Pesticide Stewardship Partnership Program

BIENNIUM REPORT

2019-21

Oregon Water Quality Pesticide Management Team

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Abbreviations

ALB	Aquatic Life Benchmark
ALR	Aquatic Life Ratio
AMPA	(RS)-AMPA (Aminomethyl phosphonic acid)
BAM	2,6-Dichlorobenzamide
DDT	Dichloro-diphenyl-trichloroethane
DEQ	Oregon Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
LEB	Likely Effects Benchmark
ODA	Oregon Department of Agriculture
ODF	Oregon Department of Forestry
OHA	Oregon Health Authority
OSU	Oregon State University
PSP	Pesticide Stewardship Partnership Program
POC	Pesticides of Concern
POCIS	Polar Organic Chemical Integrative Samplers
SPMD	Semipermeable Membrane Devices
TU	Toxicity Unit
µg/L	Micrograms per Liter
WQPMT	Water Quality Pesticide Management Team

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1 Introduction

The PSP Program is a voluntary program that relies on local partnerships to monitor pesticide levels in waterways and implement solutions to protect water quality through locally-led projects. It is an alternative to a regulatory approach for achieving reductions in pesticide concentrations in local rivers and streams. There are currently nine PSP areas across the state that cover a range of land uses, pesticide user groups, and partner groups (**Figure 1**). The number of chemicals detected and the detection frequency ranged considerably between PSP basins, reflecting the diversity of land-uses and associated pest management needs across the Program.

The program is co-led by Oregon Departments of Agriculture (ODA) and Environmental Quality (DEQ).

The PSP uses water quality sampling results to evaluate and classify pesticides based upon their concentrations, water quality criteria and aquatic life benchmarks (related to toxicity), and the frequency of detection. The overall program premise is based on using the data as a feedback loop by coupling it with relevant education, technical assistance, and pest management actions.

This document summarizes the programmatic actions and accomplishments of the Pesticide Stewardship Partnerships (PSP) Program for fiscal years 2019–2021, which covers July 1, 2019 through June 30, 2021. The Pesticide Monitoring and Results section provides a summary of water quality monitoring results for calendar years 2019 – 2021 and includes a long-term evaluation of water quality trends.

2 Program Overview

The PSP Program began in Mid-Columbia subbasins in the late 1990s as an alternative to regulatory approaches for achieving reductions in pesticide concentrations in local rivers and streams. Since 2013, the Oregon Legislature has supported the implementation and expansion of the PSP Program, which now addresses pesticides applied in basins that encompass a diversity of land uses, including from urban, forested, agricultural, and mixed land uses.

The PSP is supported by the 2011 U.S. Environmental Protection Agency (EPA)-approved *Pesticide Management Plan for Water Quality Protection*, developed by the interagency Water Quality Pesticide Management Team (WQPMT), which includes representatives from:

- Oregon Department of Agriculture
- Oregon Department of Environmental Quality
- Oregon Department of Forestry (ODF)
- Oregon Health Authority (OHA)

Oregon State University's (OSU) Extension Service also plays a critical role in providing technical assistance to the WQPMT and PSP partners. The agencies and OSU work with diverse parties, including watershed councils, natural resource groups, commodity and grower groups, local landowners and producers, soil and water conservation districts, and pesticide users. The purpose of these collaborations is to find ways to prevent pesticide movement and reduce pesticide levels in waterways thereby improving water quality, and pest and pesticide risk management.

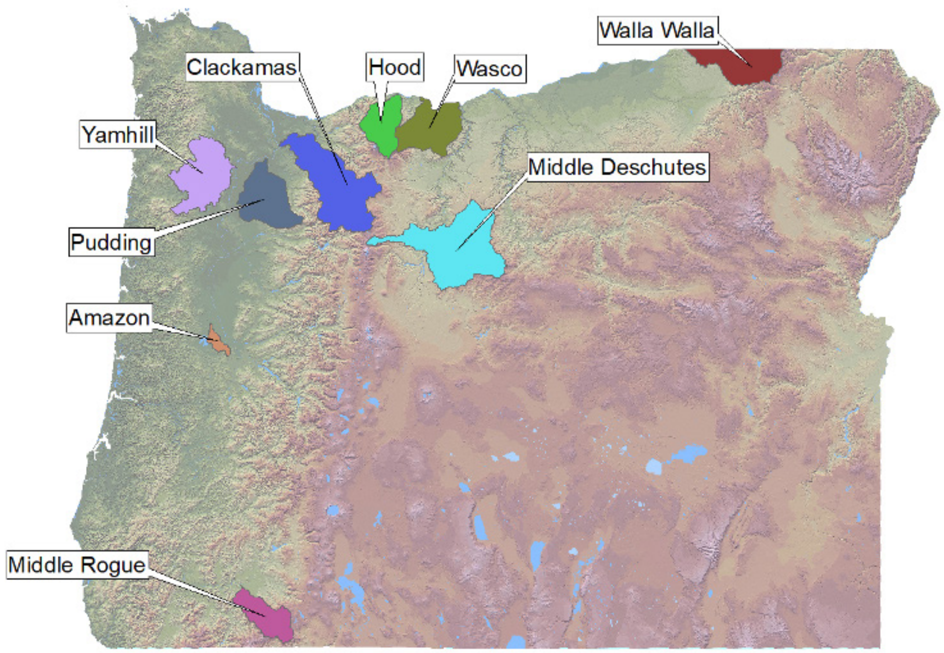
The overall goal of the PSP is measurable environmental improvements to enhance the quality of Oregon's waters for both humans and aquatic life while maintaining effective pest management outcomes. Specific basin goals are developed by local stakeholders who use monitoring data to develop, implement, and measure the effectiveness of management measures designed to reduce or eliminate pesticide loading to waters of the state and achieve water quality criteria and aquatic life benchmarks for detected pesticides.

The 2019-21 budget for the PSP Program totaled $1,824,682.00. Half of funds were General Funds allocated by the Oregon legislature and half are derived through pesticide registration fees collected by ODA. The allocation of these funds within the PSP program are presented in **Table 1**.

Table 1: Allocation of PSP Program Funds (2019-21)

Activity	Allocation
Water Quality Sample and Data Analysis (DEQ)	$1,093,446.00
Program Administration (ODA)	$288,036.00
Technical Assistance Grants	$221,600.00
Waste Pesticide Collection Events	$221,600.00

Figure 1: PSP Basins, 2019-21



3 *Pesticide Monitoring and Results*

The following section provides a summary of the water quality and sediment monitoring data collected by the PSP Program. Three primary analyses were run: an evaluation of how frequently a pesticide was detected in the current biennium compared to the 2017-2019 biennium; an evaluation of the potential relative risks to aquatic communities of measured pesticide concentrations using water quality criteria or aquatic life benchmarks (ALBs); and a trend analysis of measured pesticide concentrations to understand where pesticide levels in surface waterways are increasing or decreasing through time.

In past reports, water quality results, activities, and the budget were all presented for a fiscal-year biennium, for example from July 1, 2017, through June 30, 2019. Evaluating the water quality monitoring results on the same fiscal year biennium schedule that the programmatic and administrative actions are evaluated would exclude monitoring data collected from the first half of the biennium's first year and data from the second half of the biennium's last year. It makes more sense to present the water quality results and activities on a calendar-year basis. Therefore, in this report the data analysis section will cover three calendar years: 2019-2021. The previous biennium is similarly defined as the three calendar years from 2017-2019. Because each biennium includes 2019, the observed differences between biennia reflect changes in water quality data from 2017-18 and 2020-21.

The interpretation of PSP Program water quality data must consider the program's monitoring approach. The intent of the PSP program is to focus on areas most impacted by pesticides, and then track water quality conditions over time as management measures are implemented. When data from a monitoring site show little to no pesticide impacts over a sustained period (i.e., low numbers of detected analytes and/or low levels of aquatic life benchmark exceedances), local partners may choose to stop regular water quality sampling at that particular location. Monitoring then typically shifts to other sites (generally encompassing smaller land areas) where pesticide water quality impacts are greater, or suspected to be greater, and local partners have identified a need for additional focus.

In making these adjustments, aggregated water quality data for PSP basins may indicate a decline in water quality driven by a switch in monitoring sites when, in fact, monitoring data from a majority of the sub-watersheds do not indicate pesticide water quality concerns. To fully understand the status of pesticide water quality it is necessary to evaluate water quality on both a subbasin and watershed level.

3.1: Water Sampling Overview

From 2019 through 2021, 1,531 grab samples were collected from 64 sampling sites in the nine PSP basins and analyzed by the DEQ laboratory (**Table 2**).

No new analytes were added to the analytical suite from the 2017-19 biennium. In total, the PSP Program analyzes water samples for 134 compounds: including 57 herbicides, 40 insecticides, 16 pesticide degradates, 10 fungicides, 6 legacy compounds, and 5 other analytes (**Appendix A**).

