A Historical View of DDT Use in the
Upper Okanogan River Basin

Lake Osoyoos Sediment Coring
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Project Team: Dave Serdar, Bill Yake, & Brandee Era-Miller

Purpose of Sediment Core:

- Sediment core for Osoyoos lake was part of the Okanogan River TMDL study for DDT and PCBs (2000 – 2001)

- To show the history of DDT and PCB occurrence in the upper Okanogan River basin

Methods:
Capturing a sediment core

- Our box corer was constructed by Ecology's Bernard Strong and Bill Yake and modeled after the USGS box corer design.

- The corer is lowered and lifted by a hydraulic winch from a boat.

- The corer can hold up to 85 lbs of lead weight to help push through sediments.

- It has spring-loaded jaws that snap shut after sediment penetration and hold the sediments in place.

- Calm conditions are necessary to ensure that the corer is straight.

Methods:
Deconstructing a sediment core

- The Osoyoos Lake core was almost a 'perfect' core – sediment occupied 46 cm of the 50 cm core.

- The core consisted of fine, clay-like sediments: brown at the surface and gray at depth.

- Sediments were pushed up from the liner with an extruder mechanism.

After the overlying water was drained off, successive 1-cm horizons were sliced off, placed in jars, and sent to the lab for analysis.
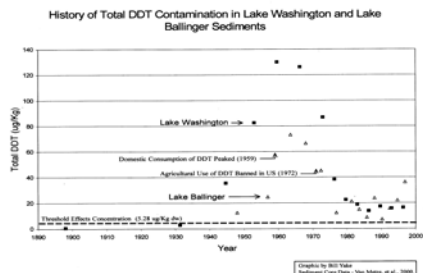
Horizons were analyzed for:
- TOC
- Lead 210
- DDT
- PCBs

Results: DDT in Osoyoos Lake

- Core dated back to 1917
- DDT concentrations rose sharply after 1945, peaked in 1976, and declined between 1976 and 1981
- Anomalous peak of DDT occurred in 1998 - 1999
- Except for the anomalous peak, DDT trend fits typical pattern

T-DDT (ng/g dw) in Osoyoos Lake Sediment Core
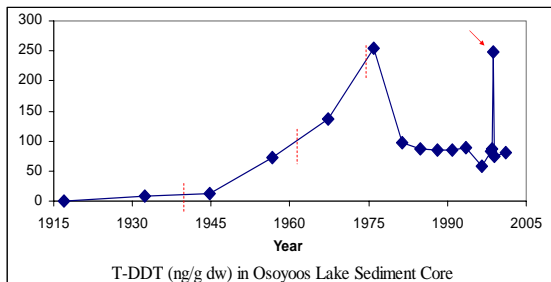
Example of Similar Results from Cores Collected by USGS

History of Total DDT Contamination in Lake Washington and Lake Ballinger Sediments
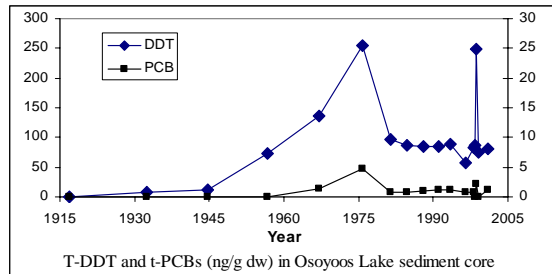

Results:
Why a DDT spike in 1998?

- Peak may represent a large disturbance of agricultural soils or spill/dumping of DDT in the late 1990s

- The sample was 39% 4,4'-DDT, whereas the rest of the samples were 5 – 15% 4,4'-DDT

- t-DDT breaks down into DDE and DDD in the aquatic environment, with the majority being DDE

- t-DDT breaks down much slower in agricultural soil

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Results: PCBs Compared to DDT

- PCB levels were low (~1 ng/g)
- PCB levels mirrored the DDT levels including the late 1998 spike
- No PCBs detected in sediments deposited prior to 1957
- PCB levels peaked in 1976 followed by sharp decline

T-DDT and t-PCBs (ng/g dw) in Osoyoos Lake sediment core

Results: Okanogan Sediment Core

- Core only reached back to 1981
- Figure shows only the tail end of typical DDT pattern
- DDT levels much higher in Lake Osoyoos than in lower Okanogan River (Similkameen River influence)
- PCBs follow same pattern as DDT

T-DDT and t-PCBs (ng/g dw) in lower Okanogan River sediment core

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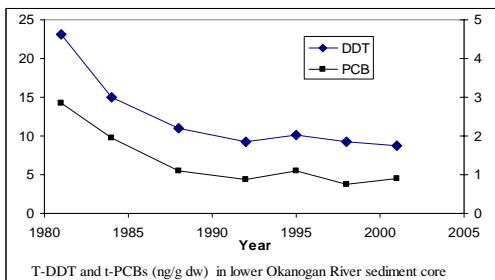
Conclusions

- Lake Osoyoos sediment core appears have a typical DDT pattern compared to other agricultural areas except for late 1990's spike

- DDT higher in Lake Osoyoos than in the lower Okanogan River – likely due to dilution of sediments with 'cleaner' Similkameen River sediments

- PCB levels were low in both cores but similar – may point to low-level PCB sources such as stormwater and wastewater treatment plants

For Further Information:

- Study available online @
  http://www.ecy.wa.gov/pubs/0303013.pdf

- Data from this study and other studies can be accessed from Ecology's Environmental Information Management (EIM) database online @ www.ecy.wa.gov/eim

- Brandee Era-Miller
  Email: Bera461@ecy.wa.gov
  Phone: 360/407-6771