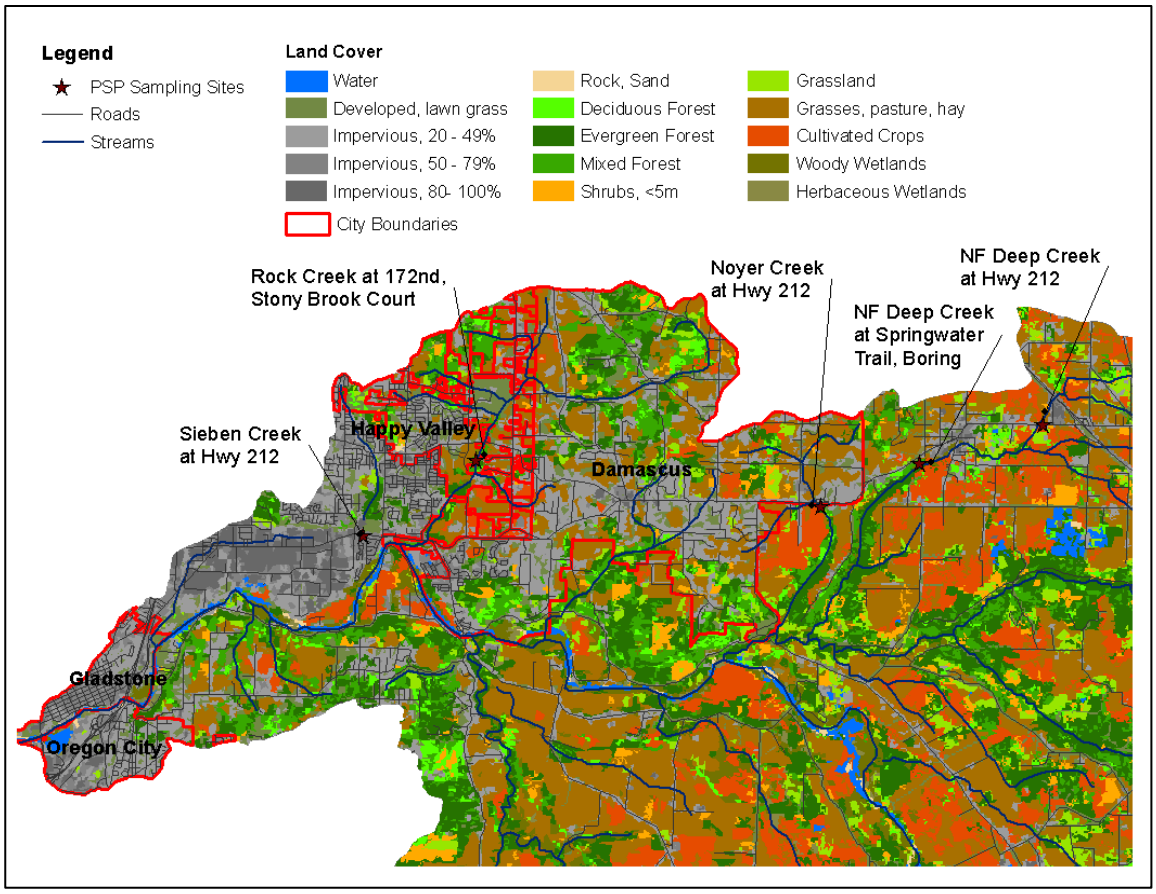
Pesticide Stewardship Partnership Monitoring Summary
Clackamas River Watershed
Updated February 2015

The Clackamas River provides drinking water for 400,000 people. Endangered fish spawn, rear and migrate in the Clackamas River and its tributaries. Thousands of people recreate on the Clackamas River year-round.

