



FACTS & FIGURES: DDT & OTHER LEGACY PESTICIDES

DDT OVERVIEW

- Widespread in the estuary, both geographically and in the food chain
- Released through use of agricultural pesticides
- Persistent and bioaccumulative
- Acutely toxic and has sub lethal effects for fish and wildlife
- Carcinogenic and toxic for humans
- Largely banned in the United States in 1972; small amounts still are used in prescribed circumstances
- Continues to be used in developing countries to control mosquitoes and minimize the spread of malaria

WHAT ARE LEGACY CONTAMINANTS

Legacy contaminants are still found in the environment decades after their use. They adhere to soil and sediment, where it can remain for years because of its slow breakdown rate. They bioaccumulate readily and can biomagnify up the food chain.

DDT is a persistent organochlorine pesticide that was widely used for decades to control agricultural pests and mosquitoes that carried diseases such as typhus and malaria. DDT is a probable human carcinogen, and its breakdown products—DDE and DDD—also have toxic effects.

Aldrin, dieldrin, and chlordane are examples of other legacy pesticides. Aldrin and dieldrin are chlorinated insecticides developed in the 1940s as an alternative to DDT. They were widely used to control termites and other soil insects until they were banned in 1987. Aldrin breaks down quickly into dieldrin, which is persistent and bioaccumulates. When exposed to sunlight, dieldrin can transform into photodieldrin, a more toxic compound.

Chlordane is a mixture of related chemicals, such as heptachlor, that was used on food crops and for termite control in the United States until it was phased out between 1978 and 1988. Chlordane bioaccumulates readily, is commonly found in human body fat, and can affect the liver, nervous system, and digestive system. It is still manufactured for export.

IMPACTS ON FISH & WILDLIFE & THE ENVIRONMENT

DDT has both acute and long-term effects on microorganisms, invertebrates, amphibians, fish, mammals, and birds. DDT and its breakdown products have been linked to eggshell thinning in both osprey and bald eagles. These detrimental effects on bald eagle reproduction were instrumental in leading to the ban of DDT in 1972. Since the ban, the bald eagle population has increased over 10-fold, making the ban one of the few environmental success stories. In juvenile salmon, exposure to DDT can suppress immune function, reduce growth, disrupt hormone and reproduction function, and cause physical and developmental abnormalities.

DDT levels in some juvenile salmon in the estuary are at or above the threshold level (5,000 – 6,000 nanograms per gram lipid) for health effects.

IMPACTS ON HUMAN HEALTH

Studies show a range of human health effects linked to DDT and its breakdown product, DDE, include both carcinogenicity and endocrine disruption.

- Breast, liver, and pancreatic cancers and likely others
- Male infertility
- Miscarriages and low birth weight
- Developmental delay
- Nervous system and liver damage
- Diabetes
- Thyroid dysfunction
- Alzheimer's and Parkinson's Diseases

SOURCES OF EXPOSURE

DDT and other legacy pesticides have been banned. Yet, these pesticides are persistent. Even DDT that entered the environment some time ago is recirculating through the food chain, meaning that it reaches the top of the food chain, is re-released to the environment when the top predator dies and decomposes or is eaten, and enters the food chain once again.

Because DDT is persistent and takes a long time to break down in the environment, we are still finding it consistently in portions of the food web in the Columbia River Basin, including fish and osprey. Because it is hydrophobic, we do not often find it in water and find it at very low concentrations in sediment in the mainstem, but it is still showing up at levels of concern in biota. Tributary areas have higher concentrations in sediment and biota.

Large quantities of DDT are still turned in at collection events throughout the Columbia Basin, and there are still some hotspots for DDT, including the Portland Superfund area.

In the Columbia River estuary, juvenile salmon are exposed to DDT through their prey and, less significantly, through hatchery feed.

DDT AND LEGACY PESTICIDES IN THE ESTUARY

DDT was found in the tissue and stomach contents of juvenile salmon from sites all along the estuary, although detections in water and on suspended sediment were rare. Dieldrin also was present in salmon tissue from all sites. Heptachlor epoxide has been detected in salmon tissue and stomach contents in the estuary.

References

Lower Columbia River Estuary Partnership. 2007. *Lower Columbia River and Estuary Ecosystem Monitoring: Water Quality and Salmon Sampling Report*.

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