



Interagency Management of Pesticides and Water Quality in Oregon

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Abstract

Focused monitoring has documented a variety of pesticides in Oregon surface or ground water. To optimize the efficacy of pesticide use and protect water quality, four state agencies formed the interagency Water Quality Pesticide Management Team (WQPMT). The role of the WQPMT is to evaluate monitoring data, communicate findings and recommendations to stakeholders, and support and facilitate efforts intended to minimize or prevent water quality degradation from pesticides currently registered for use in Oregon. Finding related to surface water are presented here.

Introduction

Core Member Agencies

- Oregon Department of Agriculture (ODA)
- Oregon Department of Environmental Quality (ODEQ)
- Oregon Department of Forestry (ODF)
- Oregon Department of Human Services (ODHS)

WQPMT Role and Scope

- Develop and implement an Oregon Water Quality Pesticide Management Plan (PMP) in collaboration with the U.S. Environmental Protection Agency (US-EPA).
- Evaluate designated "Pesticides of Interest" (POIs) based on a pesticide's chemical/physical properties, use patterns, monitoring data and recommended mitigation measures.
- Coordinate and facilitate activities and stakeholders to prevent and/or reduce the presence of current-use pesticides in surface and ground water resulting from both agricultural and non-agricultural (urban) uses.
- Operates under a Memorandum of Understanding
- Does not have independent regulatory authority

Primary Focus Areas

- Identify the highest risk pesticides
- Identify the most vulnerable watersheds
- Evaluate monitoring data
- Recommend pesticide best management practices to minimize off-target movement into surface and ground water.

Oregon Pesticides of Interest

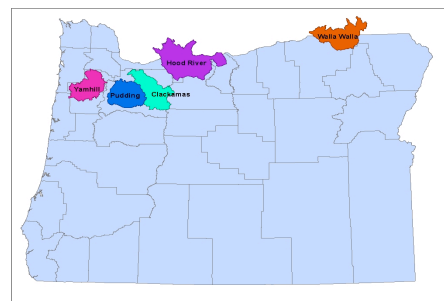
- EPA designated 57 national "Pesticides of Interest" (POIs)
- The WQPMT has identified 11 additional pesticides (68 total) based on Oregon DEQ's Toxic Reduction Strategy (<http://www.deq.state.or.us/toxics/index.htm#Reduction>) and Priority Persistent Pollutant (P3) list (www.deq.state.or.us/wq/sb737/docs/LegRpAtt20100601.pdf)

Acknowledgements

We would like to thank our agency Directors, Administrators and Staff for their support of the WQPMT. In addition, the support and cooperation of key stakeholders throughout the state have been invaluable.

Pesticide Surface Water Monitoring Program

Oregon DEQ monitors for 100 pesticides and active ingredients in streams in 5 sub-basins through the Pesticide Stewardship Partnership (PSP) program funded by an US EPA grant. Each partnership is voluntary, collaborative and focused on local sub-basin issues.



Evaluation of Pesticide Monitoring Data

The WQPMT takes a "weight-of-evidence" approach when evaluating pesticide monitoring data, considering:

1. Measured concentrations of a pesticide relative to established water quality criteria or benchmarks. In the absence of numeric water quality criteria, to assess the risk to aquatic life, the WQPMT uses the EPA Office of Pesticides (OPP) established aquatic life benchmarks (http://www.epa.gov/oppefed1/ecorisk_ders/aquatic_life_benchmark.htm) to conduct a preliminary screen of monitoring data.
2. The frequency of detection of a pesticide in a sub-basin.
3. A pesticide's environmental fate profile.
4. The presence of pesticide mixtures in surface or ground water samples.
5. Pesticide use patterns and application methods.
6. Monitoring studies in neighboring states and/or watersheds with similar conditions.

Evaluation Screening Matrix

For the purpose of determining various response options the WQPMT developed a screening tool as a first step in decision-making. It considers both the frequency of detection and a pesticide's concentration relative to an established benchmark or water quality criterion.