Several groups are collaborating to protect the Clackamas River watershed's resources and to understand how pesticides are degrading water quality, particularly for fish health and drinking water. The Oregon Department of Environmental Quality and local watershed-based groups initiated a Pesticide Stewardship Partnership in the Clackamas River watershed in 2005. The Pesticide Stewardship Partnership (PSP) is a collaborative monitoring, information sharing and problem solving effort. Regulations, alone, can't fully address all current pesticide issues because few current-use pesticides have established water quality standards. As well, mixtures of pesticides can result in greater impacts to aquatic life than a single pesticide, on its own. DEQ has found the PSP model very successful at reducing pesticide concentrations in surface water in the Hood River, Mill Creek (The Dalles) and Walla Walla Basins. But land uses in the Clackamas River basin are more heterogeneous than in those basins, so pesticide stewardship strategies need to reflect that complexity. Pesticides in the Clackamas River watershed have many applications including residential lawns and gardens, business landscaping, public parks, road and ditch maintenance, nurseries, Christmas tree farms, forestry, and golf courses.

Since 2005, DEQ has monitored five sites on tributaries to the lower Clackamas River: Noyer Creek, North Fork Deep Creek (two locations), Rock Creek, and Sieben Creek (Figure 1). The two sites surrounded by agricultural land use, including nurseries, are on Noyer Creek and North Fork Deep Creek.

Figure 1: Pesticide Stewardship Partnership sampling sites in the Clackamas River watershed.



Sampling Results

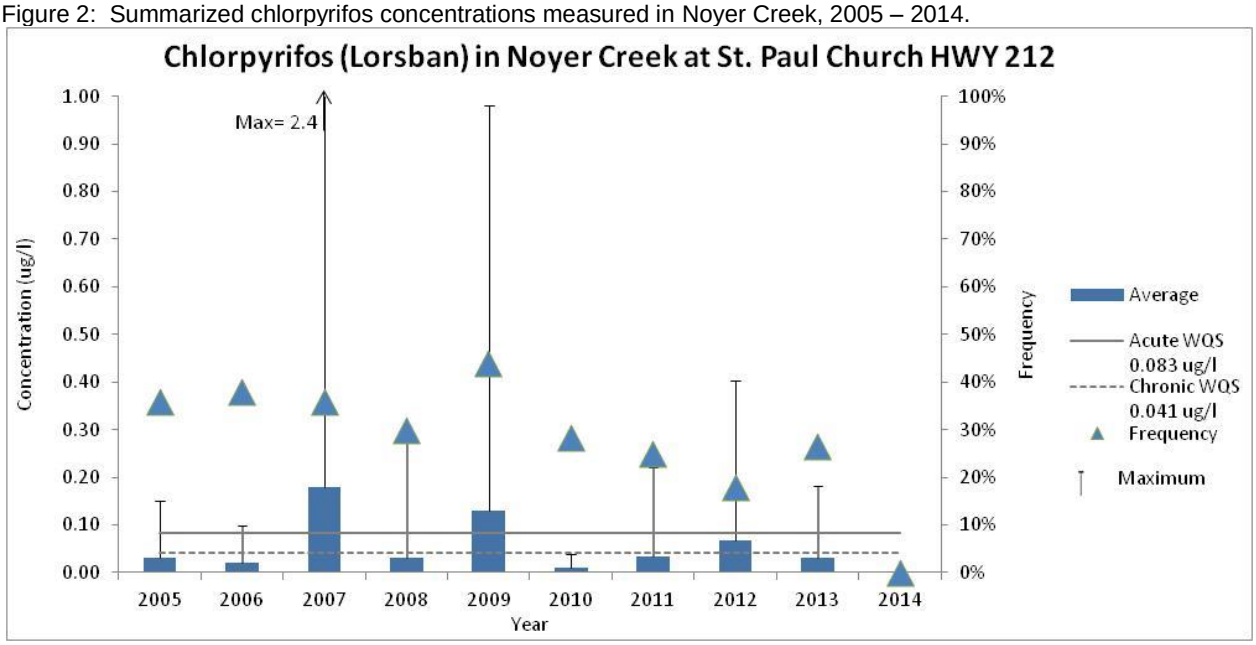
Between 2005 and 2008, DEQ's monitoring focused primarily on organophosphate insecticides, but in 2009 expanded to include over 100 pesticides. While very few of those pesticides have water quality criteria, most have non-regulatory benchmarks developed by EPA's Office of Pesticide Programs. DEQ's sampling and analysis have identified several pesticides measured in Noyer Creek and North Fork Deep Creek samples. Chemicals in Table 1 are those with elevated concentrations relative to benchmarks or frequent, multi-year detections. Chemicals in bold were detected at least once over aquatic life benchmarks or Oregon water quality criteria.

