

Pesticides and their Degradation Products in Surface Water and Ground Water of the Mid-Atlantic Region

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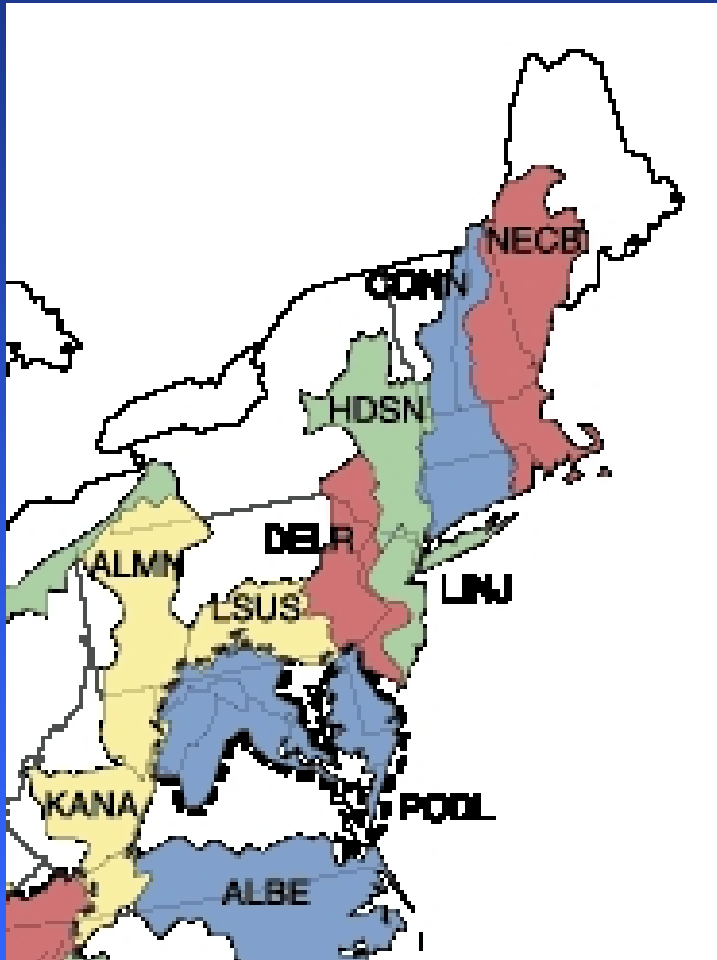
**US Geological Survey
Trenton NJ**



Why study Pesticide Degradation Products?

- When measured, degradation products are often detected more frequently than parent compounds.
- Concentrations of pesticide degradates often exceed concentrations of parent compounds.

