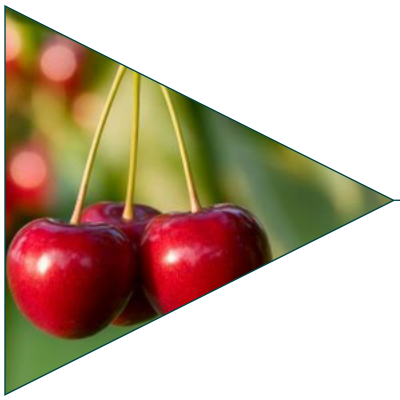
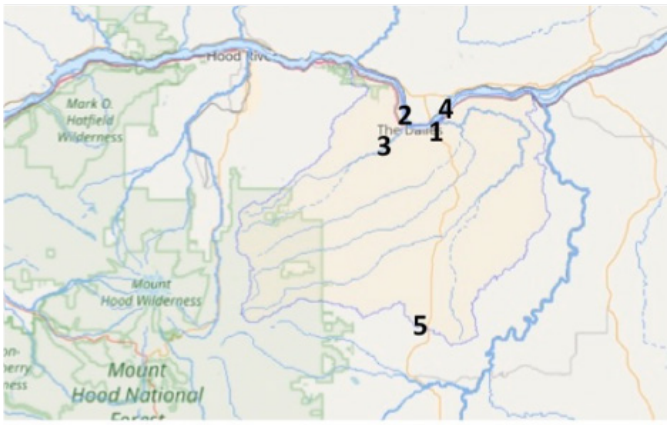


WASCO

Pesticide Stewardship Partnership
2015-17 Biennial Summary



Water Quality Monitoring Locations 2015-17

History: The Wasco Pesticide Stewardship Partnership (PSP) was initiated as a pilot project in 2002, after a similar project in the Hood River area demonstrated the effectiveness of management measures that reduced organophosphate insecticides in water. The focus of the pilot project was on the Mill Creek Watershed, where cherry orchards are the dominant agricultural land use. By 2005, levels of organophosphate insecticides in water were notably reduced. Monitoring was discontinued after 2005 due to resource constraints. However, in 2010 the Wasco County Soil and Water Conservation District (SWCD) approached the Oregon Department of Environmental Quality (DEQ) about re-starting the monitoring and partnership activities. This time period corresponded with the arrival of the Spotted Wing Drosphila, an insect pest with immense potential for damaging fruit. Growers increased the use of a number of insecticides to manage this pest, including malathion and carbaryl. The monitoring that began in 2010 included Threemile Creek and Fifteenmile Creek, in addition to some of the same Mill Creek locations used in the original pilot project. As a result, the partnership group expanded to include the Fifteenmile Watershed Council and growers in that watershed.

Land Use: The Wasco PSP encompasses 511.5 sq-mi. A significant amount of cherries (~10,000 acres) and both winter and spring wheat (~44,000 acres) are grown within the watershed. The largest city within the watershed is The Dalles with a population of 15,200 (2016 US censes estimates). Based on 2011 National Land Coverage Data (NLCD) the breakdown of land use in the watershed is 54% other, and 22% agriculture, 19% forest and 3.7% urban. Areas classed as other may include rangeland, scrubland, wetlands, etc.

Pesticide Monitoring: As part of the PSP program water quality is monitored for pesticide residues beginning in March and continuing through June and again in September and continuing through October. During the timeframe July 1, 2015 through June 30, 2017 water quality samples were collected from five locations. Until 2017 four locations were monitored in and around The Dalles area. Land use encompassed by these locations was primarily tree fruit (cherries) and urban landscapes around the city of The Dalles. Beginning in 2017 a fifth site was added in the City of Dufur to assess potential impacts from dryland wheat areas higher up in the watershed.

WATER QUALITY MONITORING STATIONS 2015-17 BIENNIUM

Station ID	Map Number	Description	Predominate Land Use	No. Detections	BM* Exceedances
25204	1	Threemile Creek at Hwy 197	Agriculture	78	4
28574	2	Mill Creek at 2nd St. The Dalles	Urban	27	6
28575	3	Mill Creek at Wright Road	Agriculture	29	8
36179	4	Fifteenmile Ck Above Seufert Falls	Agriculture	17	0
36391	5	Fifteen Mile Creek at Dufur Park	Agriculture/ Lt. Urban	3	1

**BM = US EPA Aquatic Life Benchmark for pesticides*

A majority of the pesticide detections are attributed to malathion, carbaryl, and imidacloprid. As indicated below these are also the pesticides that have been ranked as of greatest concern within the watershed.

