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An Assessment of Pesticides, Trace Elements, and Their Potential to Affect Salmonids in the Hood River Basin, Oregon, 1999-2009

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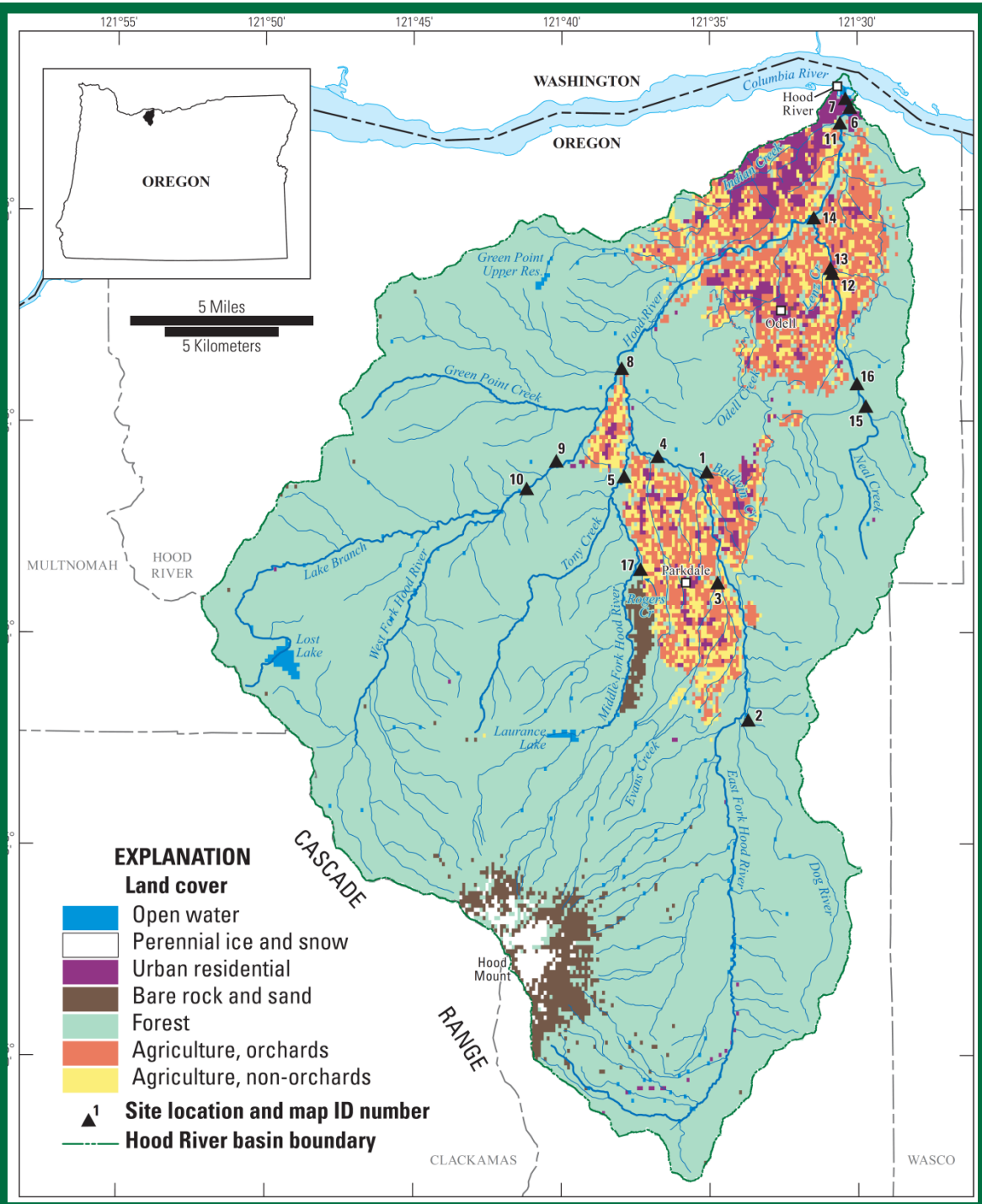
In cooperation with the Confederated Tribes of Warm Springs