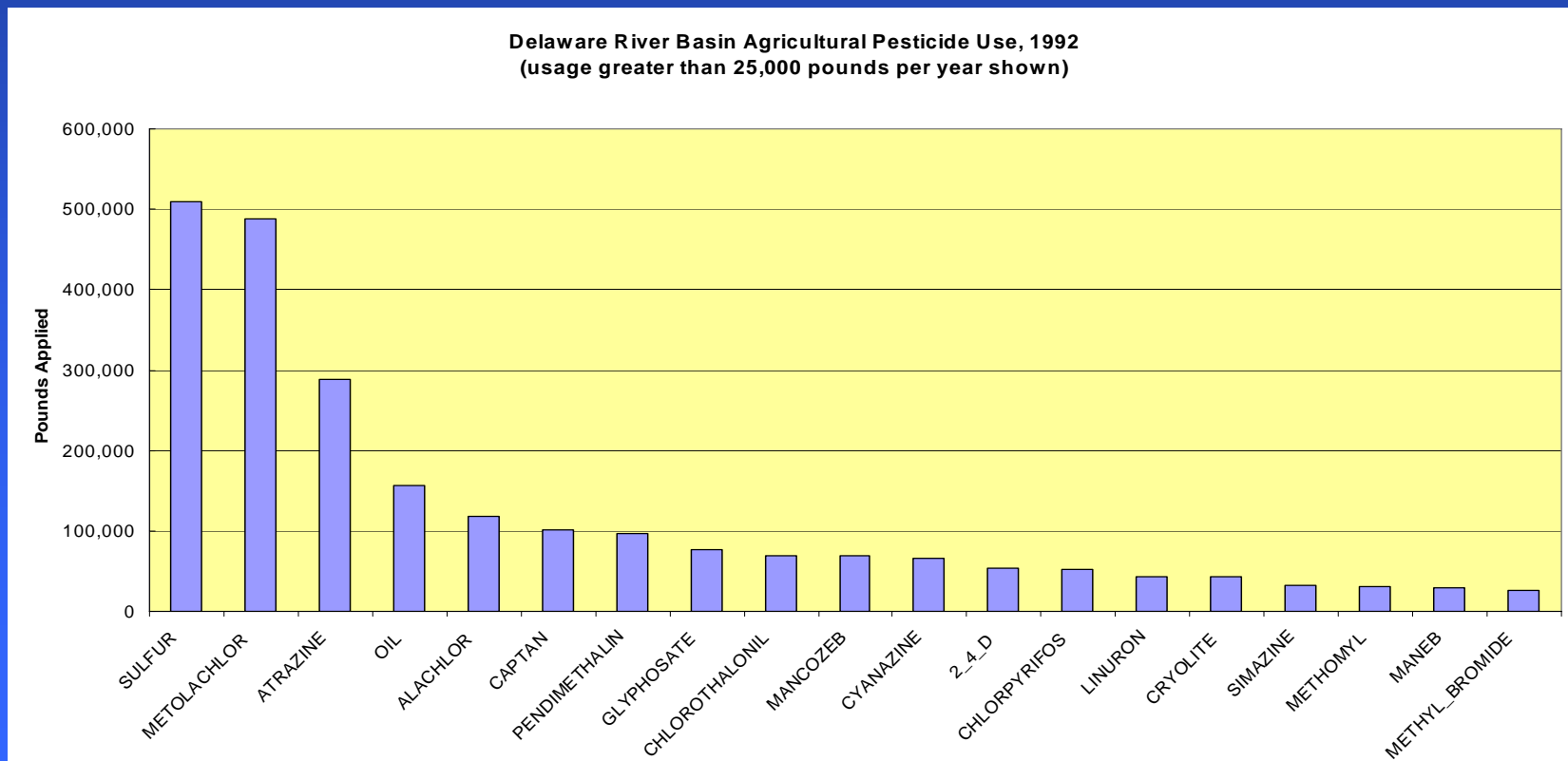
Sources of Data



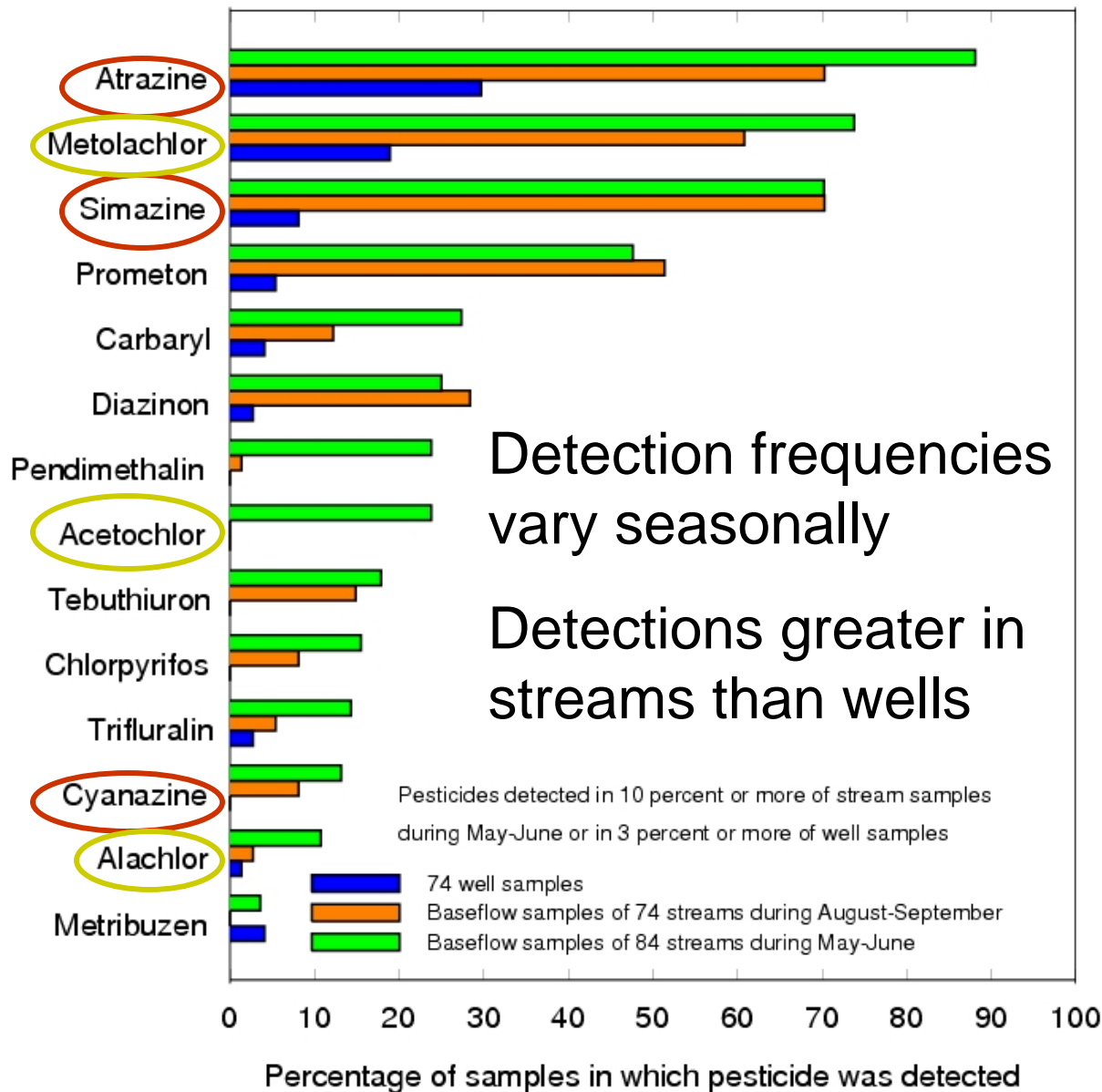
- Primarily National Water Quality Assessment Program (NAWQA)
- State Programs
- Cooperative studies