Table 2: 2019-21 Water Quality Sampling Distribution.

PSP Areas	Number of Sampling Sites	Number of Grab Samples Analyzed
Amazon	5	192
Clackamas	8	195
Hood River	5	128
Middle Deschutes	5	130
Middle Rogue	18	225
Pudding	12	151
Walla Walla	7	180
Wasco	4	184
Yamhill	5	146

3.2: Detection Frequency

Of the 134 analytes the PSP Program tests for, 64 pesticides (48%) were detected in one or more grab samples during the 2019-2021 biennium at a concentration above the analyte's minimum reporting levels[1]. The top 30 most frequently detected pesticides are displayed in **Table 3**. The majority of the most frequently detected chemicals were sampled for in at least 1,400 grab samples. Six of the analytes (2,4-D, 2,4-DB, dicamba, glyphosate and its degradate AMPA, and triclopyr) analyzed by lab method SM 6640, Phenoxy Herbicides by Electron Capture Detector, were sampled for only at select sites and times for a total of less than 500 samples per analyte across the biennium.

AMPA and glyphosate were the most frequently detected pesticides from 2019-2021 and were found in more than half of the time they were sampled for. The herbicide diuron and BAM, the degradate of the herbicide dichlobenil, were detected in 47 and 44 percent of samples, respectively. Simazine was detected just under 25 percent of the time. All other analytes were detected in less than 20 percent of grab samples.

[1]Due to limitations in laboratory chemical analysis procedures, small concentrations of some substances cannot be precisely measured. The minimum reporting level is the lowest concentration an analyte can be both detected and an accurate concentration quantified.

Table 3: Top 30 Most Frequently Detected Pesticides, 2019-2021

Analyte	Number of Samples	Number of Detections	Detection Frequency (%)	Quality Criterion or ALB (µg/L)	Maximum Aquatic Life Ratio
AMPA	471	305	65	N/A	N/A
Glyphosate	478	262	55	11,900	<0.01
Diuron	1,428	666	47	0.13	72
BAM	1,448	641	44	5	0.3
Simazine	1,428	337	24	6	4
Propiconazole *	1,428	250	18	11	0.76
Dimethenamid	1,448	229	16	8.9	4.8
Metolachlor	1,428	222	16	1	17
Deisopropylatrazine	1,428	221	15	11	0.08
2,4-D *	462	69	15	5	2.1
Azoxystrobin *	1,448	168	12	44	0.04
Deethylatrazine	1,428	164	11	N/A	N/A
Imidacloprid	1,428	155	11	0.01	1,760
Metribuzin	1,427	154	11	8.1	0.07
Sulfometuron methyl	1,428	145	10	0.45	0.86
Metsulfuron-methyl	1,404	139	9.9	0.36	2.9
Atrazine	1,428	140	9.8	1	1.2
Oxyfluorfen	1,448	108	7.5	0.29	4.6
Triclopyr *	466	32	6.9	11	0.43
DEET	1,423	81	5.7	37,500	<0.01
Linuron	1,428	73	5.1	0.09	30
Bromacil *	1,448	62	4.3	6.8	0.22
Dichlobenil	1,448	58	4	12	1.5
Imazapyr *	1,414	56	4	12	0.15
Tebuthiuron *	1,410	55	3.9	11	0.2
Dicamba *	473	18	3.8	11	0.43
Acephate *	1,444	52	3.6	10	1.9
2,4-DB *	419	15	3.6	11	0.61
Pyraclostrobin	1,390	49	3.5	1.5	0.31
Carbaryl	1,428	50	3.5	0.5	1.9

Note: "N/A" values indicate that an analyte does not have water quality criteria or ALB. Analytes denoted by "" indicate the analyte was not one of the top 27 most frequently detected pesticides in the 2017-2019 biennium.*

Table 4 displays a summary of how often selected pesticides are found in surface water grab samples. Results are aggregated across all monitoring stations within a PSP Basin that had at least one grab sample in both biennia. The 27 analytes shown in Tables 4-6 were evaluated in the 2017-2019 Biennial Report because they were the most frequently detected chemicals during that time period. Data on these same analytes were used to evaluate changes between the biennia. The list of 27 analytes includes the seven analytes identified as 2021 statewide pesticides of concern.

The results show both improvements in the frequency and magnitude of pesticide detections and also highlights opportunities to increase education and technical assistance to address pesticides being frequently detected in samples and/or have shown a relatively large increase compared to the previous biennium.

Many of the most frequently detected analytes in 2017-2019 were not detected at all in some PSP basins during 2019-2021. Bifenthrin was only detected in two percent of samples taken in the Clackamas PSP and in no other PSPs. While prometryn was only detected in one PSP, the Middle Deschutes Basin, it was found in over 40 percent of the samples there. Other analytes, such as glyphosate (and its degradate AMPA), carbaryl, diuron, imidacloprid, and metsulfuron-methyl, were detected in all, or nearly all, of the PSPs in 2019-2021. Hood River reported steady or declining detection frequencies for all analytes except for simazine, which increased by a modest four percent.

Seven analytes in the Middle Deschutes Basin (chlorpyrifos, dimethenamid, diuron, glyphosate (and its degradate AMPA), linuron, and pendimethalin) and five analytes in the Yamhill Basin (atrazine, deethylatrazine, imidacloprid, pendimethalin, sulfometuron methyl) decreased by 10 or more percent between 2017-19 and 2019-2021. Pendimethalin detections in the Middle Deschutes Basin showed the largest improvement between biennia, decreasing by 34 percent.

Only glyphosate and its degradate AMPA increased in detection frequency by more than 10 percent. In the Amazon PSP, glyphosate increased by 14 percent. Glyphosate and AMPA increased respectively by 38 and 26 percent in the Wasco PSP.

For the 27 analytes, the number of chemicals detected and the detection frequency ranged considerably between PSP basins, reflecting the diversity of land-uses and associated pest management needs across the program. A few PSP basins, such as Hood River, Walla Walla, and Wasco, reported no detections for a significant number of analytes. In general, agriculture is the predominate land use in these PSP basins and within each PSP producers grow a limited number of different crops (pears and cherries in Hood River; cherries & vineyards in Walla Walla; cherries and vineyards in Wasco). In contrast, sampling in the PSP basins that generally have a more diverse mixture of land uses (agricultural, urban, and/or forest) and a greater diversity of cultivated crops, such as Clackamas, Pudding, and Yamhill, detected a higher number of the analytes.

Table 4: Detection Frequency and Change from Previous Biennium for Selected Analytes.

