



PESTICIDE DETECTIVES

A national assessment of pesticides in
waterways

Project Summary

Pesticide Detectives is an Australia-wide citizen science project assessing concentrations of pesticides in sediment from waterways surrounding various land uses. Citizen scientists collected sediment from 240 sites over four sampling events from April 2019 to July 2020. The analysis involved a pesticide screen of 110 different types of pesticides. Twelve different pesticides were detected in the sediment samples.

Pesticides were detected in sediment from 32 out of 240 sites. These sites are surrounded by various types of land uses such as recreational, agricultural, viticulture, cropping, livestock, urban and rural residential, and industrial.

Bifenthrin was the most common pesticide detected at 23 sites across Australia. ANZECC/ARMCAZ default guideline values (DGVs) are not available for bifenthrin. Concentrations greater than $1.91 \mu\text{g/gOC}$ pose a risk to freshwater crustaceans (Jeppe et al., 2017). Concentrations exceeded $1.91 \mu\text{g/gOC}$ at eight sites. The highest concentrations of bifenthrin were found in sediment from Orphan School Creek in NSW at $26.09 \mu\text{g/gOC}$ and from the Darling River in NSW at $13.89 \mu\text{g/gOC}$.

Legacy pesticides dieldrin, aldrin, and DDT were phased out in Australia in the 1990s. Dieldrin, aldrin and DDT metabolites, DDE and DDD were detected at several sites showing evidence of persistence in the aquatic environment.

DDE was detected above the DGV at Bakers Creek (VIC) and Onkaparinga River Tributary (SA) and above the upper guideline value (GV-High) at sites in Wee Waa and Narrabri in NSW.

PROJECT FUNDING



PROJECT PARTNERS

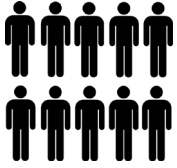




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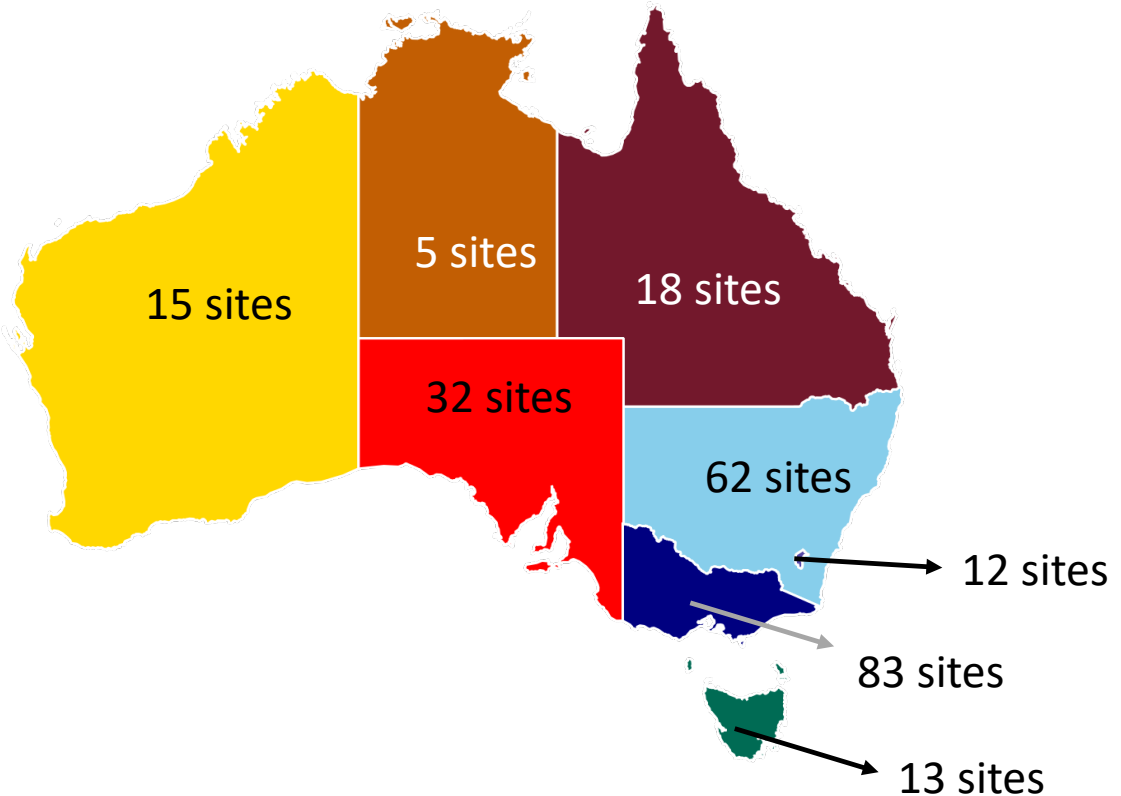
VOLUNTEER PARTICIPATION