What analyze for?

- Widely used pesticides and their degradation products.
- 2-3 lab schedules, >150 compounds



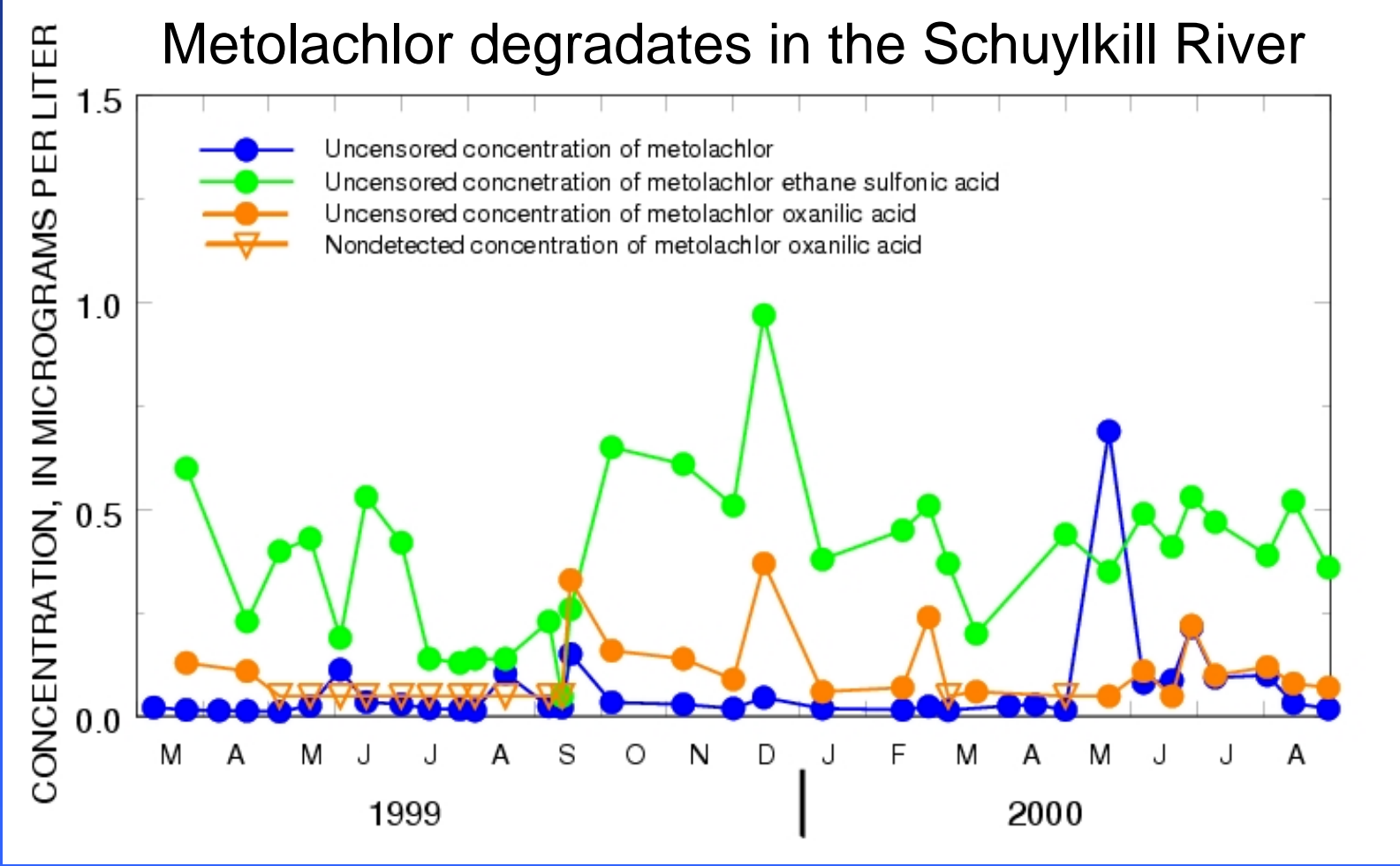
Frequently Detected Pesticides



Primarily discussing degradation products of:

- Triazine Herbicides
- Acetalinide Herbicides
- Few Other Pesticides

Herbicide Degradates in Streams



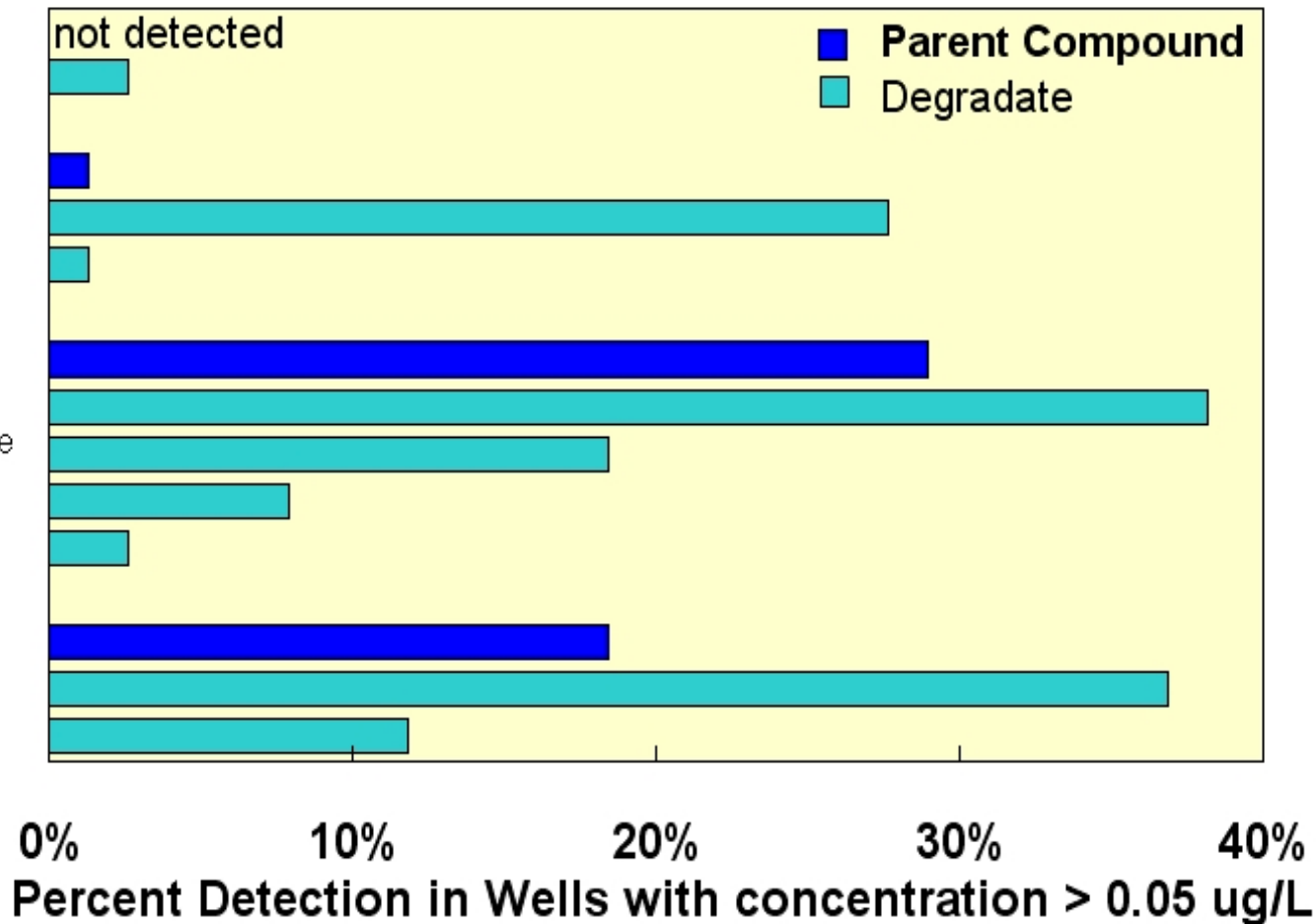
Herbicide Degradates in Domestic Wells in the Delaware River Basin

