

Indian Slough

FEBRUARY 2023

Summary of 2021 Surface Water Monitoring Program Results



In 2021, Washington State Department of Agriculture (WSDA) monitored 18 sites in Washington. Indian Slough was one of three monitoring sites located in Skagit County.

Samples were analyzed at the Manchester Environmental Lab, Port Orchard, Washington.

WSDA compares detected pesticide concentrations to WSDA assessment criteria, which are half of state and federal water quality criteria. Each pesticide has its own assessment criteria, based on its toxicity to aquatic animals, insects, and plants.

Site information:

Years sampled: 2006 – present

Fish habitat: Fall Chinook, coho, fall chum, and pink salmon; and winter steelhead trout (SalmonScape: apps.wdfw.wa.gov/salmonscape)

Sampling dates:

18 weeks, April 5 – July 12 and September 29 – October 12

Water testing:

Samples were tested for 170 current and legacy chemicals (59 insecticides, 58 herbicides, 23 fungicides, 19 pesticide degradates, 6 legacy chemicals, 2 synergists, 1 antimicrobial, 1 insect repellent, and 1 wood preservative).

Products listed are for descriptive purposes only and do not imply endorsement by the author or the Department of Agriculture.



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Indian Slough water releases directly into Puget Sound and is tidally influenced. The Skagit Valley (including the Indian Slough watershed) is a major pit stop for migratory waterfowl, including trumpeter swans, tundra swans, snow geese, and other birds. New Zealand mud snails, an invasive aquatic species, were observed in the slough. Staff saw several adult salmon multiple times in the late fall of 2021 upstream of the Indian Slough tide gate where the monitoring site was located.

Results:

- There were 58 unique chemicals detected with a total of 455 detections in Indian Slough. Of these, 28 detections were above WSDA assessment criteria. Roughly 60% (16 detections) of exceeding detections were from DDT and its degradates.
- When multiple pesticides are detected simultaneously, the harmful effects can combine; multiple pesticides were detected every week Indian Slough was sampled. Between 15 and 39 pesticides were detected at each sampling visit.
- WSDA identifies some pesticides as Pesticides of Concern (POC) when they have been detected above WSDA's assessment criteria and above established detection frequencies.

Watershed-specific POCs in Indian Slough:

ICONS FOR ENVIRONMENTAL HAZARDS LISTED ON PESTICIDE LABELS



Bifenthrin - Insecticide

- Common trade name:** Sniper
- Example uses within watershed:** berry, grass hay, potato
- Bifenthrin has extremely low solubility in water. Contamination is likely from bifenthrin bound to the soils in runoff.
- This chemical was also a watershed POC in three other monitored watersheds.



Diuron - Herbicide

- Common trade names:** Direx, Karmex
- Example uses within watershed:** berry, corn, cucumber, nursery, market crops, right-of-way
- This chemical can transport into the environment via drift or runoff and can contaminate groundwater. Diuron has been found in groundwater in Washington State.
- Also detected in nine other monitored watersheds and a POC in six of them.



Fipronil - Insecticide

- Common trade name:** Termidor
- Example uses within watershed:** ornamental tree, asphalt/cement, commercial, residential
- Also detected in six other monitored watersheds and a POC in three of them.



Imidacloprid - Insecticide

- Common trade names:** Admire Pro, Gaucho, Merit
- Example uses within watershed:** berry, corn, potato, wheat, spinach, residential
- Also detected in 13 other monitored watersheds and a POC in 10 of them.



Indaziflam - Herbicide

- Common trade names:** Esplanade, Marengo, Specticle
- Example uses within watershed:** Nursery/ornamental, residential, right-of-way, turf
- Also detected in four other monitored watersheds and a POC in one of them.



Malathion - Insecticide

- Common trade names:** Malathion, Fyfanon
- Example uses within watershed:** berry, corn, grass hay, pasture, potato, wheat
- A streamside no-spray buffer zone is required in Washington for malathion to protect threatened and endangered Pacific salmon and steelhead.
- Also detected in seven other monitored watersheds and a POC in three of them.