U.S. Department of the Interior
U.S. Geological Survey


121°55'
121°50'
121°45'
121°40'
121°35'
121°30'
WASHINGTON
OREGON
Columbia River
Hood River
OREGON
5 Miles
5 Kilometers
Indian Creek
Green Point Upper Res.
Hood River
Green Point Creek
Odell
Odell Creek
Neal Creek
Baldwin Cr
Tony Creek
Lake Branch
West Fork Hood River
Middle Fork Hood River
Rogers Cr
Parkdale
Lost Lake
Laurance Lake
Evans Creek
East Fork Hood River
Dog River
Hood Mount
MULTNOMAH
HOOD RIVER
CASCADE RANGE
CLACKAMAS
WASCO
1
2
3
4
5
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8
9
10
11
12
13
14
15
16
17
EXPLANATION
Land cover
Open water
Perennial ice and snow
Urban residential
Bare rock and sand
Forest
Agriculture, orchards
Agriculture, non-orchards
Site location and map ID number
Hood River basin boundary

Effects of pesticides on salmon

- Mortality
- Sub-lethal effects:
  - Physiological
    - Growth, reproduction, olfaction
  - Behavioral
    - Swimming, feeding, predator avoidance, homing
- Effects can be compounded when present together
- Reduced prey availability

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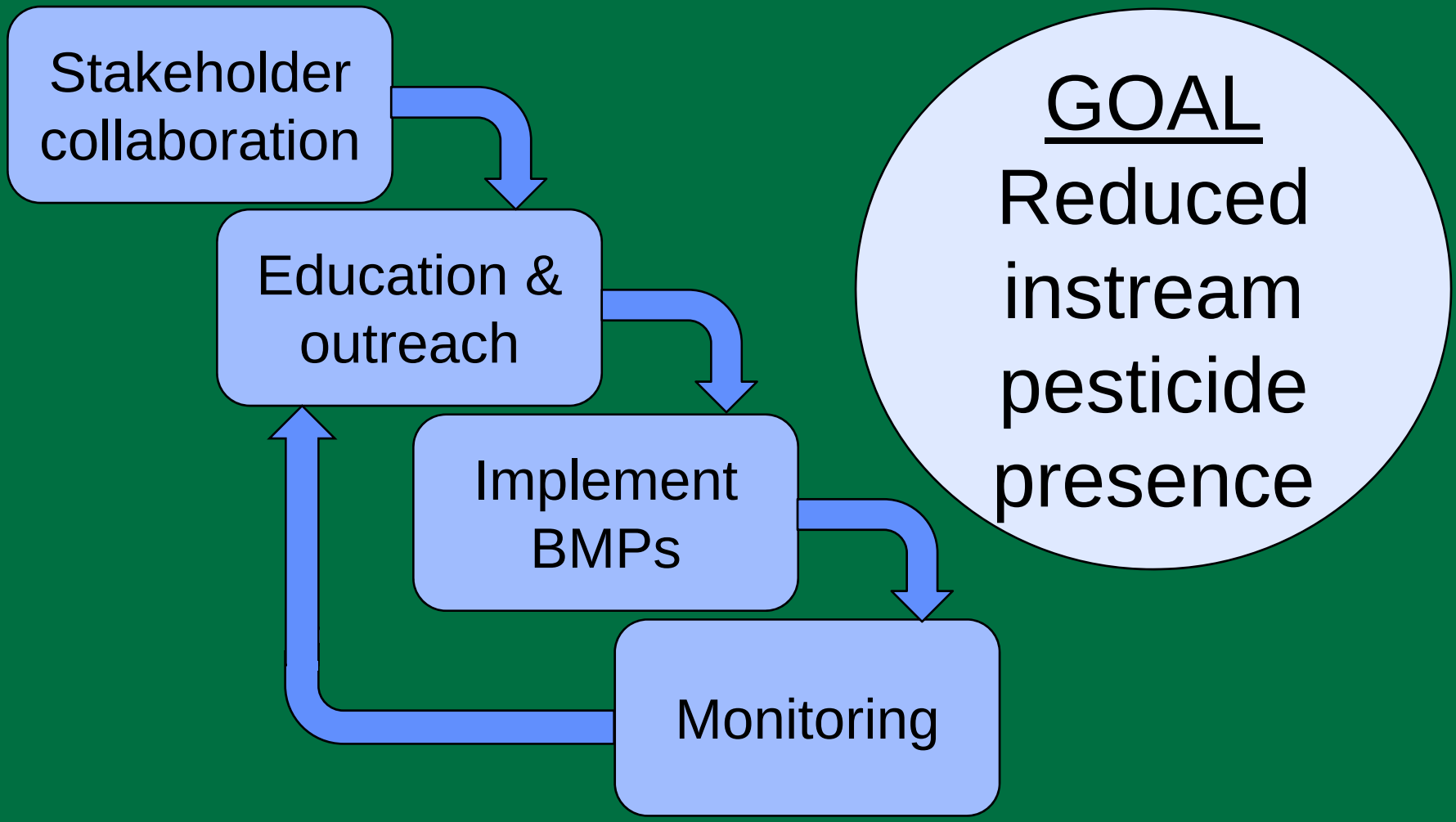
Pesticide Stewardship Partnerships