Acetochlor
Acetochlor ESA

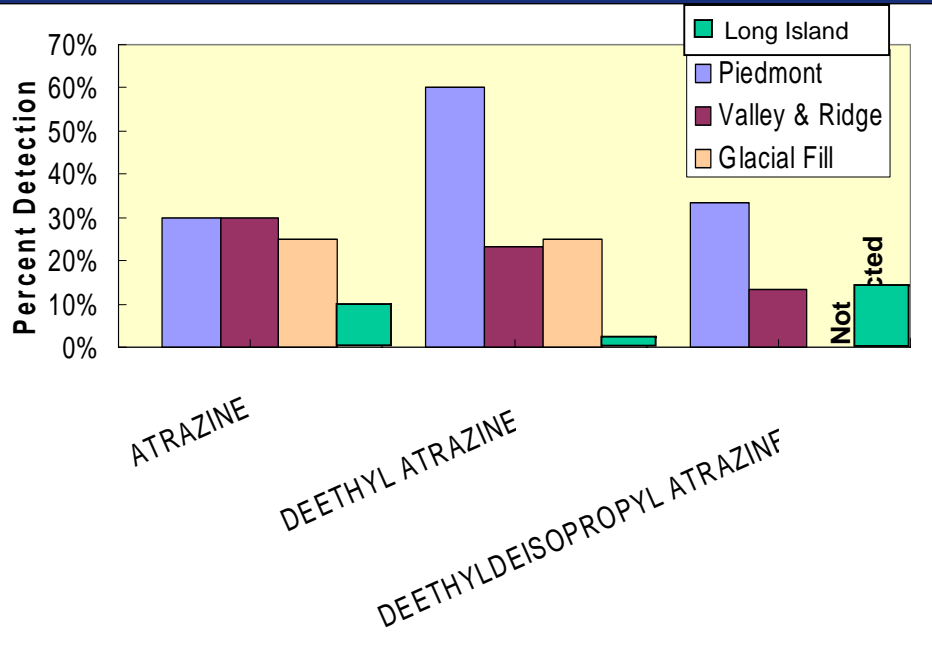
Alachlor
Alachlor ESA
Alachlor OA

Atrazine
Deethyl Atrazine
Deethyldeisopropyl Atrazine
Deisopropyl Atrazine
Hydroxyatrazine

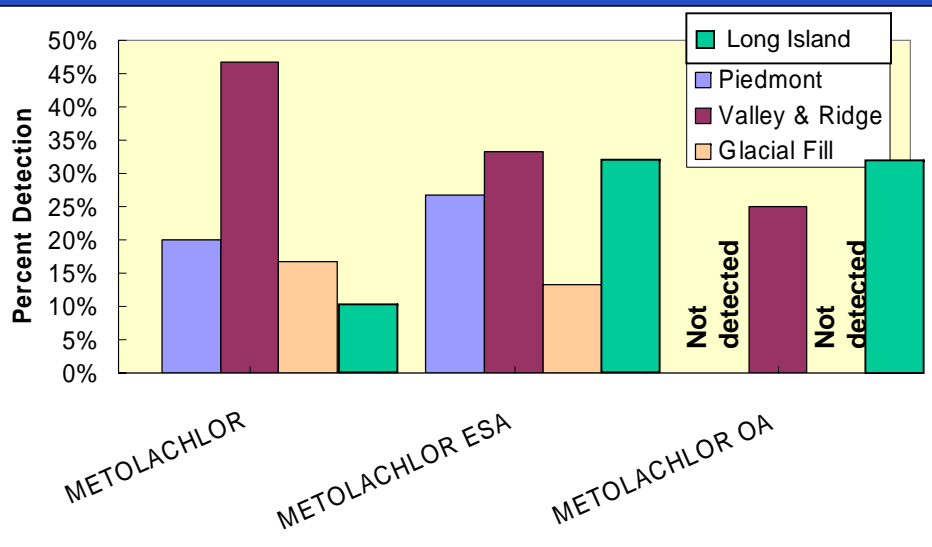
Metolachlor
Metolachlor ESA
Metolachlor OA