The one pesticide found consistently in the Clackamas River watershed for which chronic and acute water quality criteria have been set is chlorpyrifos (Lorsban). Although chlorpyrifos has not been detected in North Fork Deep Creek since 2011, it was detected at least once over the chronic water quality criterion every year between 2005 and 2013 in Noyer Creek (Figure 2). However, no chlorpyrifos was detected in Noyer Creek or any other monitoring location in 2014. Further, bifenthrin (Brigade), another insecticide that is highly toxic to aquatic life, was found over EPA benchmarks several times in 2012 and 2013, but was not detected in any samples in 2014. Another organophosphate insecticide, diazinon, has been detected multiple times in the Clackamas Basin since 2005, including once over the benchmark in 2012, but detections have notably decreased in recent years.

Table 1: Pesticides in the Clackamas River watershed measured at concentrations exceeding benchmarks, or having frequent multi-year detections.

INSECTICIDES	HERBICIDES	FUNGICIDES
Chlorpyrifos *(Lorsban)*	Diuron *(Karmex)*	**Chlorothalonil *(Bravo)***
Bifenthrin *(Brigade)*	Simazine *(Princep)*	Pyraclostrobin *(Headline)*
Diazinon *(Knox Out)*	Metolachlor *(Parallel)*	Propiconozole *(Propimax)*
Endosulfan Sulfate *(Thionex)*	Sufometuron-methyl *(Oust)*	
Ethoprop *(Mocap)*	Dimethenamid *(Frontier, Tower)*	
Imidacloprid *(Admire)*	Pendimethalin *(Prowl)*	
Carbaryl *(Sevin)*	Trifluralin *(Treflan)*	
	Oxyfluorfen *(Goal)*	
	Dichlobenil *(Casoron)*	

Figure 2: Summarized chlorpyrifos concentrations measured in Noyer Creek, 2005 – 2014.



With the addition of new pesticide analytes in 2009, the number of pesticides detected in Clackamas streams has increased. Since that time, between 25 and 30 pesticides have typically been detected across the four monitoring sites in the watershed each year. Figure 3 illustrates the 2014 detection frequency (percent of total samples in which pesticides were detected) in the Clackamas River watershed. The 10 most detected pesticides were herbicides or breakdown products of herbicides. As with many other watersheds around the state diuron is one of the most frequently detected herbicides, with at least some of those detections close to or exceeding the lowest EPA aquatic life benchmark concentration. Figure 4 shows the maximum 2014 diuron detection was more than twice the lowest EPA benchmark of 2.4 ug/L, despite detection frequency across sites dropping to the lowest level in six years of monitoring.

Figure 3: Detection frequency for pesticides in the Clackamas River watershed, 2014.