Summary of sampling locations/schedule: pesticides

- 16 sites
- 953 grab samples
- 78% collected March-June
- 10 OP insecticides, 4 OP degradation products, 2 herbicides (1999-2008)
- 100 pesticides (2009-present)

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Objectives

- Summarize pesticide & trace element data collected by ODEQ 1999-2009 in Hood basin
- Use the data to assess potential effects of those contaminants on the health of salmonids that spawn and rear in the basin
- Identify gaps in the dataset

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Analysis approach

- Summarize detection concentration & frequency
- Comparators:
  - Water-quality standards
  - Lethal concentrations
  - Concentrations causing sub-lethal effects to salmonids and their macroinvertebrate prey
- Analyze trends

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Select findings

- Herbicides (54% of detections, n=236):
  - 6 active ingredients detected
  - less-than-harmful concentrations
- Insecticides (43%, n=188):
  - 11 detected
  - concentrations exceeded water-quality criteria & effects thresholds
- Fungicides (3%, n=13), 2009 only:
  - 2 detected
  - less-than-harmful concentrations

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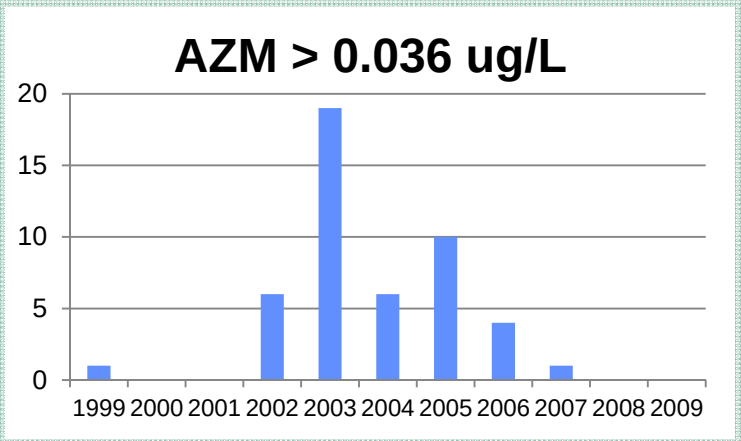
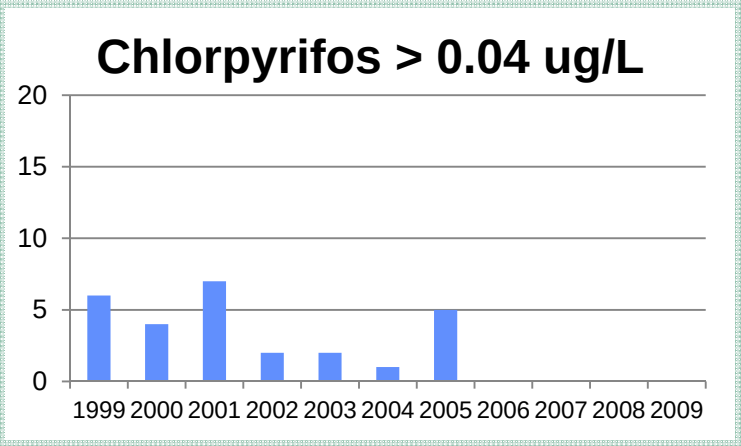
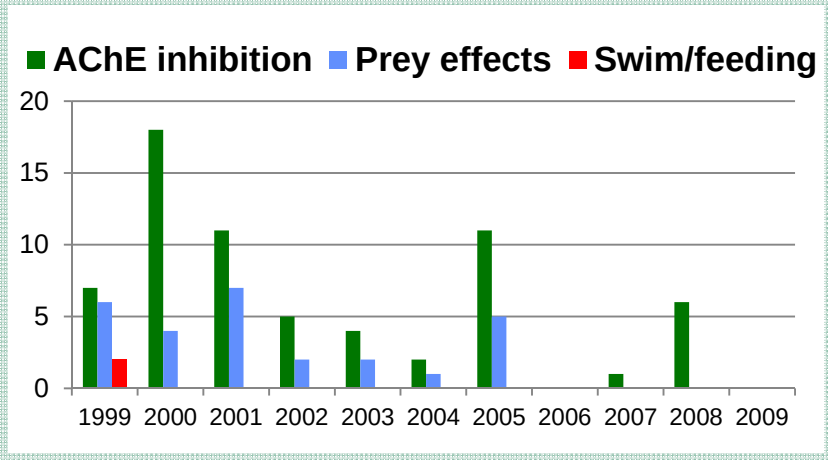
Findings: *Comparisons to thresholds*