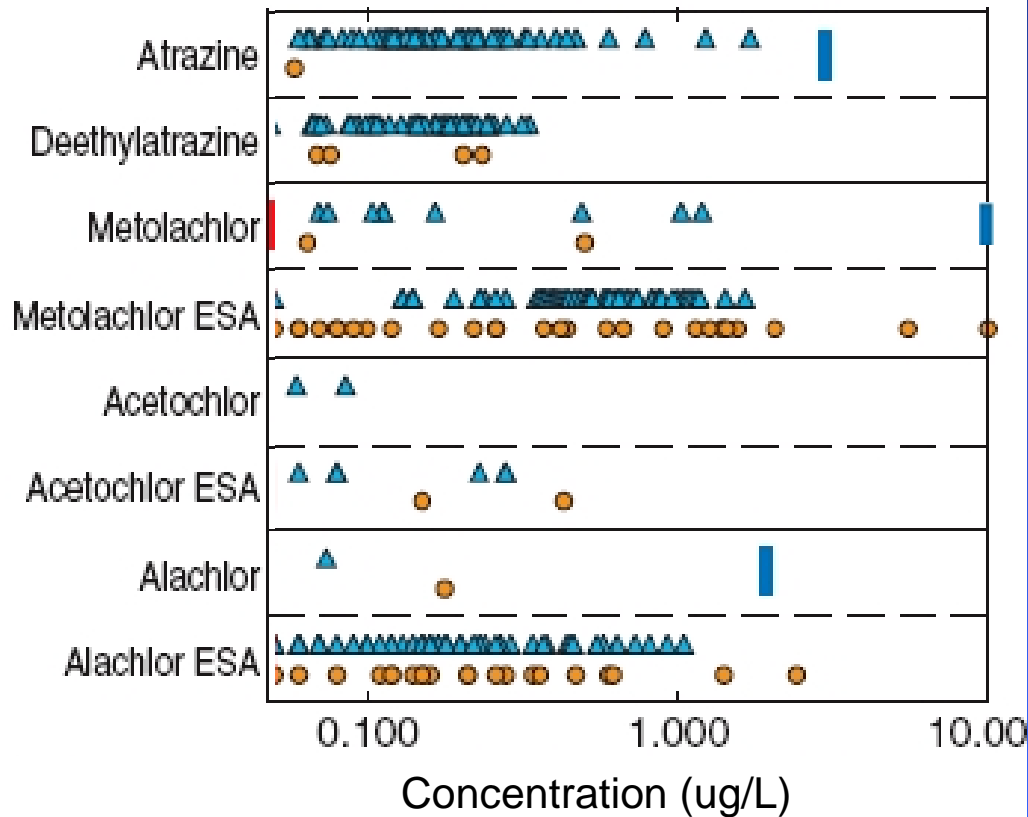
Geologic Differences



- Time since applied
- Age of water
- Thickness of Unsaturated Zone?
- Permeability?
- Soil Properties?



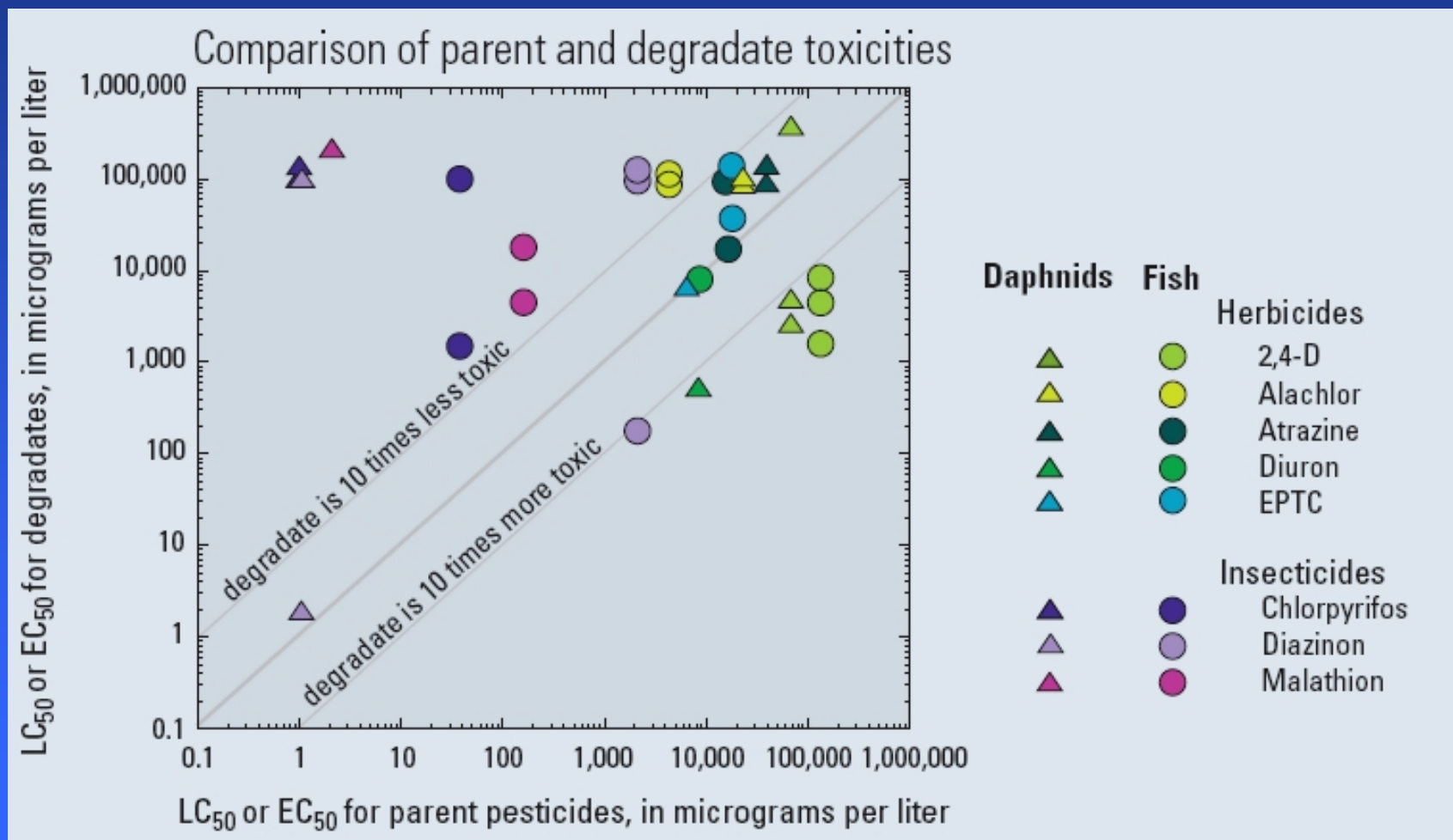
Pesticide Concentrations in Streams and Domestic Wells