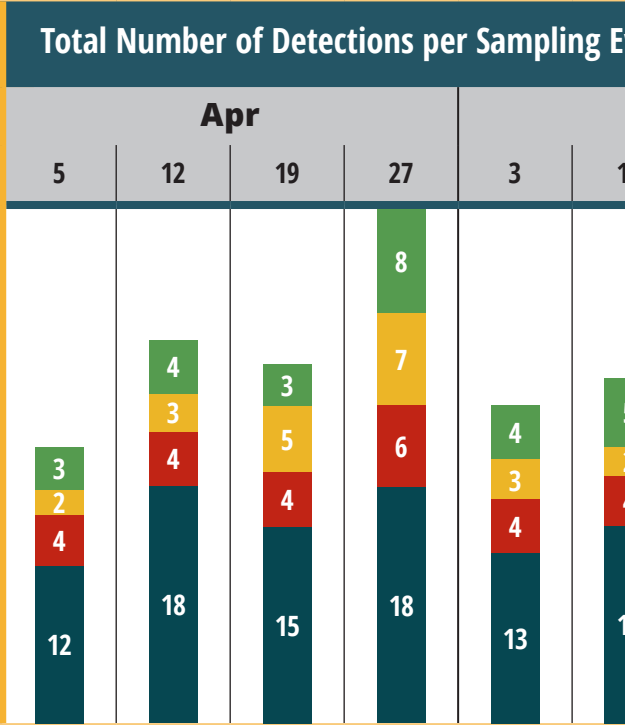


The calendar at right shows the concentration in $\mu\text{g/L}$ and date sampled of each watershed POC. The “-” identifies data that could not be collected or analyzed. This calendar does not include all the pesticides WSDA found during the growing season. Detected concentrations that exceed WSDA’s assessment criteria have a higher potential to cause harm to aquatic ecosystems. The measured streamflow varied across sampling events due to tidal influence at the site.

[* H: Herbicide; I: Insecticide]
 exceeds assessment criteria
 below assessment criteria

Watershed Pesticides of Concern Detected and their Corresponding Sample Date						
Month	Apr					
Day of the Month	Use*	5	12	19	27	3
Diuron	H	0.011	0.010	0.010	0.011	0.008
Fipronil	I	0.004			0.008	
Imidacloprid	I			0.010	0.007	0.004
Indaziflam	H		0.011		0.026	0.002
Malathion	I		0.009			
Suspended sediment concentration (mg/L)		-	-	11	11	12
Streamflow (cubic ft/sec)		32.8	36.0	23.6	31.8	17.2
Precipitation (total in/week)		0.01	0.50	0	0.65	0.11

The graph at right shows the total number of detections per sampling visit in each pesticide category. The category ‘other’ includes legacy, degradates, and additional pesticide-related chemicals. Note that the number of detections between categories cannot be directly compared due to the different number of chemicals in each category and variability in analysis methods used.



Recommendations:

Make use of natural protections

- Use buffers, filter strips, sediment basins, ground cover, and setbacks.
- Maintain vegetation along creeks and take care during spring time applications before vegetation along streams leaves out.