	Exceeded WQ standards	Exceeded sublethal endpoints
Azinphos-methyl	✓	-
Chlorpyrifos	✓	Swimming Feeding AChE inhibition Effects to prey Growth*,Reproduction*
Diazinon	✓	Olfaction Effects to prey
Malathion	✓	Effects to prey
Endrin	✓	-
Phosmet	-	Effects to prey

Findings: *Comparisons to thresholds*

	Exceeded WQ standards	Exceeded sublethal endpoints
Azinphos-methyl		
Chlorpyrifos		

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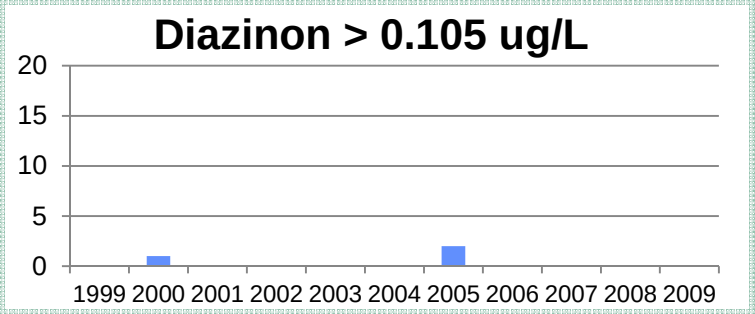
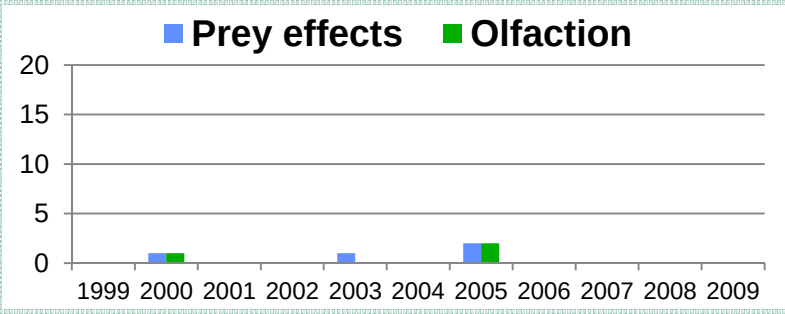
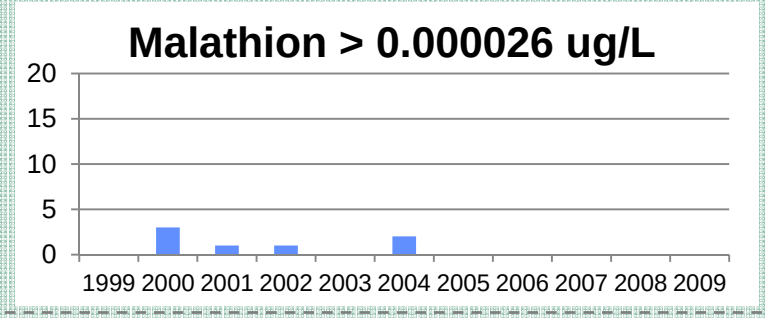
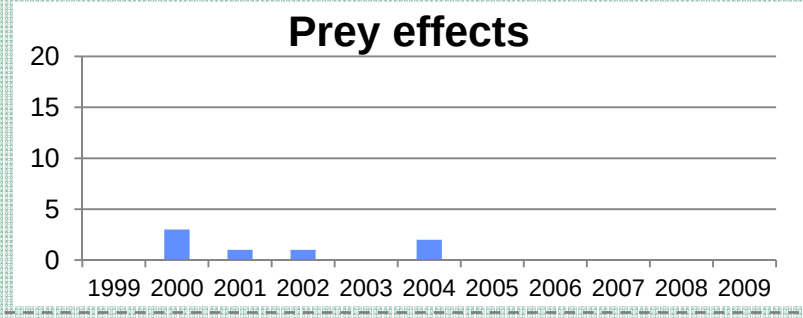
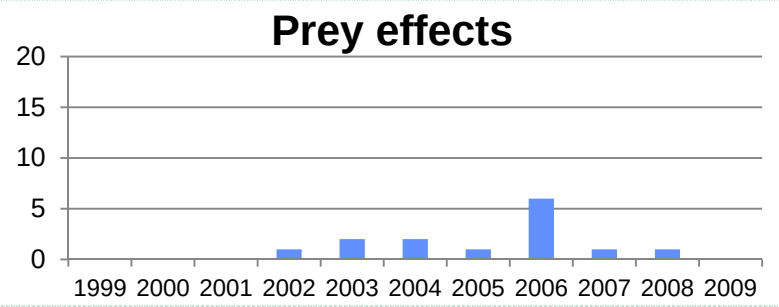
Findings: *Comparisons to thresholds*

