

Interagency Management of Pesticides and Water Quality in Oregon

Oregon Department of Agriculture (Steve Riley, Janet Fults, Sheila Marcoe, Rose Kachadoorian)
 Oregon Department of Environmental Quality (Kevin Masterson, Koto Kishida); Oregon Department of Forestry (Jeremy Groom);
 Oregon Health Authority (David Farrer); Oregon State University (Dr. Jeff Jenkins)

Abstract

Targeted monitoring has detected a variety of pesticides in Oregon surface or ground water. To optimize the efficacy of pesticides and protect water quality, four state agencies formed the interagency Water Quality Pesticide Management Team (WQPMT) in 2007. A major role of the WQPMT is to evaluate monitoring data. A key source of pesticide monitoring is the DEQ Pesticide Stewardship Partnership (PSP) program. Along with a description of the WQPMT, a summary of the PSP and three years of monitoring results are presented.

3. Pesticide Stewardship Partnerships (PSP) Collaboration at the watershed level

- ODEQ monitors for 100 pesticide and degradates in streams in 7 sub-basins under the Pesticide Stewardship Partnership (PSP) program.
- Partnership are voluntary, collaborative and focused on local sub-basin issues.
- Includes Watershed Councils, SWCDs, Tribal Govt., Grower Groups, OSU Extension, State Agencies, etc.
- Identifies streams with elevated pesticide concentrations and/or high # of detections.
- Collaboration to implement voluntary management practices.
- Follow-up monitoring to track trends over time.

1. Water Quality Pesticide Management Team

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)
- Oregon State University (OSU) – Technical Advisory

Primary Scope

- Currently registered pesticides in Oregon
- Surface and ground water
- Agricultural and non-agricultural uses
- Initial focus does not include "legacy" pesticides
- Operates under an interagency Memorandum of Understanding
- Does not have independent regulatory authority

Address 4 Key Questions

1. Which pesticide active ingredients have the biggest potential impact/risk? (identify & prioritize highest risk pesticides)
2. Which watersheds are most vulnerable?
3. What does monitoring data tell us?
4. How to prevent/reduce off-target movement?

WQPMT Role

- Develop the Water Quality Pesticide Management Plan (PMP) for Oregon. *Plan approved by EPA, June 2011*
- Designate Oregon "Pesticides of Interest" (POIs) and "Pesticides of Concern" (POCs)
- Evaluate monitoring data relative to EPA benchmarks and/or federal or state water quality criteria/standards.
- Communicate monitoring data and assessment to broad base of stakeholders and recommend/facilitate activities to prevent and/or minimize off-target movement into water

2. Oregon Pesticides of Interest & Concern

- **Pesticide of Interest (POI):** potential to occur at concentrations approaching or exceeding an established environmental or human health benchmark or standard.
- **Pesticide of Concern (POC):** close to or exceeds established environmental or human health benchmark or standard **or** a significant frequency of detection.
- 72 Oregon "Pesticides of Interest" (POIs) based on pesticide chemical/physical properties, toxicity, use patterns, current & historical detections in water, and other "weight of evidence" factors.

4. Evaluation of Pesticide Monitoring Data

Measures of relative risk:

- Detected concentrations relative to established water quality criteria/standards or benchmarks.
- In the absence of numeric criteria/standards, the WQPMT uses EPA Office of Pesticides (OPP) established Aquatic Life Benchmarks³ or Human Health Benchmarks⁴.

- **Aquatic Life Ratio (AQL) = Maximum Detected Concentration / Lowest Toxicity "Benchmark"**

AQL Values > 1.0 indicates further attention

- Number & frequency of detections
- A pesticide's environmental fate profile.
- The presence of pesticide mixtures.
- Pesticide use patterns and application methods.
- Monitoring studies in neighboring states and/or watersheds with similar conditions.

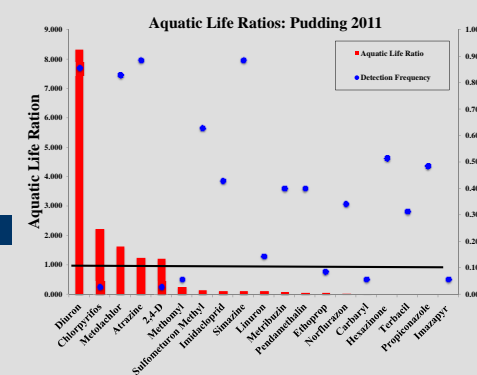
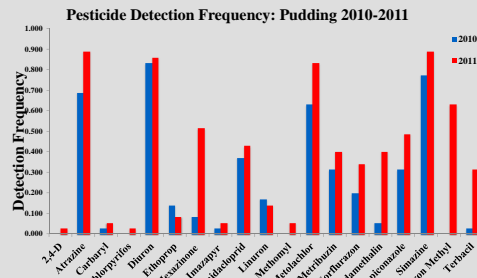
5. Pesticide Mixtures

Many PSP samples contain mixtures of pesticides. In 2009 -10, >40% of samples across sub-basins contained 2 or more pesticides. In the Molalla-Pudding sub-basin, 29% of the samples in 2009 and 11% in 2010 contained ≥10 pesticides.