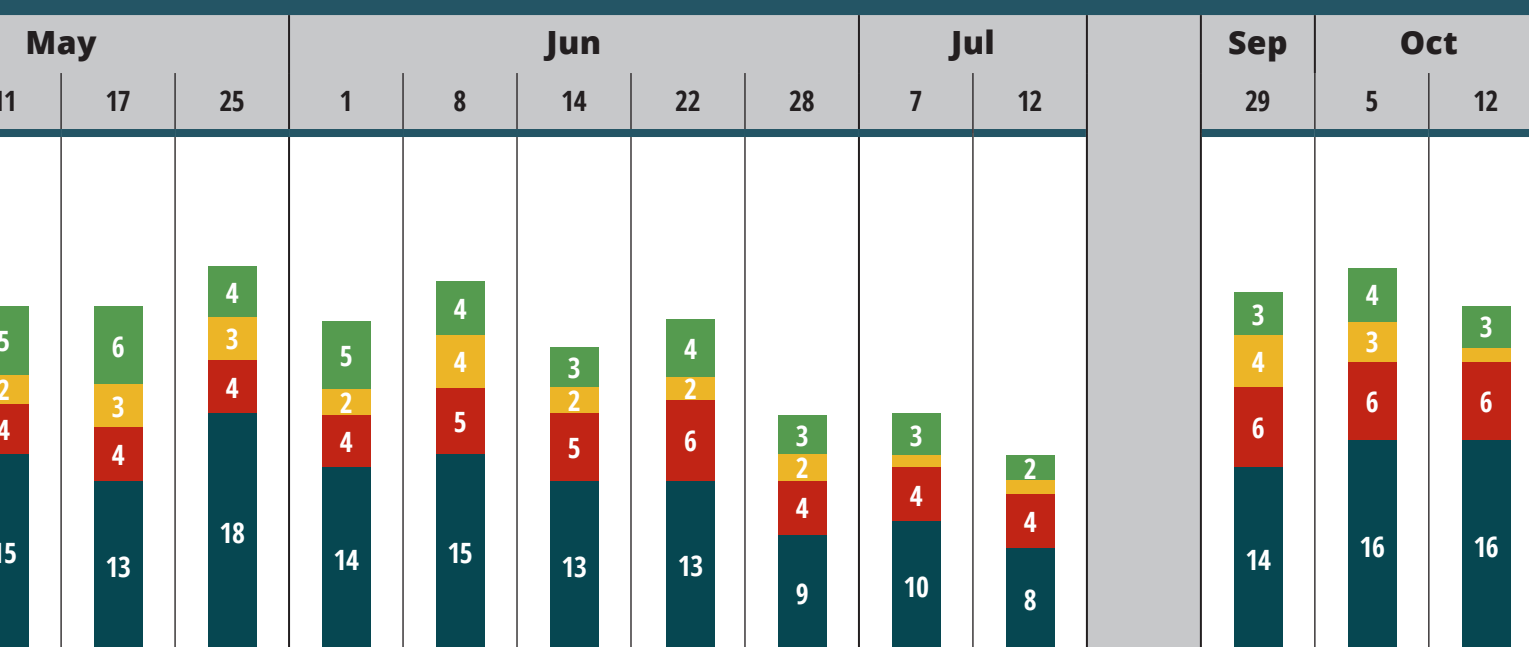
Be informed

- Read and follow pesticide label directions.
- Check the weather forecast to reduce the chances of drift or runoff.
- Review WSDA’s Pesticides of Concern and choose less-toxic pesticides when possible.

Sampling Dates and Concentrations

May			Jun					Jul			Sep	Oct	
11	17	25	1	8	14	22	28	7	12		29	5	12
0.006	0.007	0.006	0.005	0.006	0.004	0.007	0.006	0.004	0.005		0.014	0.027	0.012
		0.007									0.005	0.007	
	0.006	0.004	0.075	0.024	0.010	0.010	0.005				0.009		
0.002						0.002					0.003	0.003	
11	13	11	11	10	9	8	7	5	4		5	8	6
17.2	16.5	22.8	9.3	14.7	12.6	10.5	10.3	13.6	-		23.5	13.4	6.2
0.33	0	0.39	0.12	0.26	0.30	0.05	0	0	0		0.86	0.64	0.83

Event by Pesticide Category



Please see agr.wa.gov/AgScience for more information.