Analyte	DETECTION FREQUENCY (CHANGE FROM 2017-2019 BIENNIUM)								
	Amazon	Clackamas	Hood River	Middle Deschutes	Middle Rogue	Pudding	Walla Walla	Wasco	Yamhill
AMPA	100% (+5%)	100% (+2%)	0% (-7%)	71% **(-12%)**	48% (-2%)	100% (+0%)	18% (+7%)	81% **(+38%)**	99% (+1%)
Atrazine	19% (+1%)	ND	0% (-4%)	ND	1% (-1%)	42% (+3%)	3% (+3%)	1% (-1%)	31% **(-21%)**
BAM	76% (-3%)	86% (0%)	73% (0%)	ND	22% (+0%)	80% (+3%)	ND	ND	84% (-3%)
Bifenthrin	ND	2% (+1%)	ND	ND	ND	ND	ND	ND	0% (-3%)
Carbaryl	2% (-2%)	9% (-2%)	2% (-8%)	ND	2% (+1%)	6% (+1%)	7% (-1%)	2% (-3%)	4% (-3%)
Chlorpyrifos	ND	8% (+2%)	ND	0% **(-10%)**	ND	3% (+0%)	3% **(-11%)**	ND	4% (-6%)
Deethylatrazine	26% (-3%)	ND	1% (0%)	ND	ND	27% (-2%)	4% (-1%)	24% (-1%)	24% **(-19%)**
Deisopropylatrazine	1% (0%)	12% **(-11%)**	34% (-4%)	ND	1% (+0%)	52% (-4%)	ND	3% **(-10%)**	63% (-7%)
Diazinon	ND	3% (-2%)	ND	ND	0% (-1%)	1% (+0%)	ND	ND	4% (-4%)
Dimethenamid	1% (+1%)	30% (+6%)	ND	37% **(-10%)**	ND	62% (+4%)	ND	ND	37% (+2%)
Dimethoate	1% (+1%)	ND	ND	23% (+0%)	1% (+0%)	2% (+0%)	ND	ND	1% (+0%)
Diuron	74% (+6%)	51% (+1%)	24% **(-24%)**	67% **(-12%)**	37% **(-12%)**	90% (0%)	4% (-2%)	0% (-3%)	100% (+1%)
Ethoprop	ND	1% (-1%)	ND	0% (-1%)	ND	14% (+6%)	ND	ND	3% (-6%)
Glyphosate	90% **(+14%)**	65% **(-10%)**	4% (-3%)	53% **(-16%)**	43% (-2%)	87% (+6%)	46% (-2%)	44% **(+26%)**	78% (-4%)
Hexazinone	0% (-1%)	1% (0%)	0% (-1%)	4% (0%)	ND	1% (+1%)	ND	4% (-1%)	ND
Imidacloprid	8% (+3%)	7% **(-11%)**	1% (+0%)	10% (+1%)	14% (-2%)	17% (+1%)	1% (+1%)	0% (-1%)	51% **(-14%)**
Linuron	ND	ND	ND	53% **(-12%)**	ND	2% (-1%)	ND	ND	7% (+7%)
Malathion	ND	0% (-1%)	ND	ND	ND	ND	1% (+1%)	9% (-4%)	1% (+0%)
Metolachlor	4% (-2%)	16% (+7%)	ND	7% (-3%)	ND	56% (-5%)	ND	ND	78% (+7%)
Metsulfuron-methyl	6% (-4%)	12% (+2%)	1% (+0%)	5% (+2%)	18% (-4%)	15% (+4%)	ND	1% (+0%)	37% (+7%)
Oxyfluorfen	ND	22% (+3%)	ND	17% (-6%)	5% (-4%)	18% (+0%)	1% (-1%)	ND	13% (-4%)
Pendimethalin	0% (-1%)	0% (-5%)	ND	21% **(-34%)**	1% (0%)	6% (-6%)	1% (-7%)	1% (+0%)	11% **(-13%)**
Prometryn	ND	ND	ND	42% (-5%)	ND	ND	ND	ND	ND
Propiconazole	44% (-4%)	9% (-4%)	2% (+0%)	40% (-5%)	1% (0%)	20% (+1%)	ND	ND	59% (+1%)
Pyraclostrobin	ND	7% (+1%)	0% (-6%)	ND	ND	6% (+1%)	3% (+0%)	0% (-1%)	21% (+5%)
Simazine	4% (-3%)	52% (+4%)	38% (+5%)	ND	2% (-1%)	72% (-3%)	ND	0% (-3%)	71% (+6%)
Sulfometuron methyl	16% (-6%)	4% (-1%)	ND	11% (+6%)	21% (-1%)	7% (+3%)	ND	1% (-1%)	35% **(-12%)**

Note: Cells shaded in grey with "ND" indicate the analyte was not detected in that PSP in either biennium. Increases and decreases greater than or equal to 10 percent between the current and most recent biennium are displayed in bold green (improving; decrease in the frequency of detection) and red (degrading; increase in the frequency of detection) text. Values rounded to the nearest integer.

3.3: Water Quality Criteria or Aquatic Life Benchmark Exceedances

For certain pesticides, Oregon has EPA-approved water quality criteria to protect aquatic life[2] or human health[3] (OAR 340-041-8033 Tables 30 and 40, respectively). Notable pesticides with water quality criteria include chlorpyrifos (0.4 micrograms per liter (µg/L)), the legacy pesticide DDT and its degradates (0.001 µg/L), and malathion (0.1 µg/L). Measured concentrations of these analytes are compared against their most stringent water quality criterion. For pesticides without EPA-approved water quality criteria, aquatic life benchmarks (ALBs) are useful for evaluating the potential impact different pesticides may have on fish, vertebrates, and aquatic plants. ALBs are based on toxicity values from scientific studies reviewed by the U.S. Environmental Protection Agency and used to estimate risk to freshwater organisms (and other biota) from exposure to pesticides and their degradates. A pesticide is not expected to represent a risk of concern for aquatic life when its concentration in water is below its water quality criterion or ALB; when the concentration in water equals or exceeds the criterion or ALB, the analyte may impact aquatic organisms. Not all analytes have ALBs – notable examples relevant to the PSP Program include 2,6-dichlorobenzamide (BAM) and deethylatrazine, degradation products from the herbicides dichlobenil and atrazine, respectively.

Twenty-five of the 27 analytes selected for evaluation have water quality criterion or ALBs. Eight of those 25 analytes (32%) were not measured at concentrations that exceeded their most stringent (i.e., lowest concentration) water quality criterion or ALB in the last two biennia (**Table 5**). Other analytes, including bifenthrin, chlorpyrifos, and imidacloprid were detected at levels that exceeded their respective criterion or benchmarks 100 percent of the time they were detected in water samples. Monitoring results showed large increases in the percent of exceedances for diazinon in Yamhill (+38%) and malathion in Wasco (+19%), highlighting potential opportunities for targeted education/outreach and technical assistance to reduce in-stream pesticide concentrations. From 2019-2021, seven analytes were detected at levels that exceeded their criterion or ALB at least once in the Pudding and Yamhill PSPs, and five analytes exceeded their criterion or ALB at least once in the Clackamas and Middle Deschutes Basins. The greatest reductions in the percent of exceedances occurred for diazinon in Clackamas (-38%) and for diuron in Middle Deschutes (-11%), suggesting there were changes in the timing of pesticide use/sampling or the implementation of successful management measures related to those pesticides in 2020-2021.

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[2]The concentration for each compound listed in Table 30 are criteria established for waters of the state in order to protect aquatic life. The criteria apply to waterbodies where the protection of fish and aquatic life is a designated use.

[3]The concentration for each pollutant listed in Table 40 was derived to protect Oregonians from potential adverse health impacts associated with long-term exposure to toxic substances associated with consumption of fish, shellfish, and water.

Table 5: Frequency of Water Quality Criterion or Aquatic Life Benchmark Exceedances and Change from Previous Biennium, 2019-21

Analyte	WATER QUALITY CRITERION OR AQUATIC LIFE BENCHMARK EXCEEDANCES (CHANGE SINCE 2017-19 BIENNIUM)								
	Amazon	Clackamas	Hood River	Middle Deschutes	Middle Rogue	Pudding	Walla Walla	Wasco	Yamhill
AMPA	-	-	-	**-**	-	-	-	**-**	-
Atrazine	-	-	-	-	-	4% (+4%)	-	-	**-**
BAM	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bifenthrin	-	100% (+0%)	-	-	-	-	-	-	-
Carbaryl	-	0% (-5%)	-	-	-	-	10% (+0%)	-	-
Chlorpyrifos	-	100% (+0%)	-	**-**	-	100% (+0%)	100% (+0%)	-	100% (+0%)
Deethylatrazine	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Deisopropylatrazine	-	-	-	-	-	-	-	**-**	-
Diazinon	-	0% **(-38%)**	-	-	-	-	-	-	80% **(+38%)**
Dimethenamid	-	4% (+0%)	-	**-**	-	2% (+0%)	-	-	-
Dimethoate	-	-	-	15% (+0%)	-	-	-	-	-
Diuron	18% (-1%)	2% (-6%)	0% (-4%)	26% **(-11%)**	5% (-1%)	39% (-6%)	-	-	38% (-1%)
Ethoprop	-	-	-	-	-	11% (+5%)	-	-	0% (-5%)
Glyphosate	**-**	**-**	-	**-**	-	-	-	**-**	-
Hexazinone	-	-	-	-	-	-	-	-	-
Imidacloprid	100% (+0%)	100% (+0%)	100% (+0%)	100% (+0%)	100% (+0%)	100% (+0%)	100% (+0%)	-	100% (+0%)
Linuron	-	-	-	44% (-4%)	-	-	-	-	12% (+0%)
Malathion	-	-	-	-	-	-	100% (+0%)	94% **(+19%)**	100% (+0%)
Metolachlor	-	-	-	0% (-4%)	-	-	-	-	5% (+3%)
Metsulfuron-methyl	-	-	-	-	6% (+0%)	-	-	-	-
Oxyfluorfen	-	-	-	6% (+5 %)	12% (-3%)	-	-	-	0% (-2%)
Pendimethalin	-	-	-	**-**	-	-	-	-	**-**
Prometryn	-	-	-	0% (-2%)	-	-	-	-	-
Propiconazole	-	-	-	-	-	-	-	-	-
Pyraclostrobin	-	-	-	-	-	-	-	-	-
Simazine	-	-	-	-	-	2% (+0%)	-	-	0% (-1%)
Sulfometuron methyl	-	-	-	-	-	-	-	-	**-**

Note: Shaded cells with "-" represent no ALB exceedances in either the current or previous biennium. Shaded cells with "N/A" values indicate an analyte does not have an ALB. Increases and decreases greater than or equal to 10 percent between the current and most recent biennium are displayed in bold green (improving; decrease in the frequency of detection) and red (degrading; increase in the frequency of detection) text. Values rounded to the nearest integer.