WATER QUALITY DATA SUMMARY FOR ALL SAMPLE LOCATIONS 2015-17 BIENNIUM

Pesticide	Type	Benchmark Value µg/L	No. of Analysis	No. of Detections	Max. Conc. µg/L	Average Conc. µg/L	Percent Detections	Percent of Benchmark (Max. Conc.)
2,4-D	H	299.2	32	1	3.6	.1125	2.8	0.1
2,6-dichlorobenzamide	M	NA	143	6	.0367	.00097	4.2	NA
AMPA	M	249500	33	3	1.84	.0598	9.1	0
Atrazine	H	1	143	11	.0061	.00043	7.7	.6
Bromocil	H	6.8	143	1	.0286	.0002	.6	.4
Carbaryl	I	.5	143	28	2.41	.0347	19.6	482
Deisopropylatrazine	M	NA	143	22	.0101	.00106	15.4	NA
Diesethylatrazine	M	NA	143	39	.022	.00314	27.3	NA
Diuron	H	2.4	143	3	.0156	.00019	2.1	.7
Glyphosate	H	1800	33	3	10.1	.321	9.1	.6
Hexazinone	H	7	143	4	.22	.00293	2.8	3.1
Imidacloprid	I	.01	143	3	.0273	.0053	2.1	273
Malathion	H	.049	143	26	.529	.016	18.2	1080
Pyraclostrobin	F	1.5	137	4	.00732	.00019	2.9	.5

Pesticides highlighted in red are of high concern, pesticides highlighted in yellow are of moderate concern based upon frequency of detection and maximum detected concentration during the period July 1, 2015 through June 30, 2017 as compared to the EPA aquatic life benchmark.
F = fungicide, H = herbicide, I = insecticide, M = metabolite (breakdown product)

All of the pesticides designated as of high concern are classed as insecticides. Each of these pesticides are available for both commercial agricultural and home owner use. They may also appear in combination with other pesticides sold as home and garden products. Carbaryl and malathion have been identified in previous years as pesticides of concern. In 2017 the EPA lowered the aquatic life benchmark for imidacloprid from 1.05 µg/L to .01 µg/L. The result of this change is to elevate imidacloprid from what was previously a pesticide of moderate concern to one of high concern.

PESTICIDES OF CONCERN DETECTED IN THE WASCO PESTICIDE STEWARDSHIP PARTNERSHIP

Pesticide	Common Trade Names	Pesticide Classification
Carbaryl	Seven	Insecticide
Imidacloprid	Amire, Gaucho, Premier, Provado	Insecticide
Malathion	Cythion, Exathion, Fyfanon	Insecticide

Detection of Metabolites: Metabolites are "breakdown" products of some pesticides. They occur generally after the original pesticide has undergone chemical change due to interactions with the environment or soil microbes. Four metabolites were detected at frequencies below 20%. During the sampling period, 2,6-dichlorobenzamide (BAM), aminomethylphosphonic acid (AMPA) and desisopropylatrazine. One metabolite desethylatrazine was detected at a frequency above 20%.

2,6-dichlorobenzamide is a metabolite of the herbicide dichlobenil commonly known as Casoron. It is detected at a high frequency in a majority of the nine current PSP areas throughout the state. At this time there are no aquatic life benchmarks. The lifetime human health benchmark (HHBM) as established by the EPA is 29 µg/L. The maximum detected concentration in the watershed during the period July 1, 2015 through June 30, 2017 was .0367 µg/L (.1% of the current HHBM) with an averge of all analytical results at .00097 µg/L.

Aminomethylphosphonic acid (AMPA) is a metabolite of the herbicide glyphosate. Glyphosate is sold under a variety of names. It has an established EPA aquatic life benchmark of 249500 µg/L. At this time EPA has not established a human health benchmark.

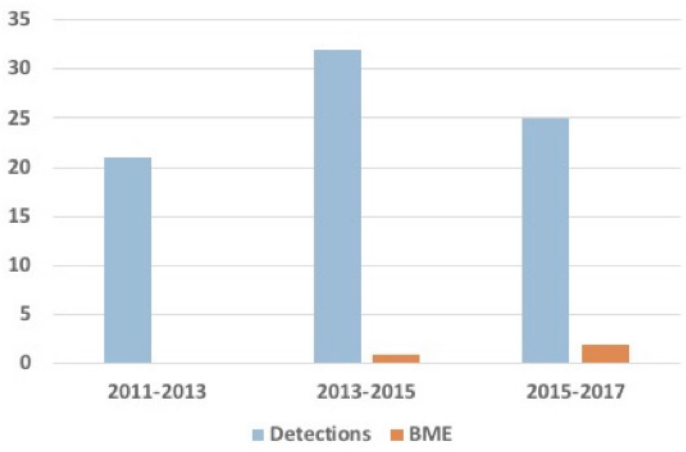
Deisopropylatrazine and desethylatrazine are metabolites of the herbicide's atrazine and simazine. Atrazine is sold under many names the most common being Aatrex. Simazine is predominately sold under the name Princep. At this time there is no EPA aquatic life benchmark or human health benchmark established for deisopropylatrazine or desethylatrazine.

Malathion: The incidence of malathion occurrence is attributed to the treatment for the insect pest spotted wing drosophila which has the potential to cause significant damage to soft fruit such as cherries.

During the course of the past six years there has been significant and steady declines in both the number of detections and the number of EPA aquatic life benchmark exceedances. The average concentration of the detections has dropped from .503 µg/L during the 2011-13 sampling period to .089 µg/L during the 2015-17 sampling period. Continued grower engagment regarding the use of malathion and use of potential alternatives or rotations with other control agents are credited with the continued reductions in malathion detections.