	Exceeded WQ standards	Exceeded sublethal endpoints
Diazinon		
Malathion		
Phosmet		

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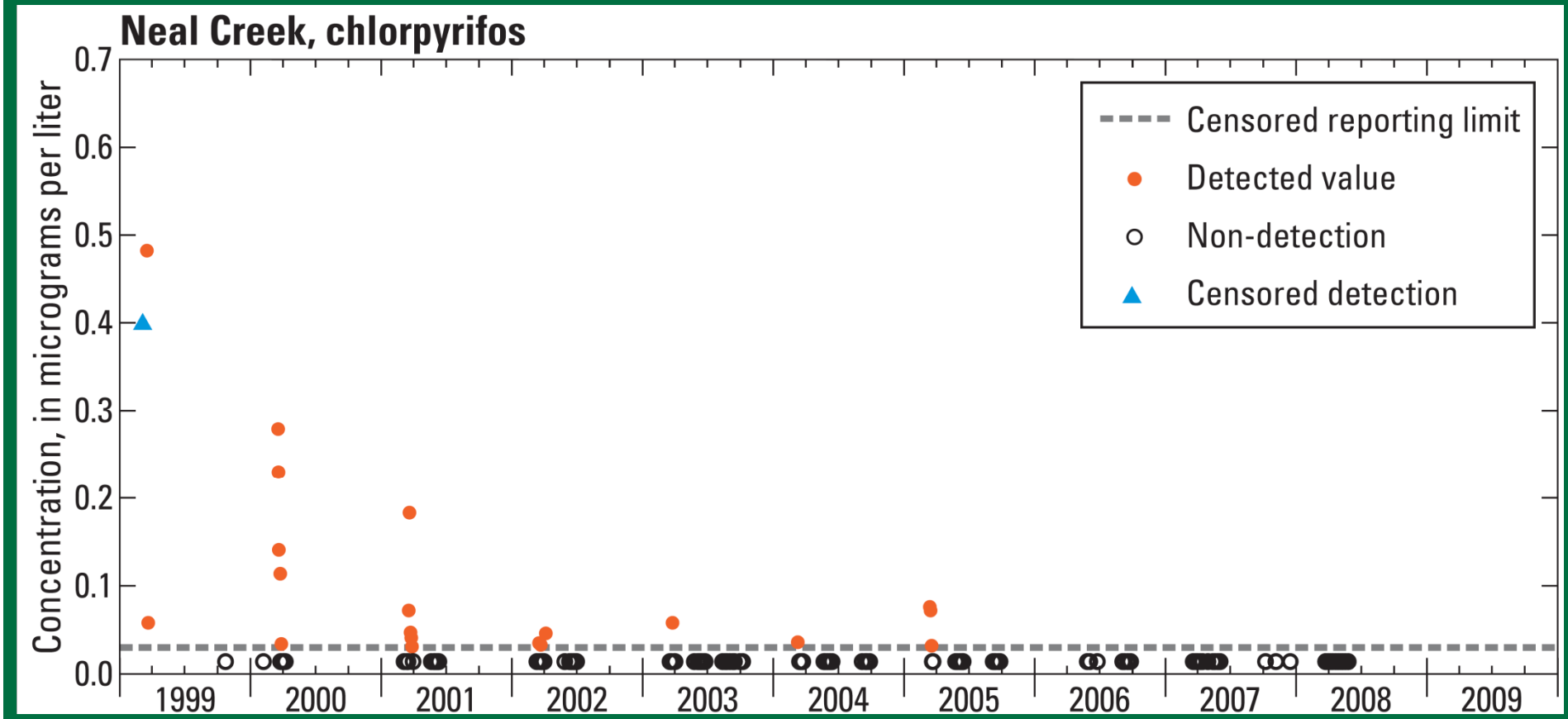
Findings: *Trends*