3.4: Trends in Pesticide Water Quality

To evaluate the long-term effectiveness of the PSP program in achieving its goal of reducing pesticide concentrations in streams, a 10-year trend analysis was conducted for each water quality monitoring location with sufficient data. For the Middle Deschutes and Middle Rogue PSPs, which initiated water quality monitoring in 2014 and 2015 respectively, an eight-year trend analysis was conducted. Water quality stations had to have at least eight years of data for each analyte to be included in the 10-year trend analysis and have at least six years of data to be included in the 8-year trend analysis.

A Seasonal Kendall test (Hirsch, Slack, and Smith 1982; Hirsch and Slack 1984; Helsel et al. 2020) was used for the trend evaluation. A Seasonal Kendall test is a nonparametric method used to test for a monotonic (one direction, either increasing or decreasing) trend and accounts for the influence of seasonal fluctuations by calculating a Mann-Kendall test (Mann 1945) on each defined season separately and then aggregates the results. In this analysis, each calendar month defined a season because grab samples were taken on a monthly or more frequent schedule. Multiple observations within any given month were collapsed into a single value using the median. The idea behind the test is that comparing water quality observations across seasons (for example, pesticide concentrations from January 2015 to concentrations in September 2020) is not informative about trends, but more likely an expression of the differences between values between the seasons (months), not the years (Helsel et al. 2020). The Seasonal Kendall test only compares data from the same season – January values to other January values, June values to other June values, etc.

For each analyte at each station where there were sufficient data to evaluate trend, the null hypothesis is that there is no monotonic trend in the pesticide concentrations above the minimum reporting level over time. The alternative hypothesis is that for one or more seasons, there is an upward or downward monotonic trend over time. The null hypothesis is rejected (and we determine there is a statistically significant trend) if the Z statistic (two-tailed p-value) is less than or equal to 0.20. This represents a 20 percent chance for a type I error – falsely identifying a trend when there is in fact none. DEQ applies the same methodology to evaluate water quality trends in its annual Statewide Status and Trends Report.

A summary of the Seasonal Kendall test shows many water quality monitoring locations had improving trends (decreasing pesticide concentrations) over the period of analysis (**Table 6**). A total of 256 water quality locations had sufficient data to be evaluated – 79 locations (31%) had statistically-significant improving (declining pesticide concentrations), 22 locations (9%) were found to have statistically-significant degrading (increasing pesticide concentrations) and 156 locations (61%) did not have statistically-significant trends.

Within each PSP Basin there were a greater number of stations with improving water quality trends than with degrading water quality. Five PSPs – Amazon, Hood River, Middle Deschutes, Middle Rogue and Pudding – had no sample locations with degrading trends over the period of analysis. Nearly all of the selected analytes had more locations showing improving conditions than degrading conditions. Across all PSP basins, diuron concentrations are improving in 16 locations, degrading in two locations, and had non-significant trends in seven locations. Diuron had an equal or greater number of improving trends compared to degrading trends in each PSP except for Wasco (0 improving, 0 degrading, two non-significant trends).

Only two analytes, dimethenamid and propiconazole had a greater number of locations showing degrading, rather than improving, water quality conditions across all PSPs. Dimethenamid is an herbicide used for control of annual grasses and certain annual broadleaf weeds in corn and other crops. Dimethenamid concentrations have improving trends in one location, degrading trends in four locations, and have non-significant trends in four locations. Propiconazole is a fungicide used on crops such as hazelnuts, corn, stone fruits, mint, and grass seeds. Propiconazole concentrations are improving in one location, degrading in two, and have non-significant trends in nine locations.

The following section details notable successes and/or challenges related to pesticide water quality in each of the PSP Basins.

Amazon

- The maximum concentration of imidacloprid decreased from .245 µg/L in 2019 (24.5 times higher than its ALB of 0.01 µg/L) to .05 µg/L or less in 2020 and 2021. The average concentration of imidacloprid also decreased by more than 50 percent, from 0.08 µg/L in 2019 to 0.03 µg/L in 2020 and 2021.
- The detection frequency of sulfometuron methyl dropped from approximately 20 percent in 2019 and 2020, to five percent in 2021. The maximum

concentration decreased by half between 2019 and 2021.

Clackamas

- The total number of pesticide detections decreased by one-third from 2020 to 2021, dropping from 274 detections to 181 detections.
- Imidacloprid's detection frequency dropped steadily each year since 2018, when it was detected in nearly 30 percent of samples; there were no detections of the analyte in 2021. Average and maximum concentrations declined from 2018-2021. The maximum concentration of imidacloprid decreased from 0.30 µg/L in 2018 (30 times its ALB of 0.01 µg/L) to no measurable detections in 2021.
- In 2020, five analytes were detected at levels above their aquatic life benchmarks (chlorpyrifos, diuron, bifenthrin, imidacloprid, and acephate). In 2021, only one analyte, chlorpyrifos, was detected at concentrations above its water quality criterion or ALB.

Hood River

- In 2019-2021, glyphosate was detected in only 4 percent of samples and its breakdown product AMPA was not detected.
- The frequency of detection and the maximum concentration of diuron decreased from 2019 – 2021. In 2019, diuron was found in 39 percent of samples but was only detected in 7 percent of samples in 2021. The maximum concentration dropped from 0.04 µg/L in 2019 and 2020 to 0.1 µg/L in 2021.
- From 2019 – 2021, only one analyte, imidacloprid, was detected at levels above its aquatic life benchmark. The insecticide was detected only once in 125 samples taken during the biennium, a detection frequency of less than 1 percent.

Middle Deschutes

- The total number of pesticide detections dropped from 237 in 2020 to 181 in 2021, a 24 percent decrease.
- Between 2020 and 2021, the detection frequency and average and maximum concentrations of dimethenamid decreased. The detection frequency decreased from 37 percent to 22 percent. The maximum concentration dropped from 4.7 µg/L to 0.23 µg/L, a 95 percent decrease. Average concentrations dropped from 0.6 µg/L in 2020 to 0.1 µg/L in 2021.
- The ALRs for the five analytes that were detected above their ALB in 2020 (linuron, imidacloprid, diuron, oxyfluorfen, and dimethoate) all declined in 2021, indicating their maximum concentrations decreased year-over-year. Oxyfluorfen was not detected at levels above its ALB in 2021.

Middle Rogue

- In 2019, oxyfluorfen was detected at a maximum concentration of 1.34 µg/L, 4.6 times its ALB. Following targeted outreach to pesticide users, there were no detections of oxyfluorfen in 2020 and there was only a single detection out of 61 samples taken in 2021, at a concentration of 0.07, less than 25 percent of the ALB.
- In 2020, the herbicide metsulfuron-methyl was detected in 32% of samples at a maximum concentration of 1 µg/L, nearly three times its ALB. In 2021, the detection frequency decreased to 20 percent and the max concentration was 0.2 µg/L, an 80 percent reduction from the year prior and below the ALB of 0.35 µg/L.

Pudding

- Beginning in 2020, water quality monitoring samples were taken on Mill Creek, resulting in an increase in the total number of pesticide detections and water quality criterion or ALB exceedances in the last two years.
- In 2020, chlorpyrifos was detected 9 percent of the time at an average concentration of 0.09 µg/L and a maximum concentration of 0.3 µg/L, which are 16 and 54 times higher respectively than the ALB. In 2021, there were no detections of chlorpyrifos.

Walla Walla

- In 2019, PSP monitoring detected the insecticide carbaryl an average concentration of 0.26 µg/L and maximum concentration of 0.93 µg/L (nearly double its ALB of 0.5 µg/L). In 2020 and 2021, average and maximum concentrations of carbaryl were .02 µg/L or less, representing respective reductions of 92 and 98 percent.
- Max concentrations of chlorpyrifos have decreased from the 2018 peak of 8 µg/L, 1,400 times higher than the aquatic life benchmark. In 2020 there were no detections of the chlorpyrifos and it was

detected in only two of 65 samples in 2021 at a max concentration of 0.04 µg/L, or approximately 6.5 times the ALB.

Wasco

- The total number of pesticide analytes detected has declined steadily from 13 in 2018 to five in 2021.
- In 2021, malathion was the only pesticide detected at levels above its ALB but the insecticide was found in less than seven percent of samples.

Yamhill

- The total number of pesticide detections decreased from 751 in 2019 to 231 in 2021, a decrease of 69 percent. Similarly, the total number of exceedances decreased from 72 in 2019 to 46 in 2020 and, in 2021, there were only 16 exceedances of a water quality criterion or ALB.
- Maximum concentrations of diuron decreased 97 percent from 2019 when it was measured at 9.4 µg/L, 72 times its ALB, to a max of 0.26 µg/L in 2021, two times the ALB. Average concentrations of diuron decreased from 0.37 µg/L in 2019 to 0.08 µg/L (below its ALB of 0.13 µg/L).
- There were no detections of chlorpyrifos in 2021. In 2019 and 2020, it was detected in five percent of samples at levels that exceeded its ALB.