Detections and Benchmark Exceedances for Malathion

Carbaryl: The incidence of carbaryl is detected in the Wasco PSP has fluctuated over the past six years. The increase in detection during the 2013-15 biennium is linked to spotted wing drosphile (SWD). The decrease in 2015-17 is likely due to increased awareness by users and use of additional chemical tools for pest control. Sevin (carbaryl) is approved for use in both agricultural amd home use. It is a common insecticide used by homeowners to control a wide range of pests on fruit trees and home gardens. A majority f the detections for the 2015-17 period were obtained for the Mill Creek at 2nd Street site which is predominately urban. Application of the insecticide by home owners should be done in strict adherence to label requirements to avoid off target movement into sensitive streams or other water bodies.



Detections and Benchmark Exceedances for Carbaryl

Imidacloprid: The incidence of imidacloprid detections increased during the 2015-17 sampling period. Previous years data indicated no detections of the insecticide. During the 2015-17 period three detections were noted, two at the Mill Creek, 2nd Street site and one at the Mill Creek at Wright Road site. All three detection exceeded the aquitic life benchmark. In 2017 the EPA lowered the aquatic life benchmark for imidacloprid from 1.05 µg/L to .01 µg/L. The result of this change is to elevate imidacloprid from what was previously a pesticide of moderate concern to one of high concern.

Sediment Data: One sediment sample was collected in the fall of 2015. No currently used pesticides were detected. Several metabolites for the legacy pesticides DDT and chlordane were detected. The sediment analysis indicated that there was likely no lethal impacts to aquatic life from expose to sediments. The pore water estimates for the DDT metabolite 2,4'-DDE did exceed the Oregon Department of Environmental Quality's human health water quality criteria of .000022 µg/L.

PESTICIDES DETECTED IN SEDIMENTS AT MILL CREEK AT 2ND STREET, THE DALLES MONITORING STATION – WASCO PESTICIDE STEWARDSHIP PARTNERSHIP

Pesticide/ Metabolite	Sample Date	Result µg/Kg	TOC Normalized µg/Kg	Sediment Toxicity	Estimated Pore Water Conc. µg/Kg	Benchmark or Criteria µg/Kg
2,4'-DDE	10/28/15	.321	66.3	.000008	.00133	.000022[1]
cis-chlordane	10/28/15	.526	108.7	NA	.0018	2[3]
trans-chlordane	10/28/15	.511	105.6	NA	.0018	2[2]
trans-nonchlor	10/28/15	.345	71.3	NA	.0013	NA

[1]Oregon Department of Environmental Quality human health water quality criteria, 2) U.S. EPA aquatic life benchmark, 3) U.S. Maximum Contaminant Level (Safe Drinking Act), 4) U.S. Geological Survey Human Health Based Screening Level

Analytical results indicate no likely impact to aquatic life due to sediment toxicity for either current or legacy pesticides. The DEQ human health water quality criteria of .000031 and .000022 µg/L was exceed in the estimated pore water analysis for each of the DDT metabolities. No benchmark or criteria was exceeded for pore water estaimes for metabolites of chlordane.

Projects Funded and Improvements Made: There has been a significant amount of progress made in the Wasco watershed since the inception of the PSP. The main pesticide of concern (malathion) concentrations have been reduced in Wasco streams decreased from 86% in 2011 to 20% in 2017. Much of this reduction has been attributed to 1) greater use of weather station data prior to aerial application of pesticides, 2) ground sprayer application of pesticide near streams, and 3) greater use of pesticide rotational practices (using other pesticides in rotation with malathion). A five-year trend analysis of pesticide concentrations within the watershed indicates only a slight increase in carbaryl, all other pesticides detection continue on a downward trend.

Much of the PSP activities within the Wasco PSP are conducted by the Wasco County SWCD and the The Dalles Watershed Council. These entities provide continued education and outreach to local agricultural stakeholders and provide information vital to urban landowners regarding the responsible use of pesticides in an urban environment. Partnerships have been established with Oregon State University Extension Service (OSU) to promote better application technologies of pesticide especially in tree fruit growing areas. Members of the WQPMT have participated in numerous local stakeholder meetings and educational events to stress the importance of maintaining good practices in the use of pesticides. These efforts have resulted in improvements in the levels of pesticide residues detected in the various sub-watersheds within the Wasco PSP.

COMPARISON OF ANALYTICAL RESULTS 2013-15 AND 2015-17 BIENNIAL MONITORING

Station Number	2013-15% Detections	Number of BM Exceedances	Number of Individual Pesticides	2015-17 % Detections	Number of BM Exceedances	Number of Individual Pesticides
25204	3.6	7	14	2.1	5	9
28574	1.8	10	11	.7	8	6
28575	1.5	9	9	.8	8	6
36179	.7	0	8	.4	0	6

A review of analytical results for monitoring stations sampled during both the 2013-15 and 2015-17 biennium indicates declines in pesticide detection frequency, number of aquatic life benchmark exceedances and the total number of pesticides detected at each location.

Produced by the Oregon Water Quality Pesticide Management Team.
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