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Gaps in the dataset

- **Sediment-bound** pesticides may be underrepresented
- Presence of pesticides **used, but not analyzed**
  - Pyrethroids, neonicotinoids
- **Seasonal** presence of pesticides
- **Exposure duration** for aquatic biota
- Effects of pesticide **mixtures** at environmentally realistic concentrations

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Sampling since 2009:

- **ODEQ/PSP:**
  - **Continued sampling (grab and passive)**
  - **Agriculture and forestry**
  - **Ongoing education and outreach**

- **USGS passive sampling in basin helps fill data gaps identified in this analysis**
  - **Results will help guide new monitoring plan**
  - **May expand to other contaminants of concern**

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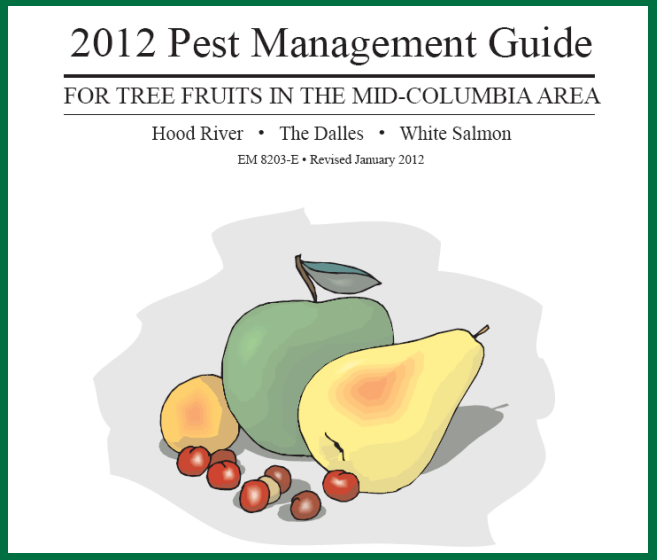
POCIS

SPMD

Summary

- PSPs: a unique collaboration
- Some issues addressed
- Ongoing work is addressing data gaps