Surface water example: Pudding Sub-Basin (2009)				
Percentage of Reference/Benchmark Concentration (site specific)				
		>100% (Level 3)	>50% (Level 2)	0 - 50% (Level 1)
Detection Frequency	> 50% (Level C)	3C: Diuron (2 sites)	2C: Diuron	1C: atrazine, simazine, diuron, pendimethalin, metolachlor, norflurazon, imidacloprid, ethoprop
	26 - 50% (Level B)	3B	2B	1B: carbaryl, ethoprop, imidacloprid, linuron, pendimethalin, metribuzin, metolachlor, norflurazon
	1 - 25% (Level A)	3A	2A: Chlorpyrifos	1A: carbaryl, EPTC, linuron, pendimethalin, metribuzin

WQPMT Response Options (By Agency)

The WQPMT may recommend a combination of actions dependent on each agency's legal authority. The WQPMT uses a tiered set of response options triggered by increasing levels of confirmed contamination. Using the screening matrix, the WQPMT can recommend increasingly stringent actions as pesticide detections move from Level "1A" to "3C". In general, detections with concentrations above a benchmark receive greater consideration, but a high detection frequency may warrant greater scrutiny and outreach. Management actions such as stakeholder education and outreach, voluntary mitigation measures and lastly, regulatory actions represent a continuum of possible response options.

Interagency Coordination & Stakeholder Involvement

Response Options	ODA	DEQ	ODF	DHS
Outreach/Education	X	X	X	X
Pesticide Labels, Use Restrictions, Applicator Training/Certification	X			
Ag. Water Quality Management Plans & BMPs	X			
303(d) Listing / TMDLs		X		
Pesticide Stewardship Partnerships (PSP)	X	X	X	X
Monitoring		X		X
Groundwater Management Areas		X		
Safe Drinking Water Act		X		X
Forest Practices Act / BMPs			X	

Most Frequently Detected Pesticides in 2009

Herbicide	Maximum Detection Frequency	Highest Detection (ug/L)	US EPA Acute Aquatic Life Benchmark for Nonvascular Plants (ug/L)
Diuron	96%	5.8	2.4
Simazine	95%	1.8	36.0
Atrazine	65%	0.14	1.0
Metolachlor	75%	0.91	8.0
Pendimethalin	45%	0.19	5.2
Hexazinone	35%	0.11	7.0

Insecticide	Maximum Detection Frequency	Highest Detection (ug/L)	US EPA Lowest Acute Aquatic Life Benchmark (ug/L)
Carbaryl	30%	0.35	0.85 (invertebrates)
Imidacloprid	42%	0.27	35.0 (invertebrates)
Ethoprop	40%	0.92	22.0 (invertebrates)
Azinphosmethyl	8%	0.98	0.08 (invertebrates)
Chlorpyrifos	6%	6.6	0.083 (fish)

Fungicide	Maximum Detection Frequency	Highest Detection (ug/L)	US EPA Lowest Acute Aquatic Life Benchmark (ug/L)
Propiconazole	30%	4.0	93.0 (nonvascular plants)
Pyraclostrobin	13%	0.71	NA

Pesticide Mixtures

Many samples collected in the five PSP sub-basins during 2009 contained mixtures of pesticides. More than 40% of the stream samples across the sub-basins contained 2 or more pesticides. In the Pudding, 29% of the stream samples contained 10 or more pesticides.

No. of Pesticides in Sample	Clackamas	Hood River	Pudding	Walla Walla	Yamhill
1	11	23	0	21	11
2 to 3	14	15	5	17	18
4 to 5	10	2	8	8	20
6 to 7	6	0	5	0	7
8 to 9	1	0	8	0	0
≥ 10	0	0	12	0	0

Summary and Key Challenges

Summary

- Pesticides are commonly detected in Oregon streams; often in mixtures.
- The herbicides diuron, atrazine, simazine and metolachlor are the most commonly detected in surface water. Of >320 sample events across 5 sub-basins in 2009, 5 detections of diuron were above an aquatic life benchmark. Eleven (11) detections of the OPs azinphosmethyl & chlorpyrifos were above aquatic life benchmarks.
- Cross-agency evaluation of pesticide detections and coordination is necessary to effectively prevent and/or reduce the impact of pesticides on water quality.

Key Challenges

- How to evaluate frequent detections at concentrations below water quality criteria/benchmarks.
- How to adequately evaluate & communicate the potential risk of pesticide mixtures.
- How to maintain consistent long-term funding for monitoring programs; while expanding to include more groundwater monitoring and urban pesticide use.

1. Current address: Portland State University