Table 6: Summary of Seasonal Kendall Tests

Analyte	NUMBER OF SIGNIFICANT IMPROVING SITES / NUMBER OF SIGNIFICANT DEGRADING SITES / NUMBER OF NON-SIGNIFICANT TREND SITES									
	Amazon	Clackamas	Hood River	Middle Deschutes	Middle Rogue	Pudding	Walla Walla	Wasco	Yamhill	Total
	2012-21	2012-21	2012-21	2014-21	2015-21	2012-21	2012-21	2012-21	2012-21	2012-21
AMPA	0/0/1	1/0/0							0/0/1	1/0/2
Atrazine	3/0/1					1/0/0	0/0/1	1/0/0	3/1/1	8/1/3
BAM	5/0/0	1/0/2	3/0/0		0/0/1	0/0/1	0/0/0	1/0/1	5/0/0	15/0/5
Bifenthrin		0/0/1							0/0/1	0/0/2
Carbaryl	0/0/5	0/0/2	0/0/2		0/0/1	0/0/1	1/0/2	0/1/3	0/0/3	1/1/19
Chlorpyrifos		0/0/1	0/0/1				0/1/2	0/0/1	0/0/4	0/1/9
Deethylatrazine	3/0/0					0/0/1		1/0/1	2/1/2	6/1/4
Deisopropylatrazine	0/0/2	0/1/2	3/0/0			1/0/0		1/0/0	2/0/3	7/1/7
Diazinon		0/0/1							0/0/1	0/0/2
Dimethenamid	0/0/1	0/2/0		0/0/1		1/0/0			0/2/2	1/4/4
Dimethoate				0/0/1						0/0/1
Diuron	4/0/1	1/1/1	2/0/1	1/0/0	1/0/1	1/0/0	2/1/0	0/0/2	4/0/1	16/2/7
Ethoprop		0/0/1				0/0/1			0/0/3	0/0/5
Glyphosate	0/0/1	1/0/0							0/0/1	1/0/2
Hexazinone						0/0/1		0/1/1		0/1/2
Imidacloprid	0/0/2	0/0/2			0/0/1				2/1/2	2/1/7
Linuron				1/0/0					0/0/2	1/0/2
Malathion							0/0/1	1/0/3		1/0/4
Metolachlor	0/0/2	0/0/2		0/0/1		0/0/1			2/2/1	2/2/7
Metsulfuron-methyl	1/0/2	0/0/2			0/0/1				0/1/4	1/1/9
Oxyfluorfen		0/1/0		0/0/1	0/0/1				1/0/2	1/1/4
Pendimethalin		1/0/1		0/0/1		0/0/1	0/0/3		0/0/5	1/0/11
Prometryn				1/0/0						1/0/0
Propiconazole	1/0/2	0/0/2	0/0/1	0/0/1					0/2/3	1/2/9
Pyraclostrobin		1/0/1	0/0/2				0/0/2	0/0/1	0/0/3	1/0/9
Simazine	0/0/4	0/1/2	2/0/1			1/0/0		0/0/2	4/0/1	7/1/10
Sulfometuron methyl	2/0/3	2/0/1			0/0/2	0/0/1			0/2/3	4/2/10
TOTAL	19/0/27	8/6/24	10/0/8	3/0/6	1/0/8	5/0/8	3/2/11	5/2/15	25/12/49	79/22/156

3.5: Sediment Sampling Results

Many contaminants preferentially bind to sediment rather than readily dissolving in water. These "hydrophobic" or "water fearing" chemicals can persist for years attached to sediments found on the bottom and sides of rivers and streams or (re)suspended in the water column. These particulate-associated chemicals include (but are not limited to) legacy pesticides, such as DDT[4] and other organochlorine pesticides; current use pesticides, such as bifenthrin and other pyrethroids; and many metals.

Hydrophobic pesticides are important to monitor for because they are of particular concern to benthic organisms, such as aquatic macroinvertebrates, that live in/amongst the bed sediments. Many benthic organisms spend a significant portion of their life in the interstitial spaces between the grains of sediment and may be particularly vulnerable to sediment-attached pesticides. Other aquatic species including fish and amphibians also live within or near bed sediments or prey on benthic invertebrates and, as a result, are sensitive to contaminants in river sediments.

Recent research has led to the estimation of pesticide-specific likely effect benchmarks (LEB) for sediment toxicity that can be used to interpret the potential effects of pesticides in whole sediments (Nowell et al. 2016; Weston, You, and Lydy 2004). The LEB defines a pesticide concentration above which there is a high probability of adverse effects on benthic invertebrates.

Sediment sampling results are used to calculate two important values: sediment toxicity units (TUs) and pore water concentrations. Sediment TUs are calculated by dividing the total organic carbon normalized pesticide concentration by the LEB that is based on acute laboratory studies on test organisms. Put another way, sediment TUs are a ratio of the measured pesticide concentration compared to the concentration benchmark above which adverse effects are expected. A sediment TU value greater than 0.5 (or half of the LEB) suggests the analyte likely contributes to negative impacts to aquatic organisms. Similar to how the PSP program uses a decision matrix to determine pesticides of concern based on water quality samples, a simplified decision matrix is used to evaluate pesticides of concern based on sediment samples (refer to Section 4). Pore water is defined as the water that fills the interstitial spaces beneath the sediment bed (i.e., the water between the individual grains of sediment). Pesticide pore water concentrations can be directly compared against aquatic life benchmarks.

Every two years, the PSP program conducts sediment sampling to monitor for a select number of sediment-associated legacy and current use pesticides. During the 2019-2021 biennium, sediment samples were taken in August and September of 2020 in select watersheds (**Table 7**). Most analytes were not detected or detected at low sediment TU levels. Only one of the analytes sampled for in sediment, bifenthrin, was found at levels greater than 0.2 sediment TU. Bifenthrin was detected at sediment TU levels above 0.5 in Amazon, Clackamas, Pudding, Walla Walla, and Yamhill PSPs. Of the PSP basins where sediment sampling occurred in 2020, pore water concentrations exceeded the applicable ALB for either bifenthrin or p,p'-DDE (a degradate of the legacy pestiicde DDT) in every PSP Basin except for the Middle Rogue. Bifenthrin pore water concentration ALRs above 1 ranged from 1.24 in the Walla Walla PSP to 3.51 in the Amazon PSP. ALRs for p,p'-DDE ranged from 1.05 in Clackamas to 71.32 in Walla Walla (over 71 times the ALB), with values over 10 in the Middle Deschutes, Pudding, and Walla Walla PSPs.

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[4] *Dichloro-diphenyl-trichloroethane*

Table 7: Pesticide Detections in Sediment Samples, 2020

PSP Basin	Station ID Number	Date	Analyte	Sediment Toxicity Units	Pore Water Concentration ALR
Amazon	25270	8/26/2020	p,p'-DDE	<0.01	0.33
Amazon	36391	8/26/2020	Bifenthrin	**0.69**	**3.51**
Clackamas	32066	8/31/2020	Bifenthrin	0.48	**2.44**
Clackamas	32066	8/31/2020	p,p'-DDE	<0.01	**1.05**
Middle Deschutes	38827	9/2/2020	Bifenthrin	0.11	0.55
Middle Deschutes	38827	9/2/2020	Dieldrin	<0.01	0.40
Middle Deschutes	38827	9/2/2020	Endosulfan sulfate	<0.01	<0.01
Middle Deschutes	38827	9/2/2020	Oxyfluorfen	<0.01	<0.01
Middle Deschutes	38827	9/2/2020	p,p'-DDD	<0.01	0.05
Middle Deschutes	38827	9/2/2020	p,p'-DDE	<0.01	**16.06**
Middle Deschutes	38827	9/2/2020	p,p'-DDT	<0.01	<0.01
Middle Rogue	38829	8/26/2020	Dieldrin	<0.01	0.47
Middle Rogue	38829	8/26/2020	Oxyfluorfen	<0.01	<0.01
Middle Rogue	38829	8/26/2020	p,p'-DDD	<0.01	0.24
Middle Rogue	38829	8/26/2020	p,p'-DDT	0.01	0.06
Pudding	10899	8/26/2020	Bifenthrin	**1.06**	**5.36**
Pudding	10899	8/26/2020	Chlorpyrifos	0.04	0.32
Pudding	10899	8/26/2020	Dieldrin	<0.01	0.39
Pudding	10899	8/26/2020	Endosulfan sulfate	0.01	<0.01
Pudding	10899	8/26/2020	Oxyfluorfen	<0.01	<0.01
Pudding	10899	8/26/2020	p,p'-DDD	<0.01	0.11
Pudding	10899	8/26/2020	p,p'-DDE	<0.01	**12.97**
Pudding	10899	8/26/2020	p,p'-DDT	<0.01	0.00
Walla Walla	32012	8/19/2020	Bifenthrin	0.25	**1.24**
Walla Walla	32012	8/19/2020	p,p'-DDD	<0.01	0.21
Walla Walla	32012	8/19/2020	p,p'-DDE	<0.01	**71.32**
Walla Walla	32012	8/19/2020	p,p'-DDT	0.01	0.07
Walla Walla	33083	8/19/2020	Chlorpyrifos	0.08	0.61
Walla Walla	33083	8/19/2020	Dieldrin	<0.01	0.24
Walla Walla	33083	8/19/2020	Endosulfan sulfate	<0.01	0.00
Walla Walla	33083	8/19/2020	Oxyfluorfen	<0.01	0.00
Walla Walla	33083	8/19/2020	p,p'-DDD	<0.01	0.61
Walla Walla	33083	8/19/2020	p,p'-DDT	0.01	0.12
Yamhill	34232	8/12/2020	Bifenthrin	**1.17**	**5.94**
Yamhill	34232	8/12/2020	Chlorpyrifos	0.01	0.07
Yamhill	34232	8/12/2020	Dieldrin	<0.01	0.08
Yamhill	34232	8/12/2020	Oxyfluorfen	<0.01	<0.01
Yamhill	34232	8/12/2020	p,p'-DDE	<0.01	0.63
Yamhill	34234	8/12/2020	Bifenthrin	0.43	**2.17**
Yamhill	34234	8/12/2020	Oxyfluorfen	<0.01	<0.01

