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DDT Removal by the Brender Creek Wetland

Summary of 2016 Brender Creek Wetland Study Results

Washington State Department of Agriculture
Natural Resources Assessment Section
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Introduction

The Washington State Department of Agriculture (WSDA) has monitored pesticide concentrations in surface water throughout the state since 2003, and specifically in the Wenatchee River watershed since 2007. DDT has been detected in Brender Creek consistently since 2007, when WSDA began monitoring there (at Upper Brender Creek). DDT is not very soluble in water and binds strongly to soil, especially soil with high organic matter.[1] Once bound to soil, DDT and its breakdown products often persist for decades. DDT was widely used in orchards prior to its banning in 1972. The Washington State Department of Ecology tested upland orchard soils adjacent to Brender Creek in 2003 and found that they were high in DDT.[4]

In 2015, the Cascadia Conservation District restored a wetland downstream from the current WSDA monitoring site to enhance riparian habitat. When water flows through a wetland, it slows down because of the reduction in slope and the increase in aquatic vegetation. As a result suspended sediment settles out of the water.[2,3] WSDA and the Cascadia Conservation District cooperated to study whether the wetland was effectively removing suspended sediment (and the DDT bound to it) from the water. WSDA began collecting samples at an additional site on Brender Creek downstream of the wetland (Lower Brender Creek) to compare suspended sediment and total DDT (both DDT and DDT breakdown products) in the water at the upstream and downstream sites.