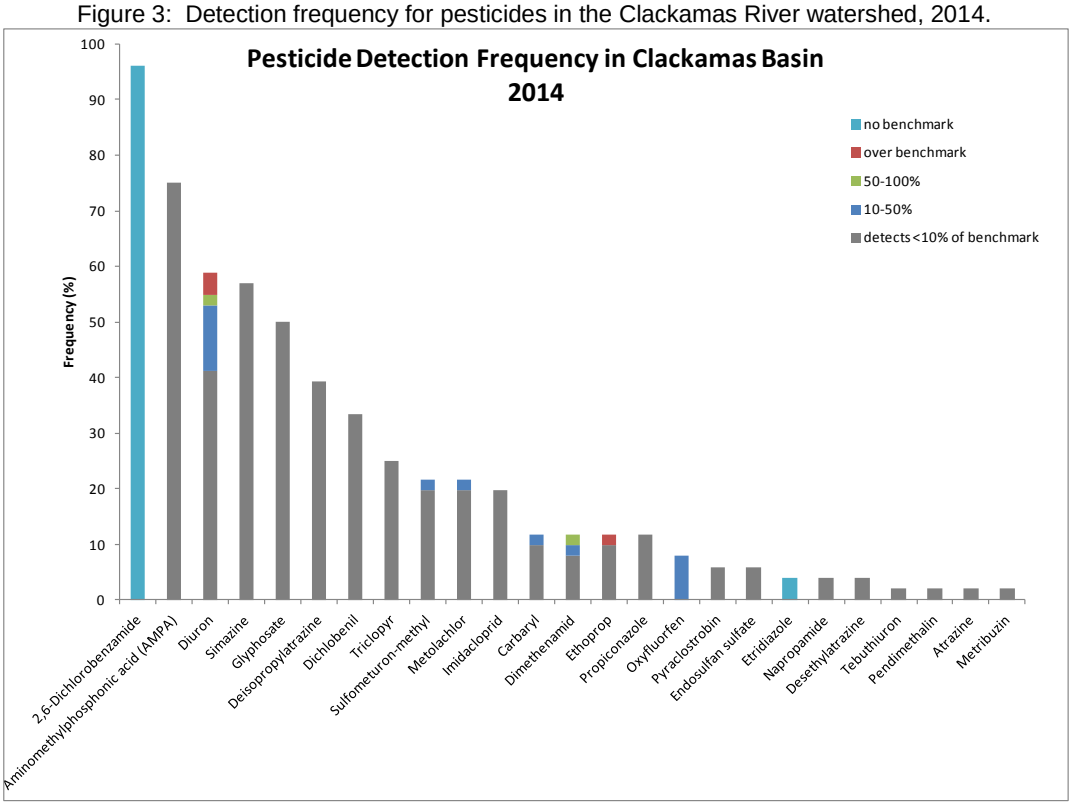
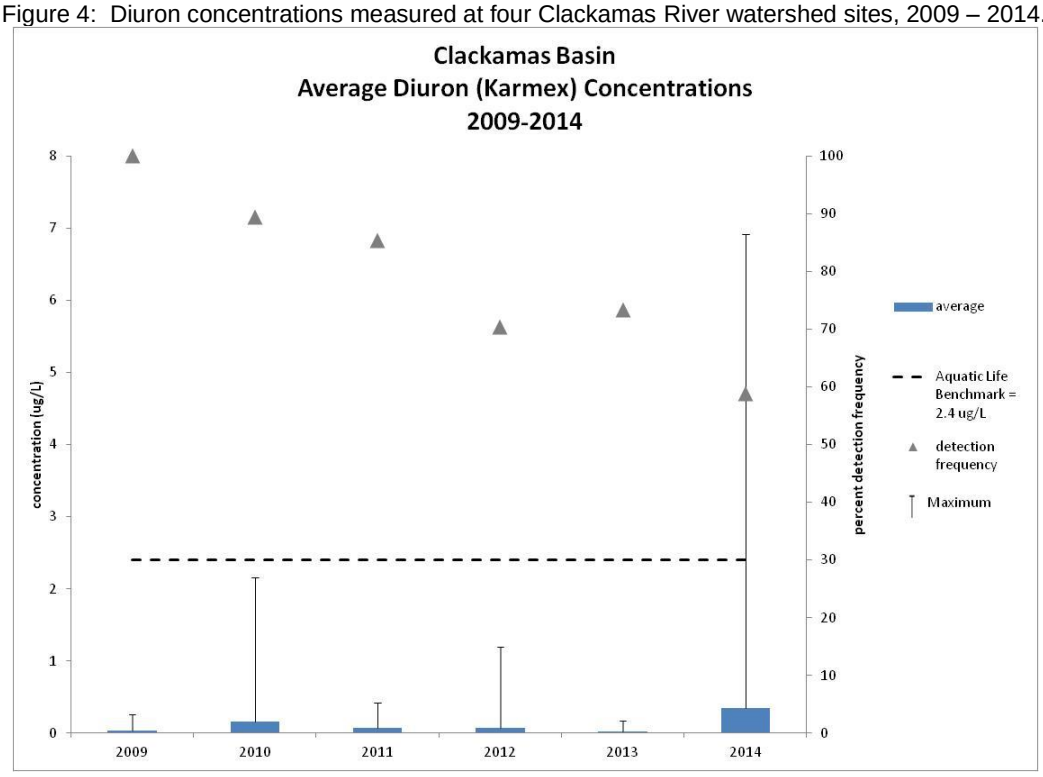


Figure 4: Diuron concentrations measured at four Clackamas River watershed sites, 2009 – 2014.



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