Cambridge, Canterbury, Eton, Oxford, Swanson, Westminster and Windsor Roads, KDYD** situation on Provincial Crown land located in the vicinity of **Sicamous**.

#### URBAN

- • **Transferable development rights** or conservation easements
- • **Clustering developments**
- • **Density compensation** grants the landowner a credit for additional density elsewhere on the site, in compensation for developable land that has been lost due to a buffer or RAR
- • **Voluntary conservation easements** protect sensitive areas and buffers with a mutually negotiated perpetual conservation easement for tax savings to owner
- • **Buffer and lot averaging** - SOURCE [www.polytechnic.edu.na/academics/schools/.../Hydrology-](http://www.polytechnic.edu.na/academics/schools/.../Hydrology-)

## How big should a protection zone be?

### If IHA defines Filtration Deferral goalposts then \$\$\$ is easier

#### Intake Protection Zone

- Protect area a contaminant could travel in 2 hours under 80% of the wind events expected in a year
- Exclude new stormwater outfalls, multi-slip marinas, houseboat boon docking, floating commercial space etc.

#### Riparian Protection Zone

- Create default 85 m vegetated protection zone around reservoir lakes and their transmission creeks to protect against 80% of nutrient and sediment contribution (Top of bank, 100 yr floodplain preferred)
- Zone should be “no build no disturb no machine”
- Burden of proof for exemption lies with proponent
- Full cost-accounting for proposed activities in watersheds. Buy-back policy on key properties should be considered



Your thoughts??

Thank you