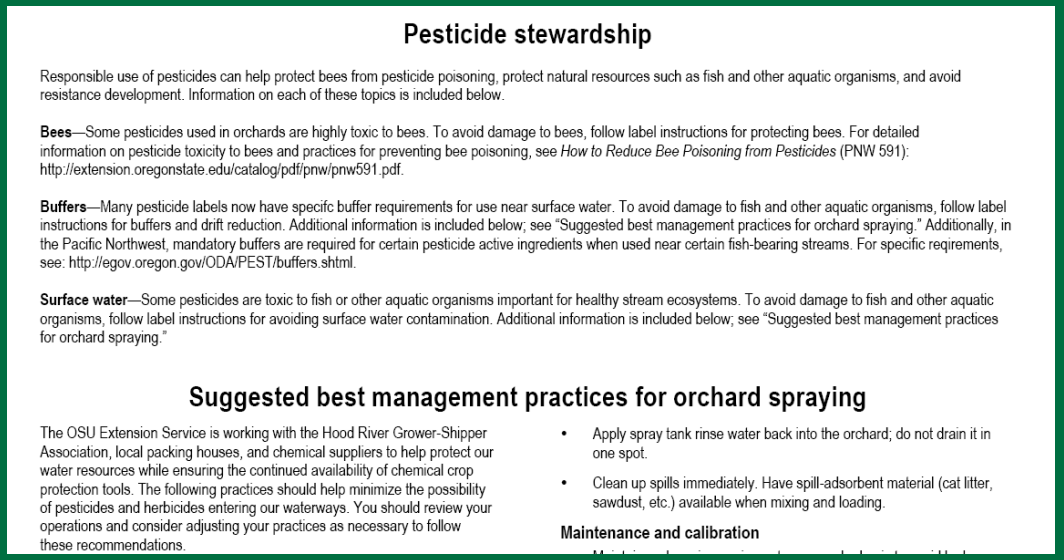


2012 Pest Management Guide

FOR TREE FRUITS IN THE MID-COLUMBIA AREA

Hood River • The Dalles • White Salmon

EM 8203-E • Revised January 2012



Pesticide stewardship

Responsible use of pesticides can help protect bees from pesticide poisoning, protect natural resources such as fish and other aquatic organisms, and avoid resistance development. Information on each of these topics is included below.

Bees—Some pesticides used in orchards are highly toxic to bees. To avoid damage to bees, follow label instructions for protecting bees. For detailed information on pesticide toxicity to bees and practices for preventing bee poisoning, see *How to Reduce Bee Poisoning from Pesticides* (PNW 591): http://extension.oregonstate.edu/catalog/pdf/pnw/pnw591.pdf.

Buffers—Many pesticide labels now have specifc buffer requirements for use near surface water. To avoid damage to fish and other aquatic organisms, follow label instructions for buffers and drift reduction. Additional information is included below; see "Suggested best management practices for orchard spraying." Additionally, in the Pacific Northwest, mandatory buffers are required for certain pesticide active ingredients when used near certain fish-bearing streams. For specific reqirements, see: http://egov.oregon.gov/ODA/PEST/buffers.shtml.

Surface water—Some pesticides are toxic to fish or other aquatic organisms important for healthy stream ecosystems. To avoid damage to fish and other aquatic organisms, follow label instructions for avoiding surface water contamination. Additional information is included below; see "Suggested best management practices for orchard spraying."

Suggested best management practices for orchard spraying

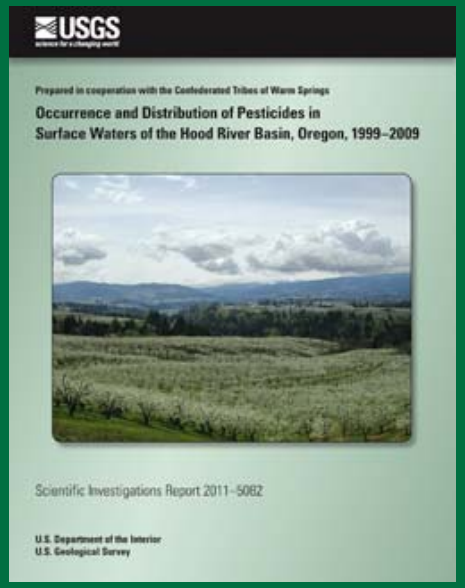
The OSU Extension Service is working with the Hood River Grower-Shipper Association, local packing houses, and chemical suppliers to help protect our water resources while ensuring the continued availability of chemical crop protection tools. The following practices should help minimize the possibility of pesticides and herbicides entering our waterways. You should review your operations and consider adjusting your practices as necessary to follow these recommendations.

- Apply spray tank rinse water back into the orchard; do not drain it in one spot.
- Clean up spills immediately. Have spill-adsorbent material (cat litter, sawdust, etc.) available when mixing and loading.