Note: Sediment Toxicity Unit cells shaded in orange with black text represent values between 0.2 and 0.5 sediment TUs, cells shaded in red with red white represent sediment TU levels greater than 0.5. Pore water concentration cells shaded in red and with red text represent ALRs greater than or equal to 1, indicating levels that equal or exceed an analyte's ALB.

3.6: Uncertainties Associated with Water Quality Data

Water quality samples collected as part of the PSP program are generally obtained through the use of grab sample techniques. Grab sampling is a sampling technique in which a single sample or measurement is taken at a specific time. Grab samples provide the ability to obtain an immediate sample (as opposed to collecting samples using automated samplers or passive samples such as polar organic chemical integrative samplers (POCIS), or semipermeable membrane devices (SPMD)) and are preferred for the constituents of concern in the PSP program because set-up and equipment costs are low and sample scheduling can be easily modified to account for pesticide application timing and/or weather events.

The use of grab samples for water quality collection does have several disadvantages over more extensive and expensive monitoring techniques. A grab sample takes a snapshot of the characteristics of the water at a specific location and moment in time, and it may not be completely representative of the entire flow of the waterbody being sampled. Because it represents a snapshot in time, results can be influenced by stream flow, weather conditions leading up to and following pesticide application and, timing of the collection in relation to pesticide applications. These disadvantages can contribute to uncertainties in applying water quality monitoring results acquired via grab samples to characterizations of land use influences or the impacts of education and outreach on pesticide water quality.

Strong collaboration, coordination, cooperation, and communication between DEQ and ODA, the local PSP leads, and the pesticide user community can reduce uncertainties regarding pesticide contributions to surface waters from upstream land uses. Because pesticide occurrence in streams is episodic, the PSP sampling approach requires DEQ, ODA, and local partners know the types of pesticides being used, the geographic area of pesticide applications, and the timing of pesticide applications in the PSP. Without this information, there is a high likelihood of nondetects, due not to the PSP Program's success in reducing pesticides from reaching streams, but more likely due to inadequacy of the monitoring study design.

To further reduce uncertainties associated with sample collection techniques DEQ provides technical assistance in proper field monitoring techniques to local partners. DEQ conducts annual training and audits of sampling staff to ensure that data are collected per established protocols necessary to maintain high data quality and allow for data comparison. Results from the 2019 field audit indicate that protocols are being followed to ensure that data quality is being protected at the point of sample collection within the individual PSP areas. Due to COVID[5] concerns, no field audits were conducted for 2020 or 2021.

[5] *The respiratory disease caused by SARS-COV-2, a coronavirus discovered in 2019.*

Figure 2: Pesticides of Concern Decision Matrix based on Water Quality Monitoring Data (2019)

Detected concentration relative to aquatic life benchmarks (ALB) and frequency of detection

REFERENCE LEVEL CRITERIA

FREQUENCY OF DETECTION IN LAST 3 YEARS (%)	≥1 detection at or above 50% of an acute ALB	≥3 detections at or above 50% of a chronic ALB	1 to 2 detections at or above 50% of a chronic ALB	No detections over 50% of any ALB
65.1 to 100%	High Level of Concern	High Level of Concern	High Level of Concern	Moderate Level of Concern
35.1 to 65%	High Level of Concern	High Level of Concern	Moderate Level of Concern	Moderate Level of Concern
0 to 35%	High Level of Concern	High Level of Concern	Moderate Level of Concern	Low Level of Concern

Local water quality monitoring data are used to determine pesticides of concern within each PSP. Pesticides that are deemed to be of high concern based on water quality monitoring in over 30% of the PSP areas are designated as statewide pesticides of concern.

The WQPMT in collaboration with other EPA Region 10 states, have developed a process to determine which frequently detected pesticides are of greatest concern. This process considers how frequently in the past three years an analyte has been detected and how the measured concentration levels relate to EPA acute or chronic aquatic life benchmarks[6] (**Figure 2**). A designation as a pesticide of high concern is used by states and EPA to track progress in reducing the frequency and concentrations of pesticides.

The WQPMT and PSP Program also use the designations to inform local partners' prioritization of technical assistance and outreach and education activities to address specific pesticides. DEQ determines pesticides of concern for each PSP area based on local monitoring data. Pesticides that are classified in one of the "High Levels of Concern" boxes in more than 30% of the PSP areas are designated as statewide pesticides of concern (POC).

Five analytes have been identified as statewide pesticides of concern based on PSP monitoring data from calendar years 2019-2021 (**Table 8**). These chemicals are found frequently in PSP basins and have been detected at levels that exceed acute or chronic aquatic life benchmarks. The statewide pesticides of concern include three herbicides (diuron, oxyfluorfen, dimethenamid,) and two insecticides (imidacloprid, chlorpyrifos). Each of these analytes was categorized as a pesticide of concern in at least four of the nine PSPs basins. Five analytes (diuron, imidacloprid, chlorpyrifos, oxyfluorfen, and dimenthenamid) were also identified as statewide pesticides of concern in the last biennium, based on data from calendar years 2017-2019. Dimethenamid was elevated to a statewide pesticide of concern while diuron was reclassified as a statewide pesticide of moderate concern. Refer to Appendix B for tables with the 2022 pesticides of concern (based on data from calendar years 2019-2021) within each PSP Basin.

[6] Aquatic life benchmarks are based on toxicity values from scientific studies that EPA reviewed and used to estimate risk to freshwater organisms from exposure to pesticides and their degradates in their most recent publicly available ecological risk assessments and preliminary Program Formulations written in support of pesticide registration or registration review. For more information, visit EPA's website.

Table 8: Top 30 Most Frequently Detected Pesticides, 2019-2021

Pesticide	Category	Statewide Level of Concern	Number of "High" Pesticide of Concern Designations in PSP Basins
Diuron	Herbicide	High	6
Imidacloprid	Insecticide	High	6
Oxyfluorfen	Herbicide	High	5
Chlorpyrifos	Insecticide	High	4
Dimethenamid	Herbicide	High	4
Diazinon	Insecticide	Moderate	3
Malathion	Insecticide	Moderate	3
Metolachlor	Herbicide	Moderate	3
2,4-D	Herbicide	Moderate	2
Acephate	Insecticide	Moderate	2
Carbaryl	Insecticide	Moderate	2
Linuron	Herbicide	Moderate	2
Metsulfuron-methyl	Herbicide	Moderate	2
Sulfometuron methyl	Herbicide	Moderate	2
2,4-DB	Herbicide	Moderate	1
Atrazine	Herbicide	Moderate	1
Bifenthrin	Insecticide	Moderate	1
Dichlobenil	Herbicide	Moderate	1
Dieldrin	Legacy Pesticide	Moderate	1
Dimethoate	Insecticide	Moderate	1
Ethoprop	Insecticide	Moderate	1
Prometryn	Herbicide	Moderate	1
Propiconazole	Fungicide	Moderate	1
Pyriproxyfen	Insecticide	Moderate	1
Simazine	Herbicide	Moderate	1
Tebuthiuron	Herbicide	Moderate	1
AMPA	Degradate	Moderate	N/A
BAM	Degradate	Moderate	N/A
Glyphosate	Herbicide	Moderate	0

Note: Some analytes do not have water quality criterion or aquatic life benchmarks. As a result, it is not possible for these analytes to be categorized as pesticides of high concern because the reference level criteria consider detections above acute or chronic criteria or benchmarks. Therefore, analytes without a criterion or benchmark have "N/A" listed for the number of "high" POC designations in PSP areas.