48 groups Australia-wide
>100 participants

Sediment samples collected from 240 sites across all states/territories

Pesticides were detected at 32 sites:

- 33% of sites (4 out of 12 sites) in ACT
- 15% of sites (9 out of 62 sites) in NSW
- 17% of sites (3 out of 18 sites) in QLD
- 9% of sites (3 out of 32 sites) in SA
- 8% of sites (1 out of 13 sites) in TAS
- 12% of sites (10 out of 83 sites) in VIC
- 14% of sites (2 out of 15 sites) in WA



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USES OF DETECTED PESTICIDES

Organochlorine insecticides



Aldrin/Dieldrin - Aldrin and Dieldrin are legacy organochlorine insecticides that were phased out in Australia together with other organochlorines in November 1997. They were used to control soil insects in crops such as corn and potatoes. Dieldrin was commonly used for the protection of wood against termites and wood borers.

DDE/DDD - Both DDE and DDD are metabolites of DDT, an organochlorine insecticide used to protect agricultural crops against insects in Australia and for mosquito control worldwide and has been banned in Australia since 1987.

Organophosphate insecticides

Chlorpyrifos - Is an organophosphate insecticide used to control different kinds of insect pests. Chlorpyrifos acts on the nervous system of insects.

Synthetic pyrethroids

Bifenthrin, Fenvalerate, Permethrin - Synthetic pyrethroid insecticides used in a combination of home gardens, agriculture, commercial and domestic pest control.

Fungicides



Tebuconazole and Propiconazole - Tebuconazole is a broad spectrum fungicide used in home gardens, agriculture, turf grass & ornamentals for controlling foliar fungi. Propiconazole is a fungicide used on crops and for controlling turf pathogens.

Iprodione - A fungicide used to control a wide variety of crop diseases. It inhibits the germination of spores.

Herbicide



Diuron - Broad spectrum herbicide and algaecide used to control weeds in agriculture and irrigation channels and to protect boats from algal growth.

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Pesticides detected at the 32 sites

Type of pesticide	Name	No. of detects	States
Synthetic pyrethroid insecticide	Bifenthrin	23	NSW, ACT, QLD, WA, SA, VIC
Synthetic pyrethroid insecticide	Permethrin	2	VIC, NSW
Synthetic pyrethroid insecticide	Fenvalerate	1	VIC
Organochlorine insecticide	Dieldrin	4	NSW
Organochlorine insecticide	Aldrin	1	VIC
Organochlorine insecticide	DDE	4	NSW, SA
Organochlorine insecticide	DDD	1	NSW
Organophosphate insecticide	Chlorpyrifos	2	NSW
Herbicide	Diuron	2	TAS, QLD
Fungicide	Tebuconazole	2	SA, VIC
Fungicide	Iprodione	1	VIC
Fungicide	Propiconazole	1	VIC

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Breakdown of pesticides detected in the different states and territories

Names of pesticides/state or territory	ACT	NSW	NT	QLD	SA	TAS	VIC	WA
Bifenthrin	✓	✓		✓	✓		✓	✓
Permethrin		✓					✓	
Fenvalerate							✓	
Dieldrin		✓						
Aldrin							✓	
DDE		✓			✓		✓	
DDD		✓						
Chlorpyrifos		✓						
Diuron				✓		✓		
Tebuconazole					✓		✓	
Iprodione							✓	
Propiconazole							✓	
Total	1	6	0	2	3	1	8	1

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My site has pesticides - what do I do now?

Please contact the Australian Pesticides and Veterinary Medicines Authority (APVMA) for information on the chemical of interest. APVMA: +61 2 6770 2300. A single sample gives us an idea of the occurrence of pesticides, additional samples can confirm their presence and concentrations over time and help work out the next steps.

Why were pesticides not detected at my site?

- Pesticides that we are screening for may not have been present in the sediment at the site, which is good news!
- New pesticides are being created every day - while we have screened for an extensive list of pesticides, there may not be a test available to detect a particular pesticide that is present.
- Some pesticides are more water-soluble and, if present, may not have adsorbed to sediment sufficiently for detection to occur.
- Dynamics of the waterway may mean that pesticides could have been present in sediment in different locations of the waterway but not at the specific sites that were sampled.
- Quality of sediment may affect detection of pesticides. Pesticides may not adsorb to sandy or coarse sediment compared to fine sediment.

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