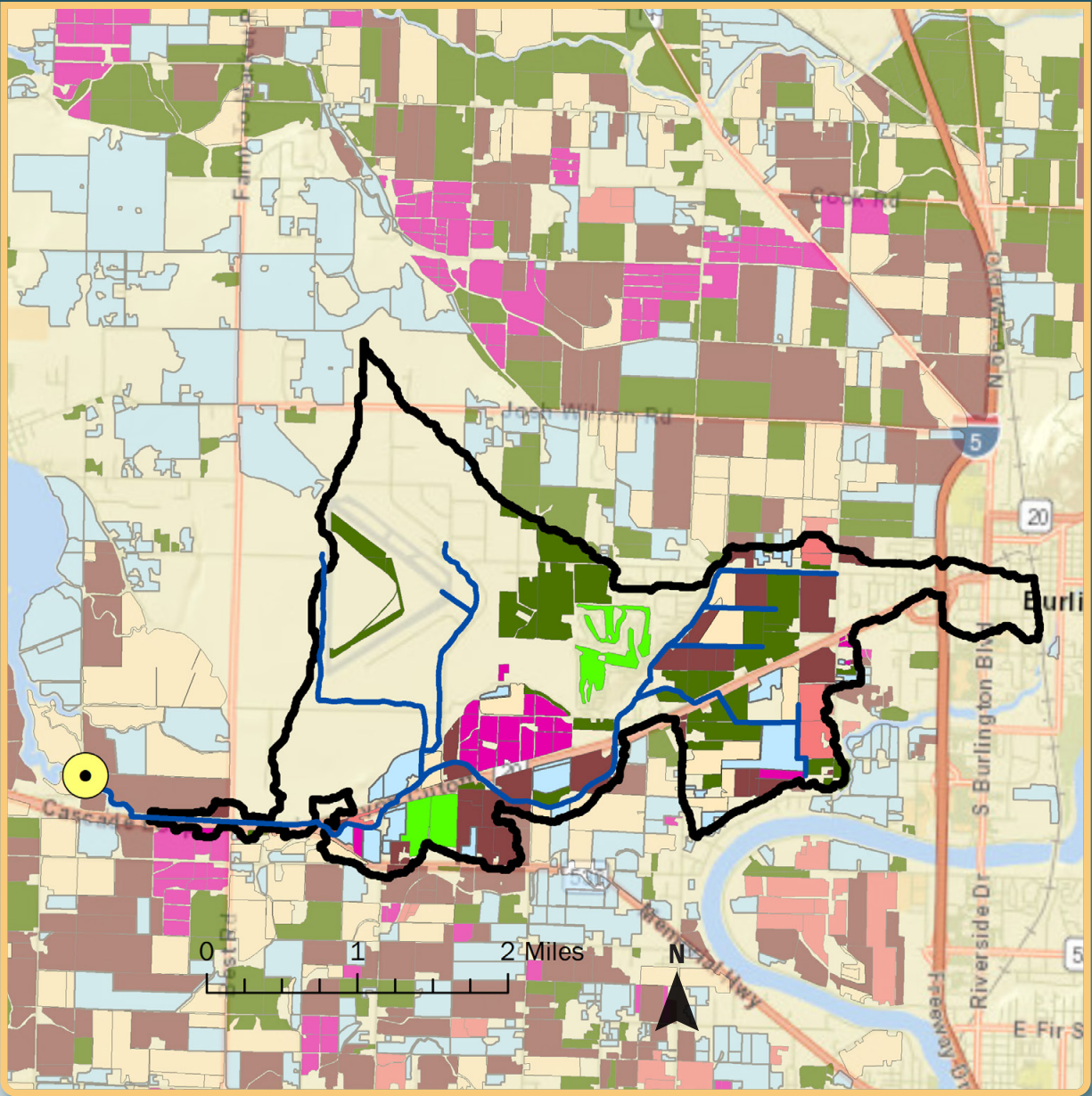
Care for your equipment and products

- Calibrate, maintain, and inspect application equipment.
- Properly dispose of all unneeded pesticides. Visit agr.wa.gov/wastepesticide to learn about waste pesticide collection events.



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Indian Slough crop groupings | acres

■ Other	256
■ Berry	181
■ Cereal Grain	231
■ Hay / Silage	586
■ Nursery	91
■ Turfgrass	152
■ Vegetable	480

- Sampling Location
- Indian Slough
- Indian Slough Watershed

Total Agriculture 1,977 acres

Watershed Total 5,025 acres

To view mapped crop groups at the field scale, download the WSDA Agricultural Land Use data or view the interactive web map here:
<https://agr.wa.gov/departments/land-and-water/natural-resources/agricultural-land-use>