The Project's Research & Data Gaps Panel:

Communicating Recent Pesticide Research Findings to Inform Stakeholders

Dr. Vicki Blazer
Research Fisheries Biologist,
U.S. Geological Survey

Dr. Greg Allen
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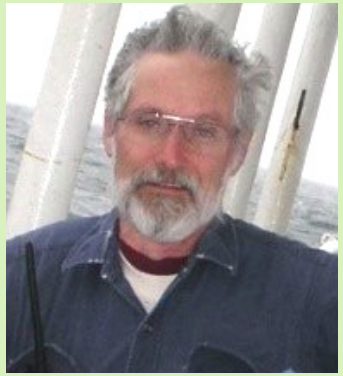
U.S. Environmental Protection Agency



Dr. Ian Hartwell
Ecotoxicologist,
National Oceanic & Atmospheric Administration (NOAA - retired)

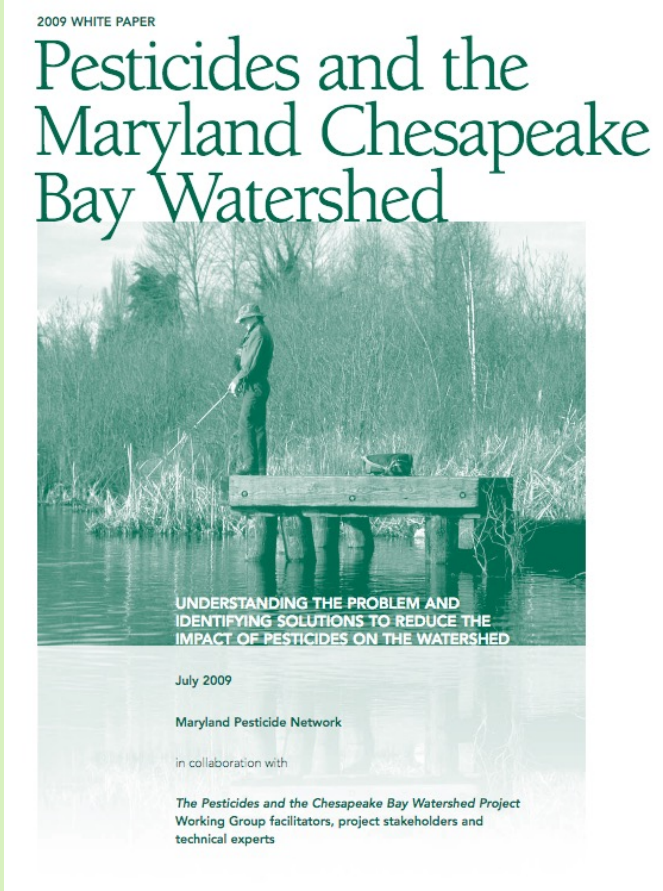
From the Research & Data Gaps Working Group

New 2024 Report:

"Communicating Recent Pesticide Research Findings to Inform Stakeholders"

The 2024 Report's Purpose:

- Compile and review recent relevant scientific literature for the period, 2010-2021 to the Chesapeake Bay watershed;
- Update the previous report, which was shared with Project stakeholders and Governor's Cabinet;
- Summarize the research for use by this conference, state agencies, legislators, and concerned citizens



Initial Report, Published 2009

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***"Communicating Recent Pesticide Research Findings to Inform Stakeholders"* Provides:**

- Overview of findings on key research studies and data gaps
- Six recommendations for Potential Actions to the Bay Cabinets and other stakeholders
- Over 25 summaries of studies, specifically relating to the Chesapeake Bay Watershed

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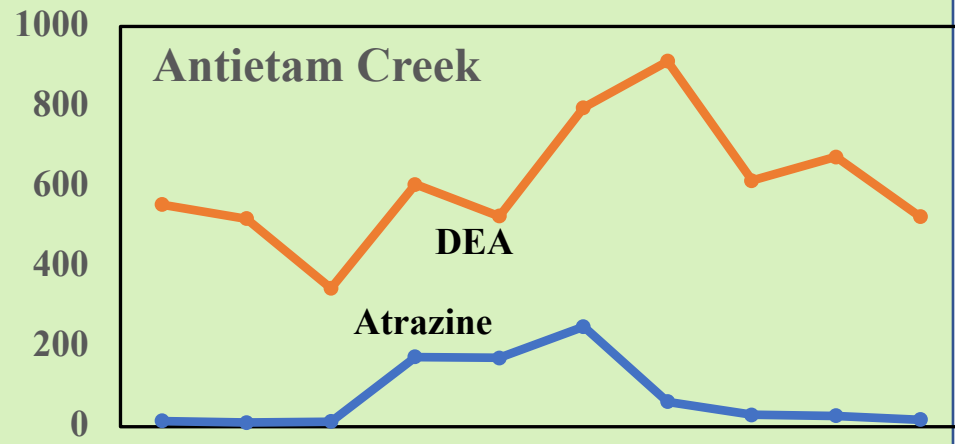
The 2024 Report Going Forward:

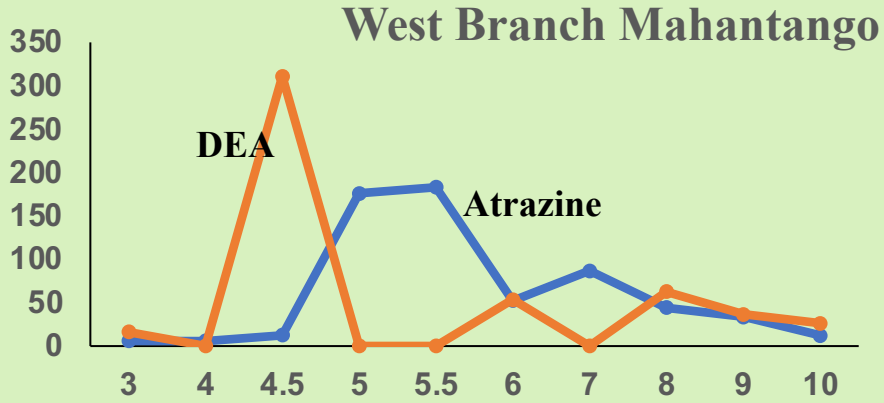
- Present relevant research findings that may inform strategies to reduce the impacts of pesticides on the Bay Watershed and its lifeforms
- Present research for the 11-year period since the last report
- Update the effort annually, to keep current with latest research findings that can improve strategies and policies

Dr. Vicki Blazer:

Mahler et al. (2021) evaluated 108 parent compounds and 116 pesticide transformation products in small streams from five regions of the U.S.

1) Example of a study not done in the Chesapeake Bay watershed but very relevant
2) Transformation products or degradates are formed by many processes, concentrations often exceed parent compounds, 70% were as or less toxic, 30% more toxic than parent compound but are not routinely measured
3) Demonstrated, as do numerous papers we evaluated, the importance of considering complex mixtures, importance of flow and other environmental factors.





Environ. Sci. Technol. 2021, 55, 8, 4740–4752 | Publication Date: March 10, 2021 | https://doi.org/10.1021/acs.est.0c06625

Dr. Greg Allen:

Hartwell (2011) While total pesticide mass declined in Chesapeake Bay watershed, toxicity units, a measure of potency of pesticides, stayed the same or increased depending on the species of bioassay test organism.

Even with the understanding that different species can react differently to different pesticides, this result suggests:

1) The chemistry of the pesticides are manufactured to be more and more toxic
2) The real load of pesticides entering the Bay is actually greater than the reported load
3) The Chesapeake Bay watershed is annually subjected to massive quantities of toxicants from agricultural and urban pesticide application.
4) Although the mass of pesticides being applied to the watershed declined during the reporting period, their increasing potency results in static or significantly increased Toxic Units applied to the watershed

Hartwell, S.I. (2011), Chesapeake Bay watershed pesticide use declines but toxicity increases. Environmental Toxicology and Chemistry, 30: 1223-1231. https://doi.org/10.1002/etc.491

Dr. Ian Hartwell

Britt et al. (2020) The effects of atrazine on the microbiome of the eastern oyster: *Crassostrea virginica*

1) Atrazine is the second most widely used herbicide in the world. It has been banned in the European Union, but is still used in the United States, with an estimated 76 million pounds sprayed annually on crops.
2) Exposure to Atrazine in the Chesapeake Bay may be contributing to a significant shift in the microbiomes of juvenile oysters that reduces fitness, introduces pathogenic microbes, and impedes natural and artificial repopulation of the oyster species within the Bay.
3) Results indicate that atrazine exposure may cause *C. virginica* juveniles to develop at a slower rate than they would without exposure, possibly due to a loss of beneficial bacteria .
4) A significant increase of *Nocardia* (a gram-positive, partially acid-fast actinomycete, pathogenic bacteria) was observed in the 4 atrazine treatment groups. *Nocardia* was found only within the atrazine treated groups, which suggests the presence of atrazine may have artificially selected for the colonization and subsequent survival of pathogenic *Nocardia spp*.

Crassostrea virginica

Britt, A, et al. Scientific Reports 10:11088 https://doi.org/10.1038/s41598-020-67851-4

Research & Data Gaps Working Group

Ways You Can Help:

- Send pesticide studies you are aware of relating to the Bay Watershed
- Recommend groups that might benefit from a briefing or copy of the report
- Join this Project's Research & Data Gaps Working Group

Next Steps:

- Work will be ongoing in 2024
- Look for final Report to be published in January

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