A decision matrix has also been developed to determine pesticides of concern based on sediment monitoring data. Unlike the decision matrix for water quality data, the sediment data does not consider the frequency of detection in sediments due to the limited number of sampling events. The criteria only consider the calculated sediment TUs. Pesticides detected in one or more samples at sediment TU levels between 0.2 and 0.5 are classified as a "moderate" level of concern; pesticides detected in one or more samples at levels equal to or greater than .5 sediment TUs are classified as a "high" level of concern.

Based on the 2020 sediment sample results, two pyrethroid insecticides are classified as a pesticide of moderate or high concern in at least one PSP area. Bifenthrin is a pesticide of high concern in three PSPs and a moderate concern in one. The insecticide lambda-cyhalothrin, which is used to control pests in a variety of crops and around homes and businesses, is a pesticide of moderate concern in the Pudding PSP basin.

Figure 3: Decision Matrix Based on Stream Bed Sediment Monitoring Data — Aquatic Life (2021)

Detected concentration relative to Sediment Toxicity Units

≥1 detection at or above 0.5 Sediment Toxicity Unit (TU)	≥1 detection Between 0.2-0.5 Sediment Toxicity Unit (TU)
High Level of Concern	Moderate Level of Concern

Decision Matrix for Pesticides of Concern Based on Sediment Monitoring Data. Local stream bed sediment monitoring data are used to determine pesticides of concern within each PSP.

Based on the 2020 sediment sample results, two pyrethroid insecticides are classified as a pesticide of moderate or high concern in at least one PSP area. Bifenthrin is a pesticide of high concern in three PSPs and a moderate concern in one. The insecticide lambda-cyhalothrin, which is used to control pests in a variety of crops and around homes and businesses, is a pesticide of moderate concern in the Pudding PSP basin.

Table 9: 2022 Sediment Pesticides of Concern

PSP Basin	Analyte	Category
Amazon	Bifenthrin	High
Clackamas	Bifenthrin	Moderate
Pudding	Lambda-Cyhalothrin	Moderate
Pudding	Bifenthrin	High
Yamhill	Bifenthrin	High

5 Distribution of Grant Funding

During the 2019-2021 biennium, the PSP Program funded one grant project outside of the local PSP partners. The decrease in funding for competitive projects was the result of an increase of funding for local PSP partners to support water monitoring and data analysis, development of strategic action plans and expansion of education and outreach activities at the local level.

The competitive grant project was awarded to OSU for the development of an educational presentation to pesticide users, focused on statewide water quality concerns. This presentation will be made available to the local PSP partners and is adaptable to their specific needs. This proposal also funded a web based one-hour program focused on water quality protection for pesticide applicators. The total funds awarded to this project was $50,000.00

Increased funding was provided to PSP basin partners to assist in the collection of water quality samples and fund the development of strategic plans within the individual PSP basins. Wasco PSP did not apply to receive funding during this biennium. These grants, termed "partner grants," are non-competitive in nature. The activities covered in the grants and the funding amount are presented in **Table 10**.

Table 10: Partner Grant Fund Distribution, Fiscal Years 2019-21

Basin	Activities Funded	Total Funded	Percent of Budget
Amazon	WQ sampling, strategic plan creation, discharge measurements	$50,992.69	21.4%
Clackamas	WQ sampling, strategic plan creation, discharge measurements	$55,131.00	23.1%
Hood River	WQ sampling	$5,050.00	2.1%
Middle Deschutes	WQ Sampling, Discharge Measurements	$18,975.00	8.0%
Middle Rogue	WQ Sampling, Outreach Education, Discharge Measurements	$15,850.00	6.7%
Yamhill	WQ Sampling, Data Collection, discharge measurements	$7,250.00	3.0%
Pudding	WQ Sampling, WQ Data Cataloging, Macroinvertebrate sampling	$13,180.00	5.5%
Walla Walla	WQ Sampling, Weather Station	$26,890.50	11.3%
OSU	See above	$50,000.00	18.9%
TOTAL		**$238,319.19**	**100.0**

6 Data Communication and In-Kind Outreach and Services

WQPMT members presented information about the PSP program at 26 virtual events during the biennium.

This decrease in events from last biennium was due to the COVID-19 pandemic. Members of the WQPMT virtually attended meetings of PSP partner organizations to provide technical assistance or advice.

7 Changes in Watershed or Program Activites, Outreach

There were no major program changes during the 2019-2021 biennium.

In-person outreach and education events were canceled due to the COVID-19 pandemic. Due to public health concerns, WQPMT agencies and local PSP partners hosted educational and outreach events virtually.

8 Waste Pesticide Collection

Pesticide collection events were greatly impacted by the COVID-19 pandemic this biennium. However, events continue to safely dispose of significant amounts of pesticides from the environment. From 2019-2021, four pesticide collection events removed 46,365 pounds of unwanted or unusable pesticides. Collection events are coordinated with local stakeholders (watershed councils, OSU Extension, soil and water conservation districts, grower groups, and solid waste management businesses). These stakeholders provide support to the program through publicizing the event via newspaper, radio, and posting on web pages.

Table 11: Partner Grant Fund Distribution, Fiscal Years 2019-21

Event Location	Date	Participation	Pounds of Pesticides Collected
Clackamas	10/26/2019	N/A	11,500
Tangent	11/22/2019	24	18,949
Madras	2/5/2020	N/A	1,600
Ontario	5/17-21/2021	7	14,316

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Table 12: PSP Analytical Suite, 2009-21

Analyte	Analytical Method	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Acetamiprid	DEQ11-LAB-0031-SOP			X	X	X	X	X	X	X	X	X	X	X
Acetochlor	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Alachlor	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Ametryn	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Aminocarb	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Atrazine	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Azinphos-methyl (Guthion)	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Baygon (Propoxur)	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Carbaryl	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Carbofuran	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
DEET	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Deisopropylatrazine	DEQ11-LAB-0031-SOP			X	X	X	X	X	X	X	X	X	X	X
Desethylatrazine	DEQ11-LAB-0031-SOP			X	X	X	X	X	X	X	X	X	X	X
Diuron	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Fluometuron	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Imazapyr	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Imidacloprid	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Linuron	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Methiocarb	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Methomyl	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Metolachlor	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Metribuzin	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Metsulfuron Methyl	DEQ11-LAB-0031-SOP						X	X	X	X	X	X	X	X
Mexacarbate	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Neburon	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Oxamyl	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Prometon	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Prometryn	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Propazine	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Propiconazole	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Pyraclostrobin	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Siduron	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Simazine	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Simetryn	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Sulfometuron-methyl	DEQ11-LAB-0031-SOP			X	X	X	X	X	X	X	X	X	X	X
Terbutryn (Prebane)	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Terbutylazine	DEQ11-LAB-0031-SOP	X	X	X	X	X	X	X	X	X	X	X	X	X
Aminomethylphos-phonic acid (AMPA)	DEQ16-LAB-0011-SOP						X*	X*	X*	X*	X*	X*	X*	X*
Glyphosate	DEQ16-LAB-0011-SOP						X*	X*	X*	X*	X*	X*	X*	X*
2,6-Dichloroben-zamide	EPA 8270D						X	X	X	X	X	X	X	X

Analyte	Analytical Method	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
4,4´-DDD	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
4,4´-DDE	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
4,4´-DDT	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Acephate	EPA 8270D									X	X	X	X	X
Aldrin	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
alpha-BHC	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Azoxystrobin	EPA 8270D									X	X	X	X	X
beta-BHC	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Bifenthrin	EPA 8270D			X	X	X	X	X	X	X	X	X	X	X
Bromacil	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Butachlor	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Butylate	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Chlorobenzilate	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Chloroneb	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Chlorothalonil	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Chlorpropham	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Chlorpyrifos	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
cis-Chlordane	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Cyanazine	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Cycloate	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Dacthal (DCPA)	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
delta-BHC	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Diazinon	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Dichlobenil	EPA 8270D						X	X	X	X	X	X	X	X
Dichlorvos	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Dieldrin	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Dimethenamid	EPA 8270D						X	X	X	X	X	X	X	X
Dimethoate	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Diphenamid	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Endosulfan I	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Endosulfan II	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Endosulfan sulfate	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Endrin	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Endrin aldehyde	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
EPTC	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Ethoprop (Ethoprophos)	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Etridiazole	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Fenamiphos	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Fenarimol	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Fenvalerate+Esfenvalerate	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Fluridone	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
gamma-BHC (Lindane)	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Heptachlor	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Heptachlor epoxide	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Hexazinone	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Imidan (Phosmet)	EPA 8270D	X	X	X										