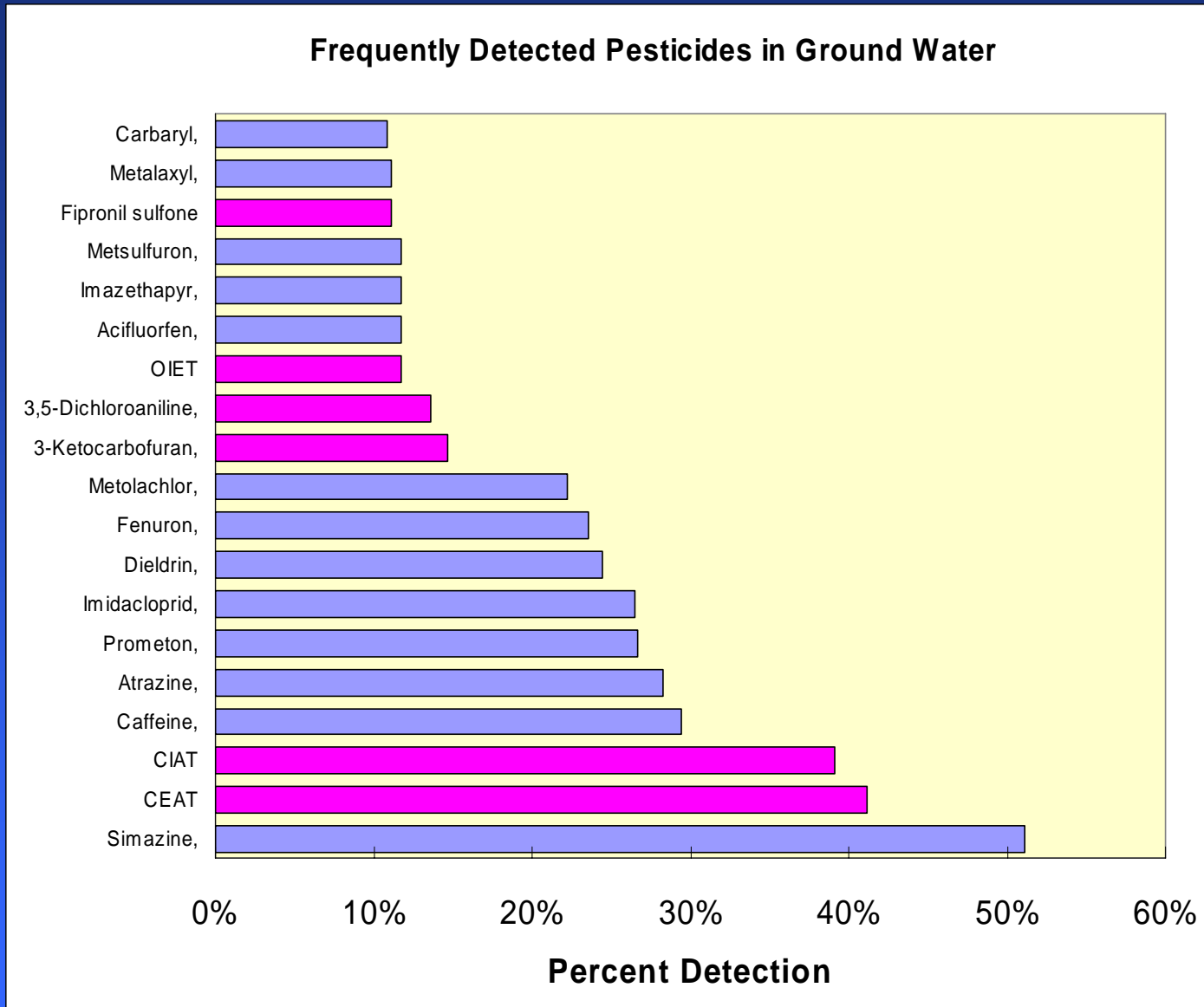
- Degradate concentrations typically are equal to or greater than parents
- Degradates have no drinking water standards, but sometimes approach MCL for parents.