Maintenance and calibration

More information

- **Full report:**
  http://pubs.usgs.gov/sir/2011/5082/



- **ODEQ Pesticide Stewardship Partnerships:**
  www.deq.state.or.us/wq/pubs/factsheets/community/pesticide.pdf

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Findings: *spatial*

- **Detections at 13 sites**
- **No detections (3 sites)**
- **Exceeded WQ standards (9 sites)**

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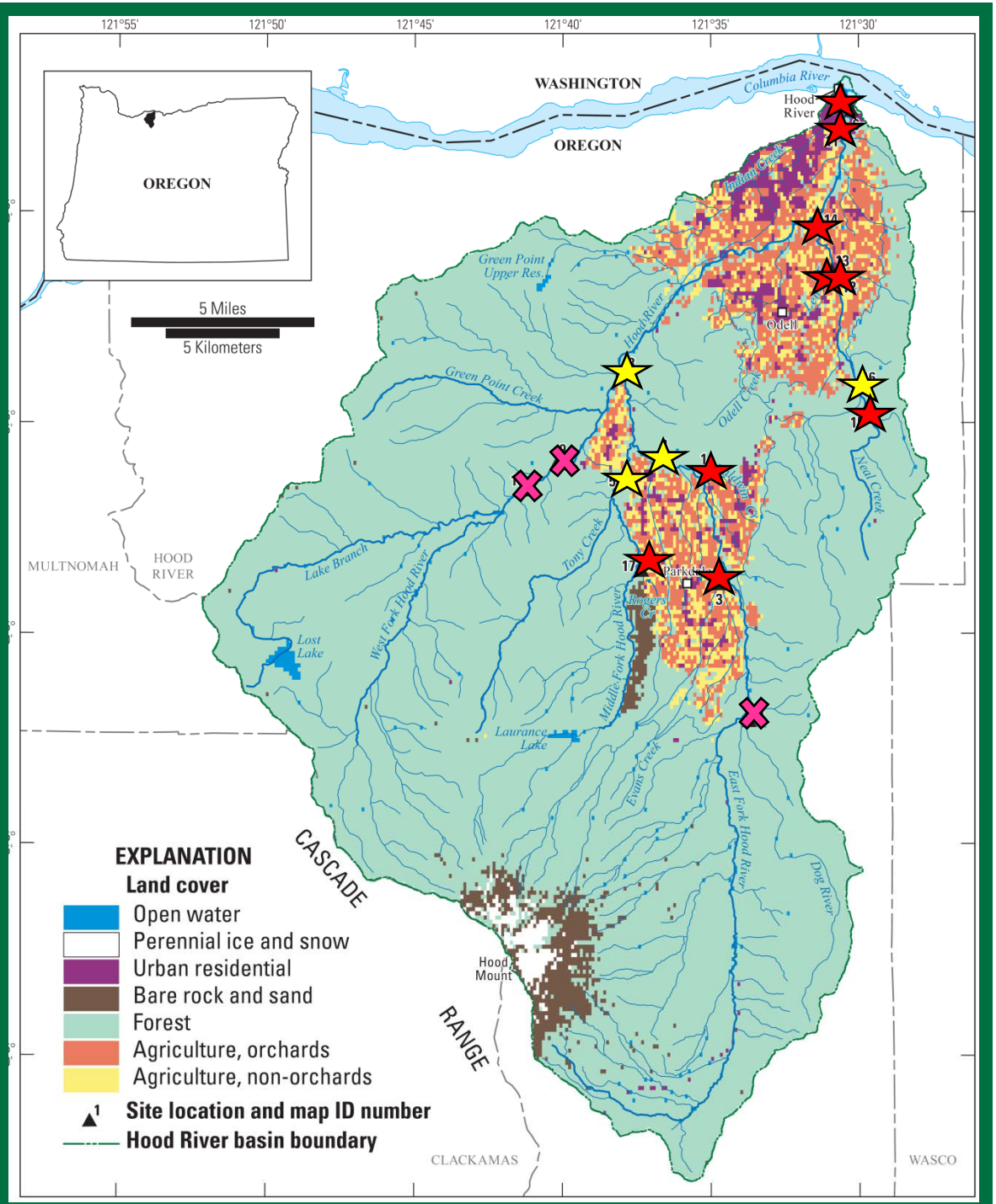

Findings: *Mixtures*

- 12% of samples with 2+ pesticides detected
  - OPs:
    - Azinphos-methyl (43% of mixture samples)
    - Chlorpyrifos (20%)
  - Herbicides:
    - Simazine (79%)
    - Diuron (31%)
    - Hexazinone (13%)

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