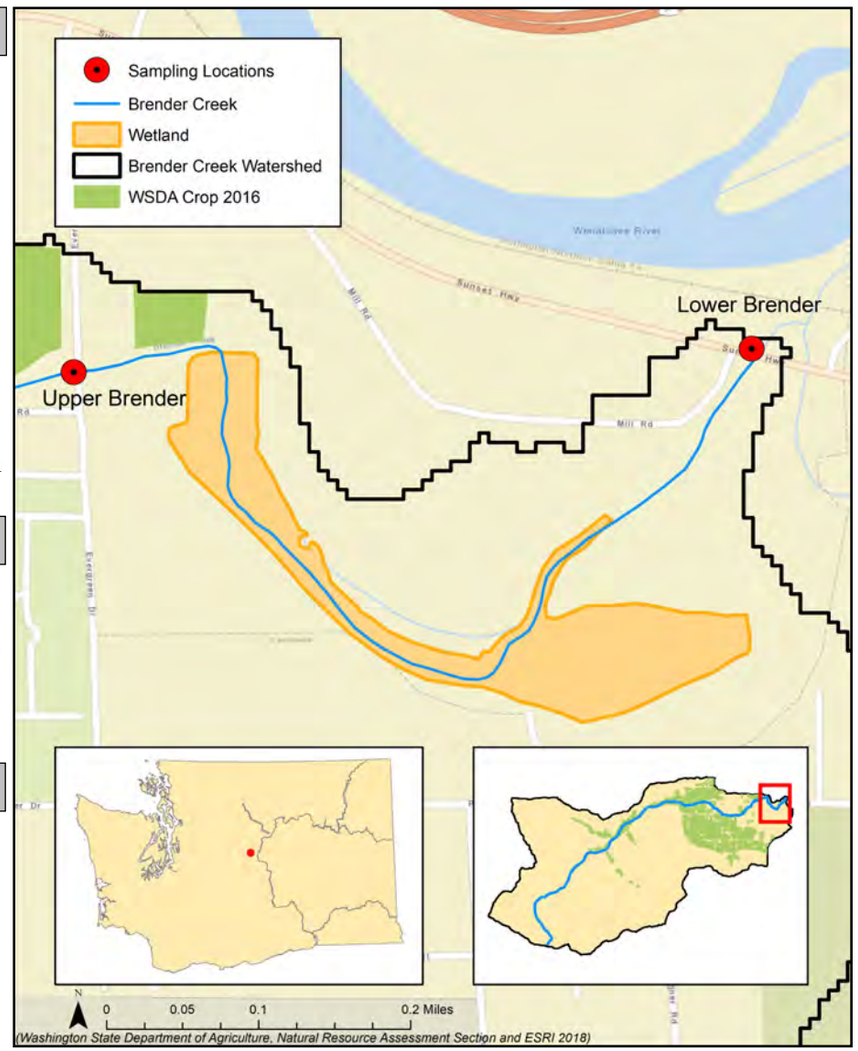
Study Area

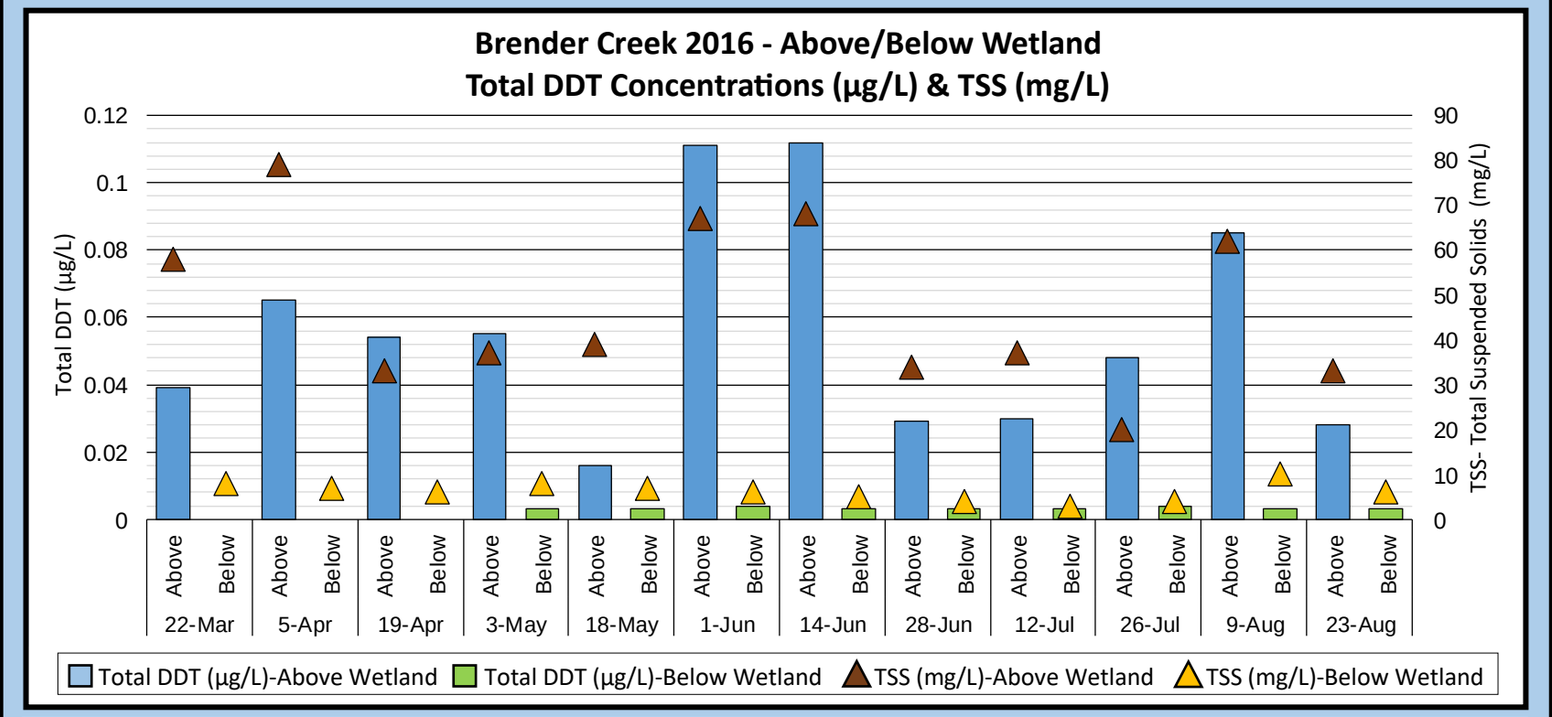
WSDA has been testing water from Upper Brender Creek from 2007 through 2016. The watershed drains about 6,900 acres, and about 13% (approx. 900 acres) of the watershed is used for agriculture. The main crops are pears, apples, cherries, and pasture. Growers in the watershed try to maintain vegetated cover along the stream and in orchards to reduce DDT loading to streams. Below Evergreen Drive, Brender Creek provides habitat for spring Chinook and summer steelhead. Above Evergreen Drive, Brender Creek is blocked to fish passage*.

* Washington State Department of Fish and Wildlife Salmon Scape, (http://apps.wdfw.wa.gov/salmonscape/)

Sampling Details

- Samples were collected every week at Upper Brender Creek for 22 weeks, from March 22 through August 23, 2016.
- Water samples from Upper Brender Creek were tested for 152 chemicals: current and legacy insecticides, herbicides, fungicides, rodenticides, wood preservatives, pesticide degradates and total suspended solids (TSS). Only TSS and total DDT data are shown here.
- Samples were collected at Lower Brender Creek every other week for 22 weeks, from March 22 through August 23.
- Water samples from Lower Brender Creek were tested for 8 chemicals: legacy organochlorine pesticides and pesticide degradates (including DDT and DDT degradates).
- Sample analysis was conducted at Manchester Environmental Laboratory in Port Orchard, Washington.





Conclusions and Recommendations

- The wetland is removing both suspended solids and total DDT from the water; suspended solids and total DDT were lower in water samples collected below the wetland throughout the season.
- To help reduce suspended solids and DDT in streams, **control bank erosion** to prevent the movement of upland soils contaminated with DDT into streams.
- Implement management practices including **conservation buffers**, **vegetative filter strips**, maintenance of **ground cover** to reduce erosion, **sediment basins**, and **setbacks from streams**.
- Make sure streams are off limits to livestock. They can contribute to bank erosion and stir up sediment.
- If you have any unneeded pesticides, WSDA hosts waste pesticide collections; apply here to participate www.agr.wa.gov/wastepesticide

For More Information

- Contact **Cascadia Conservation District** for more information on implementing some of the listed management practices. **sandyl@cascadiacd.org** or **(509) 436-1601**
- Download an electronic version of this factsheet at the NRAS publications website: https://agr.wa.gov/PestFert/natresources/SWM/.
- Factsheets for other watersheds, and information on other pesticide detections in Brender Creek can also be found at the web address provided above.

Results Summary

- The figure to the left shows 2016 results for total DDT and Total Suspended Solids (TSS) - at all site visits water from below the wetland (Lower Brender) had lower total DDT and TSS than water collected above the wetland (Upper Brender).
- Water samples from upstream and downstream of the wetland had detectable levels of total DDT for most of the season. On March 22, April 5, and April 19, DDT was not present or was present in concentrations too low to identify.
- Upstream of the wetland, concentrations of total DDT exceeded the state water quality standard (0.01 µg/L). The health of aquatic organisms such as fish and macroinvertebrates may be compromised when these standard concentrations are exceeded.
- Present-day detections of DDT like those in Brender Creek are due to the way DDT and its breakdown products persist in the environment and bind to soil particles.
- Other studies have also found wetlands to be effective at removing organochlorine pesticides such as DDT through retention and filtration processes that remove suspended solids from water. [2,5]

References

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