



Pesticide Detectives

Interpretation of results
Sampling Blitz 4 - July 2020

KEY FINDINGS

- Pesticides were detected in sediment at 16 out of 85 sites (14%); meaning most sites sampled in this round did not have detects of pesticides that are on our list (see [www.http://pesticidedetectives.com.au/pesticides-tested-for/](http://pesticidedetectives.com.au/pesticides-tested-for/) for a full list of pesticides).
- Nine pesticides were detected in sediment for sampling blitz 4. These are dieldrin, DDE and DDD, chlorpyrifos, bifenthrin, fenvalerate, permethrin, propiconazole and tebuconazole (see [www.http://pesticidedetectives.com.au/pesticide-information/](http://pesticidedetectives.com.au/pesticide-information/) for more information).
- Pesticides were detected at six sites in New South Wales, five sites in Victoria, and one site each in South Australia and Queensland.
- Bifenthrin (a synthetic pyrethroid insecticide) was most commonly detected at 10 out of the 16 sites, followed by DDE, detected at four sites.



Bifenthrin, Permethrin and Fenvalerate

ANZECC/ARMCAZ (see: <https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/sediment-quality-toxicants>) toxicant default guideline values (DGVs) for sediment quality is not available for bifenthrin. Values were normalised based on Jeppe et al. (2017) for toxicity comparisons.

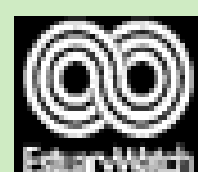
- Highest concentrations of bifenthrin were detected at the Darling River in NSW (13.89 $\mu\text{g/gOC}$) followed by four other sites where concentrations ranged from 2.32 to 2.75 to $\mu\text{g/gOC}$. These four sites are, Little Salt Pan Creek (NSW), Orphan School Creek (NSW), Scotchmans Creek (VIC) and Four Mile Drain (QLD). Concentrations detected at the remaining five sites were all below 1.91 $\mu\text{g/gOC}$.
- Concentrations greater than 1.91 $\mu\text{g/gOC}$ pose a risk to freshwater crustaceans (Jeppe et al., 2017) suggesting that impacts may be occurring at the Darling River site and the other four sites. Further testing is required at these sites to investigate if detection is persistent.
- Permethrin, a synthetic pyrethroid, was detected in sediment from Orphan School Creek (NSW) at 0.004 mg/kg. Fenvalerate, a synthetic pyrethroid in household insecticides, was detected in sediment from Scotchmans Creek (VIC) at 0.013 mg/kg. These are likely from residential use as these two creeks are surrounding by urban residential land. Sediment DGVs are not available for permethrin and fenvalerate.



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DDT and its metabolites

KEY FINDINGS

DDT is a legacy pesticide and its registration was discontinued in Australia in 1997. DDT was not detected in sediment, but breakdown products DDD and DDE were detected at several sites showing their long-lived persistence in the environment.

ANZECC/ARMCAZ (2000) sediment quality default guideline values (DGVs), normalised to 1% organic carbon, dry weight for:

DDD is 3.5 $\mu\text{g p.p}'\text{-DDD/kg}$

DDE is 1.4 $\mu\text{g p.p}'\text{-DDE/kg}$

The upper guideline value (GV-High) for DDE is 7.0 $\mu\text{g p.p}'\text{-DDE/kg}$

DDE was detected above the DGV at the two sites listed below and above the GV-High at Wee Waa and Narrabri in NSW. Further investigations are necessary at these sites for re-testing and determining impacts to aquatic biota.

>DGV

Bakers Creek (VIC) at 0.003 mg/kg*

Onkaparinga River Tributary (SA) at 0.004 mg/kg*

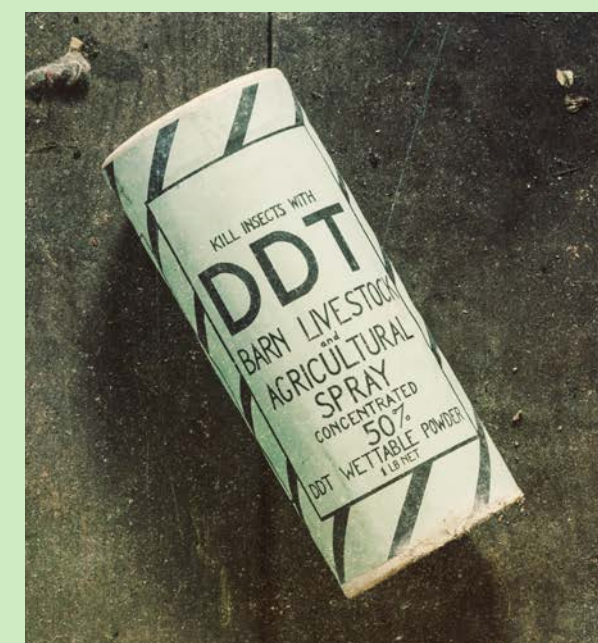
>GV-High

Wee Waa (NSW) at 0.008 mg/kg*

an agricultural site in Narrabri (NSW) at 0.033 mg/kg*

DDD was also detected at the site in Wee Waa (NSW) at 0.001 mg/kg* below the guidelines (DGV).

*normalised to organic carbon



Chlorpyrifos is an organophosphate insecticide used on pests in agriculture. It is also used on buildings for termites and ants. Chlorpyrifos was detected in sediment from Little Salt Pan Creek (NSW) and Orphan School Creek (NSW) at 0.037 mg/kg and 0.030 mg/kg respectively. The presence of the insecticide at the urban sites could be attributed to residential and public space use. Its half-life in sediment has been reported at 200 days.

Sediment guidelines (DGV) for chlorpyrifos is not available.

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Dieldrin

Dieldrin, an organochlorine insecticide, was also detected in sediment from Poulton Creek (NSW) and Little Salt Pan Creek (NSW) at 0.020 mg/kg* and 0.004 mg/kg* respectively. It was also detected in sediment at Wee Waa (NSW) at 0.002 mg/kg*

These concentrations are low when compared to the ANZECC/ARMCAZ (2000) guidelines (DGV) of 0.12 mg/kg* dieldrin (Simpson et al., 2013) for freshwater sediment. Dieldrin is a legacy pesticide and was phased out in 1997 in Australia. Degradation of this pesticide will occur slowly over time.

*normalised to organic carbon.



Propiconazole and Tebuconazole

The fungicide, propiconazole, was detected in sediment from an urban site at Scotchmans Creek (VIC) at 0.01 mg/kg. Propiconazole is registered for use on turf and wood. Its detection may be attributed to residential and public space use.

Tebuconazole was detected in sediment from Lake Wallace (VIC) at 0.025 mg/kg. Tebuconazole is a fungicide used commercially on cereals, wheat, barley and oats. Lake Wallace is surrounded by land used for cropping and grazing and it is likely that run-off would have entered the lake.

Sediment guidelines (DGVs) for propiconazole and tebuconazole are not available.

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Interpretations

Results displayed on the Pesticide Detectives map at www.pesticidedetectives.com.au/results are raw pesticide data in mg/kg for all pesticides. In this interpretation of results, for some pesticides, such as bifenthrin, an organic carbon normalisation is undertaken to determine the bioavailable concentration of the pesticide in sediment. The organic carbon normalised values are used to access risks posed to aquatic biota through comparisons to sediment quality guidelines.

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 didn't we get many sites with pesticides detected?

- 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.

For specific information on the pesticides detected, please go to the Pesticide Information Fact Sheets on our website.

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