Analyte	Analytical Method	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Malathion	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Methoxychlor	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Methyl paraoxon	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Mevinphos (Phos-drin2009-2011)	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
MGK 264	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Mirex	EPA 8270D						X	X	X	X	X	X	X	X
Molinate	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Napropamide	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Norflurazon	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Oxyfluorfen	EPA 8270D						X	X	X	X	X	X	X	X
Parathion-ethyl	EPA 8270D						X	X	X	X	X	X	X	X
Parathion-methyl (Methyl Parathion)	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Pebulate	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Pendimethalin	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Permethrin	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Pronamide	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Propachlor	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Pyraflufen ethyl	EPA 8270D									X	X	X	X	X
Pyriproxyfen	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Tebuthiuron	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Terbacil	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Terbufos	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Tetrachlorvinphos (Stirophos)	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
trans-Chlordane	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
trans-Nonachlor	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Triadimefon	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Tricyclazole	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Trifloxystrobin	EPA 8270D										X	X	X	X
Trifluralin	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Tris (1,3-di-chloro-2-propyl) phosphate (TDCP)	EPA 8270D									X	X	X	X	X
Tris (2-chloroethyl) phosphate (TCEP)	EPA 8270D									X	X	X	X	X
Vernolate	EPA 8270D	X	X	X	X	X	X	X	X	X	X	X	X	X
Alachlor	GC/MS	X	X	X										
Atrazine	GC/MS	X	X	X										
Azinphos Methyl	GC/MS	X	X	X										
Carboxin (ng/L)	GC/MS	X	X											
Metolachlor (ng/L)	GC/MS	X	X	X										
Metribuzin (ng/L)	GC/MS	X	X	X										
Propazine	GC/MS	X	X	X										
Simazine	GC/MS	X	X	X	X	X	X	X	X	X	X	X	X	X
2,4-D	GC/MS DI	X	X	X										
Triclopyr	GC/MS DI	X	X	X										
Total Solids	SM 2540 B	X	X	X	X	X	X	X	X	X	X	X	X	X

Analyte	Analytical Method	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Total Suspended Solids	SM 2540 D												X*	X*
2,4,5-T	SM 6640				X*	X*	X*	X*	X*	X*	X*	X*	X*	X*
2,4,5-TP (Silvex)	SM 6640				X*	X*	X*	X*	X*	X*	X*	X*	X*	X*
2,4-D	SM 6640				X*	X*	X*	X*	X*	X*	X*	X*	X*	X*
2,4-DB	SM 6640				X*	X*	X*	X*	X*	X*	X*	X*	X*	X*
3,5-Dichlorobenzoic acid	SM 6640				X*	X*	X*	X*	X*	X*	X*	X*	X*	X*
Acifluorfen	SM 6640				X*	X*	X*	X*	X*	X*	X*	X*	X*	X*
DCPA acid metabolites	SM 6640				X*	X*	X*	X*	X*	X*	X*	X*	X*	X*
Dicamba	SM 6640				X*	X*	X*	X*	X*	X*	X*	X*	X*	X*
Dichloroprop	SM 6640				X*	X*	X*	X*	X*	X*	X*	X*	X*	X*
Dinoseb	SM 6640				X*	X*	X*	X*	X*	X*	X*	X*	X*	X*
MCPA	SM 6640				X*	X*	X*	X*	X*	X*	X*	X*	X*	X*
MCPP	SM 6640				X*	X*	X*	X*	X*	X*	X*	X*	X*	X*
Pentachlorophenol	SM 6640				X*	X*	X*	X*	X*	X*	X*	X*	X*	X*
Picloram	SM 6640				X*	X*	X*	X*	X*	X*	X*	X*	X*	X*
Triclopyr	SM 6640				X*	X*	X*	X*	X*	X*	X*	X*	X*	X*

Note: "X" denotes standard PSP analyte at all sites and all events. "X" denotes analytes monitored for at selected sites and events.*

B Appendix

Tables 13-21 display the pesticides of moderate and high concern for each PSP Basin based on data from calendar years 2019-21.

Table 13: 2022 Pesticides of Concern, Amazon PSP

Pesticide	Category	Level of Concern
2,4-D	Herbicide	High
2,4-DB	Herbicide	High
Diuron	Herbicide	High
Imidacloprid	Insecticide	High
Propiconazole	Fungicide	High
AMPA	Degradate	Moderate
BAM	Degradate	Moderate
Glyphosate	Herbicide	Moderate

Table 14: 2022 Pesticides of Concern, Clackamas PSP

Pesticide	Category	Level of Concern
2,4-D	Herbicide	High
Acephate	Insecticide	High
Bifenthrin	Insecticide	High
Carbaryl	Insecticide	High
Chlorpyrifos	Insecticide	High
Diazinon	Insecticide	High
Dieldrin	Insecticide	High
Dimethenamid	Herbicide	High
Diuron	Herbicide	High
Imidacloprid	Insecticide	High
Metolachlor	Herbicide	High
Oxyfluorfen	Herbicide	High
AMPA	Degradate	Moderate
BAM	Degradate	Moderate
Glyphosate	Herbicide	Moderate
Simazine	Herbicide	Moderate

Table 15: 2022 Pesticides of Concern, Hood River PSP

Pesticide	Category	Level of Concern
BAM	Degradate	Moderate
Imidacloprid	Insecticide	Moderate
Simazine	Herbicide	Moderate

Table 16: 2022 Pesticides of Concern, Middle Deschutes PSP

Pesticide	Category	Level of Concern
Dimethenamid	Herbicide	High
Dimethoate	Insecticide	High
Diuron	Herbicide	High
Imidacloprid	Insecticide	High
Linuron	Herbicide	High
Oxyfluorfen	Herbicide	High
Prometryn	Herbicide	High
AMPA	Degradate	Moderate
Azoxystrobin	Fungicide	Moderate
Glyphosate	Herbicide	Moderate
Propiconazole	Fungicide	Moderate

Table 17: 2022 Pesticides of Concern, Middle Rogue PSP

Pesticide	Category	Level of Concern
Diuron	Herbicide	High
Imidacloprid	Insecticide	High
Metsulfuron-methyl	Herbicide	High
Oxyfluorfen	Herbicide	High
Sulfometuron methyl	Herbicide	High
Tebuthiuron	Herbicide	High
AMPA	Degradate	Moderate
Glyphosate	Herbicide	Moderate

Table 18: 2022 Pesticides of Concern, Pudding PSP

Pesticide	Category	Level of Concern
Acephate	Insecticide	High
Atrazine	Herbicide	High
Chlorpyrifos	Insecticide	High
Diazinon	Insecticide	High
Dichlobenil	Herbicide	High
Dimethenamid	Herbicide	High
Diuron	Herbicide	High
Ethoprop	Insecticide	High
Imidacloprid	Insecticide	High
Metolachlor	Herbicide	High
Oxyfluorfen	Herbicide	High
Simazine	Herbicide	High
AMPA	Degradate	Moderate
2,4-D	Herbicide	Moderate
BAM	Degradate	Moderate
Deisopropylatrazine	Degradate	Moderate
Glyphosate	Herbicide	Moderate
Triclopyr	Herbicide	Moderate

Table 19: 2022 Pesticides of Concern, Walla Walla PSP

Pesticide	Category	Level of Concern
Carbaryl	Insecticide	High
Chlorpyrifos	Insecticide	High
Malathion	Insecticide	High
Pyriproxyfen	Insecticide	High
Glyphosate	Herbicide	Moderate
Imidacloprid	Insecticide	Moderate

Table 20: 2022 Pesticides of Concern, Wasco PSP

Pesticide	Category	Level of Concern
Malathion	Insecticide	High
AMPA	Degradate	Moderate
Glyphosate	Herbicide	Moderate

Table 21: 2022 Pesticides of Concern, Yamhill PSP

Pesticide	Category	Level of Concern
Chlorpyrifos	Insecticide	High
Diazinon	Insecticide	High
Dimethenamid	Herbicide	High
Diuron	Herbicide	High
Imidacloprid	Insecticide	High
Linuron	Herbicide	High
Malathion	Insecticide	High
Metolachlor	Herbicide	High
Metsulfuron-methyl	Herbicide	High
Oxyfluorfen	Herbicide	High
Sulfometuron methyl	Herbicide	High
AMPA	Degradate	Moderate
BAM	Degradate	Moderate
Azoxystrobin	Fungicide	Moderate
Deisopropylatrazine	Degradate	Moderate
Glyphosate	Herbicide	Moderate
Metribuzin	Herbicide	Moderate
Propiconazole	Fungicide	Moderate
Simazine	Herbicide	Moderate