▲ Surface-water sample
● Ground-water sample
Minimum reporting limit
Drinking-water standard

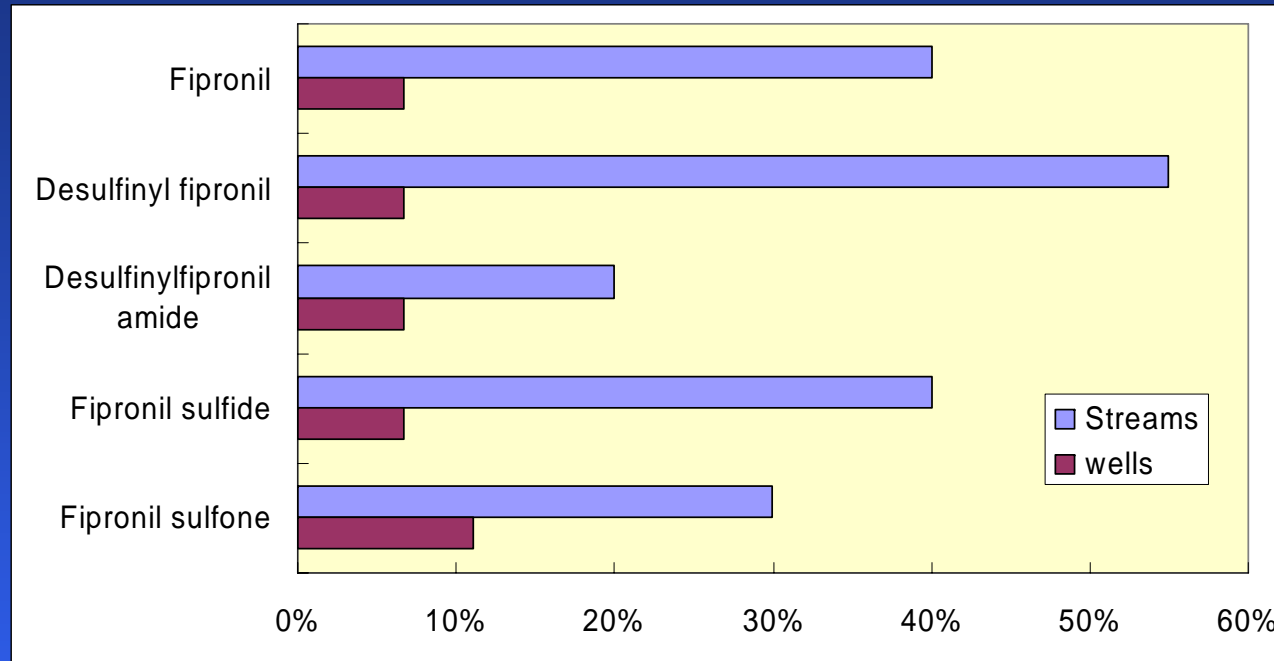
Toxicity of Degradates



Other Recent Pesticide Sampling



Other Pesticide Degradates



- Fipronil Maximum Parent concentrations
 - SW=0.020 ug/L; GW=0.100 ug/L
- Maximum Degradate concentrations
 - SW=0.013 ug/L; GW=0.194 ug/L

Summary

- Pesticide degradation products are often detected more frequently than parent compounds.
- Concentrations of pesticide degradates often exceed concentrations of parent compounds, especially in ground water.
- Formation of degradation products is controlled by geologic and hydrologic conditions as well as chemical properties.
- Degradation products have no standards for protection of humans or wildlife.