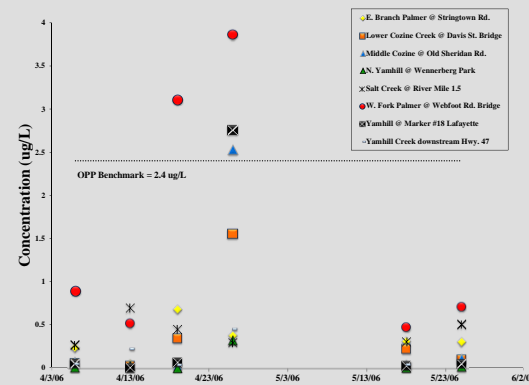
Footnotes: Referenced Internet links

1. PMP and list of Oregon POIs & POCs: http://www.oregon.gov/ODA/PES7/water_quality.shtm
2. PSP link: <http://www.deq.state.or.us/wq/pesticide/pesticide.htm>
3. EPA Pesticide Aquatic Life Benchmarks: http://www.epa.gov/oppfed1/ecorisk_ders/aquatic_life_benchmark.htm
4. EPA Pesticide Human Health Benchmarks: <http://iaspub.epa.gov/apex/pesticides/f?p=HHBP:home:1033649148835496>

6. Examples: Pudding & Yamhill Sub-Basins



Diuron in Yamhill Basin Spring 2010



7. Most Frequently Detected Pesticides: 2009-2011

Active Ingredient	Sub-basins of Concern	Monitoring Summary Notes (>1000 samples collected from 2009-2011)
Diuron (Karmex)	Amazon (*11) Clackamas (09*/10/11) Hood River (*10) Pudding (09*/10/11) Walla Walla (*10) Yamhill (09*/10/11)	<ul style="list-style-type: none"> • 35 detects above lowest Aquatic Life Benchmark (2.4 ug/L) • 100% detects in some locations • 625 (63%) total detects over 3 years (# 1)
Simazine (Princep)	Clackamas (09*/10) Hood River (*10) Pudding (09*/10) Yamhill (09*/10)	<ul style="list-style-type: none"> • Concentrations below lowest benchmark • High # of detects in some locations • 416 (38%) total detections over 3 years (#2)
Atrazine (Aatrex)	Pudding (09*/10) Yamhill (09*/10)	<ul style="list-style-type: none"> • Concentrations below lowest benchmark • High # of detects in some locations • 303 (28%) total detections over 3 years (#3)
Chlorpyrifos (Lorsban)	Clackamas (09*/10/11) Hood River (*10) Walla Walla (09*/10) Wasco (10*/11) Yamhill (*10/11)	<ul style="list-style-type: none"> • 28 total detects above WQ standard (0.041 or 0.083 ug/L) • Low # of detects (5%), but up to >80% above WQS
Malathion	Wasco (*11)	<ul style="list-style-type: none"> • 4 total detections above WQ standard (0.08 or 0.036 ug/L) • Low number of detections (2%)
Others of Interest: Metolachlor, Carbaryl, Imidacloprid, Sulfometuron-methyl		<ul style="list-style-type: none"> • Commonly detected, but at low detection frequencies • Commonly detected but...Overall, low number of detects • Urban use for some may be a greater contribution than Ag.

8. Summary and Key Challenges

Summary

- Pesticides are commonly detected in Oregon streams; but a relatively low number of detections are above established standards or benchmarks.
- It is not uncommon to find two or more pesticides in a single water sample.
- The herbicides diuron, atrazine, simazine and metolachlor were the most commonly detected in surface water. In some watersheds these were found in 70-100% of the samples.
- From 2009-2011, 35 detections of diuron were above an aquatic life benchmark. Twenty-eight (28) detections of the OP chlorpyrifos were above the acute or chronic water quality standard.
- Monitoring provides a valuable real-world feedback mechanism, especially when linked to outreach and education on pesticide labels, management practices and the risk factors associated with off-target movement.
- The PSP approach has demonstrated significant reductions in chlorpyrifos in the Hood, Wasco and Walla-Walla watersheds.
- Cross-agency coordination is necessary to effectively minimize the impact of pesticides on water quality.

Key Challenges

- How to evaluate & communicate frequent detections at concentrations below water quality criteria/benchmarks.
- How to adequately evaluate the potential risk of pesticide mixtures and potential sub-lethal, indirect and/or cumulative effects.
- How to maintain consistent long-term resourcing for monitoring programs that address surface and ground water, urban & Ag uses, sediment partitioning pesticides such as the pyrethroids and new products entering the marketplace.

Acknowledgements

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