Fact Sheet

Lower Columbia Slough Sediment Investigation

As described in the February 2010 fact sheet, the Department of Environmental Quality completed settlement agreements with six private parties and the Oregon Department of Transportation concerning cleanup of contaminated sediments in a segment of the Columbia Slough. DEQ used the money generated from these settlements to conduct sediment sampling to lay the foundation for cleanup action in this part of the slough. This fact sheet describes the investigation and evaluation of the data generated from this study.

Background

In 2005, the DEQ issued a Record of Decision for the Columbia Slough that described the framework for cleanup of sediment contamination in the Slough. The three primary components of the sediment cleanup approach are:

- Pollutant source reduction
- Specific site cleanup
- Long-term monitoring.

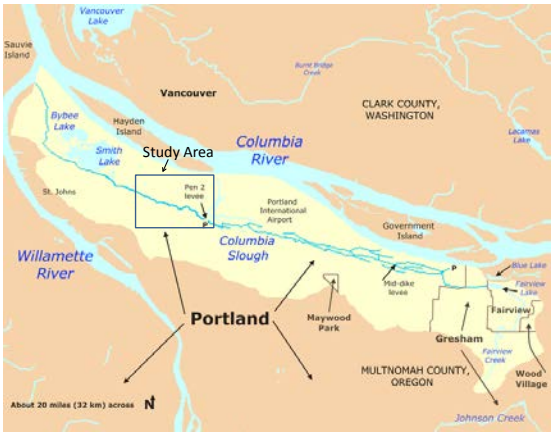
There are currently over 30 active cleanup projects in the Columbia Slough watershed. These projects are in various stages of investigation or cleanup. A number of parties have resisted conducting site-specific Columbia Slough sediment investigations due to concerns that DEQ would hold them responsible for investigation and cleanup of contamination caused by others. Investigation and cleanup of contaminated sediments is difficult to implement using a site-specific approach because numerous private, commercial and industrial facilities have discharged stormwater to the slough.

To address this issue, DEQ created a process through which parties can settle potential Columbia Slough-related liability with the State of Oregon by paying an amount, based on the number of site outfalls and other site information, into a fund that DEQ can use to address the sediment contamination. DEQ still requires each facility to complete necessary upland cleanup and associated source control measures under existing agreements with DEQ.

To date, DEQ has collected over $2 million in this fund. In the summer of 2009, DEQ used some of this money to conduct a sediment investigation in the Lower Columbia Slough, adjacent to sites owned by settling parties.

Investigation area

The investigation area is one of the oldest industrial areas in the Columbia Slough watershed. The area extends from the Peninsula 2 levee approximately 4.3 kilometers to City of Portland stormwater outfall number 59.



Study area location

The general sampling strategy included two sample designs: an incremental sampling strategy to determine average sediment concentrations throughout the study area and targeted samples in locations of suspected contamination within the study area. Incremental sampling provides a reliable, defensible, and cost-effective method to determine average concentrations within the area. Field activities were carried out in accordance with the Quality Assurance Project Plan, *Columbia Slough Outfall 59-65 Sediment Study* (DEQ, 2009).

Incremental sampling involved collecting 50 sediment samples spread throughout the study area and using them to create three composite samples which were analyzed for all contaminants of concern.

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Location of incremental subsamples

Targeted samples, consisting of 3 to 8 samples composited into one, were located adjacent to outfalls or contaminated banks.

Location of targeted samples

Samples were analyzed for metals, PCBs (polychlorinated biphenyls), pesticides, PAHs (polycyclic aromatic hydrocarbons), petroleum, polybrominated diphenyl ethers, and tri-butyl tin. In addition, bioassays were performed on 12 samples to assess sediment toxicity to benthic organisms.

Bank sampling area

Eckman dredge sampler used for deep water locations

Results

The incremental sampling data shows low variability between the three replicates, indicating that it provides a representative average concentration for this segment of the slough. DEQ considers the mean value to reflect baseline conditions for the Lower Columbia Slough.

As can be seen from the table below, average metals concentrations were generally lower based on this data set compared to the slough-wide data set used to generate previous baseline concentrations, possibly reflecting the presence of more significant metal sources in other portions of the slough. While not shown in this table, PAH baseline concentrations showed the opposite trend; i.e., lower slough values are higher than slough-wide values, possibly reflecting run-off from I-5 and other significant transportation corridors that drain to this portion of the Slough.

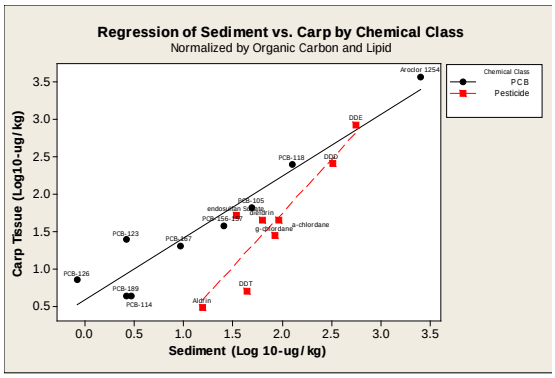
Analyte	Lower Slough IS mean	Previous Slough baseline
Organics (ug/kg)		
Aroclor 1254	27	24
DDE	6.3	6.1
DDD	3.7	7
Metals (mg/kg)		
Arsenic	5.3	8
Copper	37.5	54
Lead	41	90
Zinc	244	314

Incremental sampling strategy and baseline concentrations for select contaminants

Average PCB concentrations were similar to previous values.

Targeted sampling results were, as expected, higher than the baseline values as they were located in the vicinity of source areas.
Two of the bioassays conducted on sediment samples indicated potential toxicity to organisms that live in the sediment. However, considering the results and analytical data for all samples on which bioassays were performed, the observed toxicity could not be correlated to contaminants measured in this study.

Incremental sediment concentration of PCBs and pesticides were compared to fish tissue concentrations to generate a lower-slough-specific relationship or biota sediment accumulation factor . The correlation developed using concentrations for several PCB congeners and various pesticides was significant as shown in the figure below.



Sediment-fish tissue correlation

Evaluation

DEQ is using the data from this study to:

- Establish baseline concentrations specific to the lower slough. These are values that define the practical level of active sediment cleanup efforts due to general area-wide contamination.
- Revise risk-based concentrations for contaminants in the lower slough based on toxicity test results and site-specific bioaccumulation factors.
- Identify portions of the investigation area that warrant active cleanup to reduce the overall average concentration to levels amenable to natural recovery. Natural recovery involves reduction of surface level contamination through contaminant degradation or covering with clean sediment entering the system via stormwater runoff.

The primary concern for the lower slough sediment appears to be PCB contamination which has been found in fish tissue at levels of concern.

For more information

For the full report on this study go to http://www.deq.state.or.us/lq/cu/nwr/columbiaslough/index.htm**.**
DEQ welcomes questions and comments on the Columbia Slough Sediment Project. For more information contact DEQ Project Manager, Jennifer Sutter, (503) 229-6148 or sutter.jennifer@deq.state.or.us.

Priority cleanup areas for Lower Slough segment