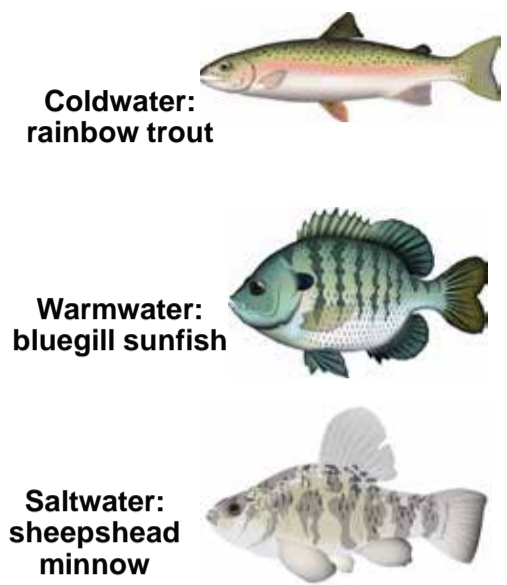


# Retrospective Evaluation of the Acute Fish Toxicity Test for Pesticide Registration

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## Introduction

- The acute fish toxicity test (Figure 1) is used to assess the potential hazard and risk of substances to non-target fish.
- For registration of conventional pesticides in the United States, the test is typically conducted on three different species.
- Evaluating the acute toxicity of one substance can use 200 or more fish.
- We conducted a retrospective data analysis to determine whether the number of species could be reduced while still meeting risk protection goals.



## Conclusions and Future Directions

- Cold- and warmwater freshwater species were the most sensitive for 37/45 non-functionally equivalent analysis groups.
- We evaluated the effect of dividing coldwater fish data LC50 values by small integer values.
  - Dividing by 3 would make coldwater species the most sensitive for 98% of analysis groups.
  - Dividing by 4 or 5 would make coldwater fish most sensitive for 100% of analysis groups.
- The same approach could be applied to coldwater or warmwater fish data.
  - Dividing by 2 would make warm or coldwater fish most sensitive for 96% of analysis groups.
  - Dividing by 3 or more make warm or coldwater fish most sensitive for 100% of analysis groups.
- These results of these analyses can help inform whether testing with fewer fish species can be used to evaluate potential acute risk to fish from pesticides. Using fewer species could reduce the number of fish required for this testing by up to two-thirds.
- These analyses will be submitted to a peer-reviewed scientific journal for publication.

Figure 1. Acute Fish Test

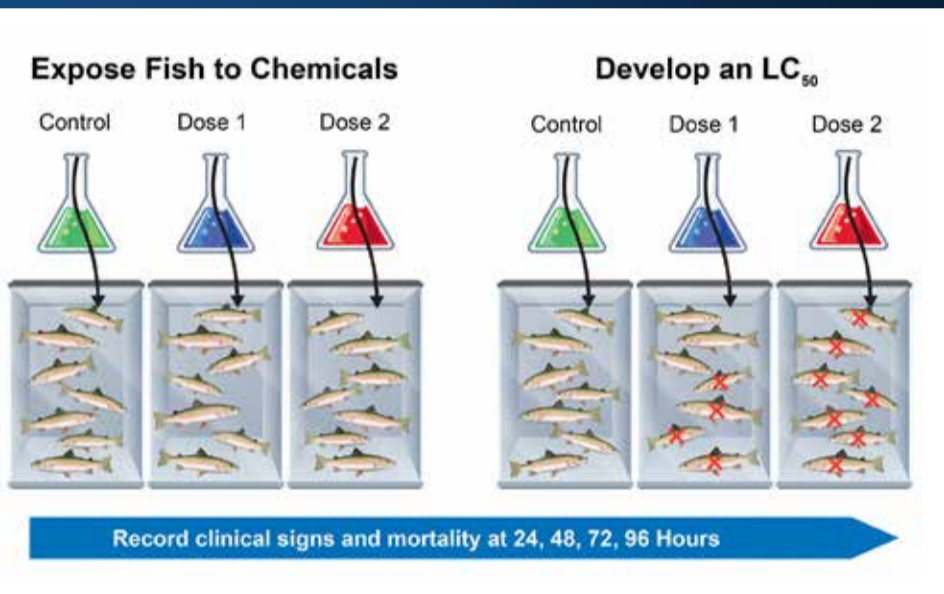
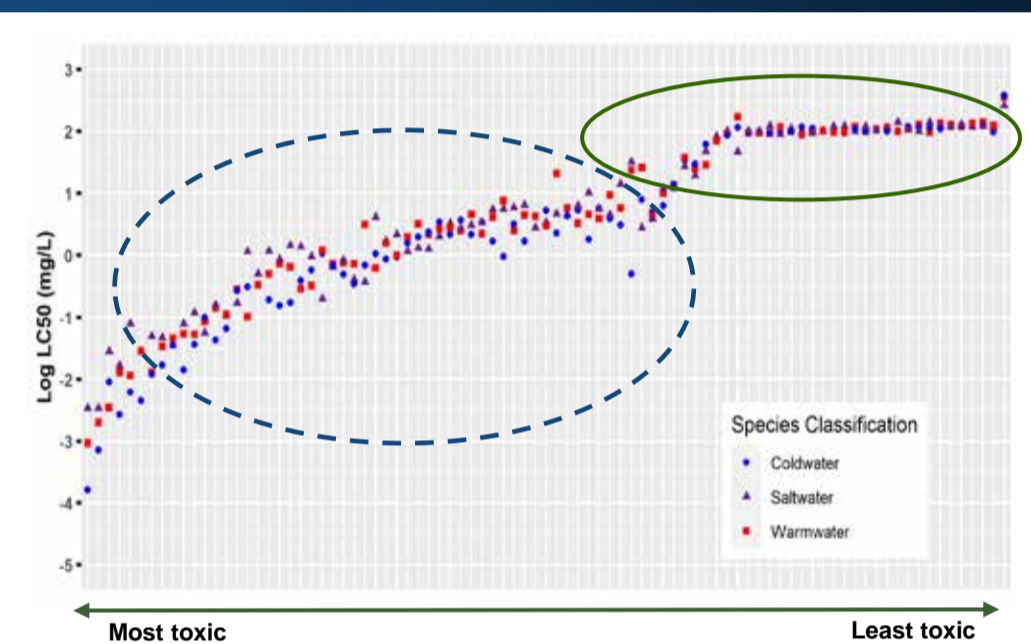
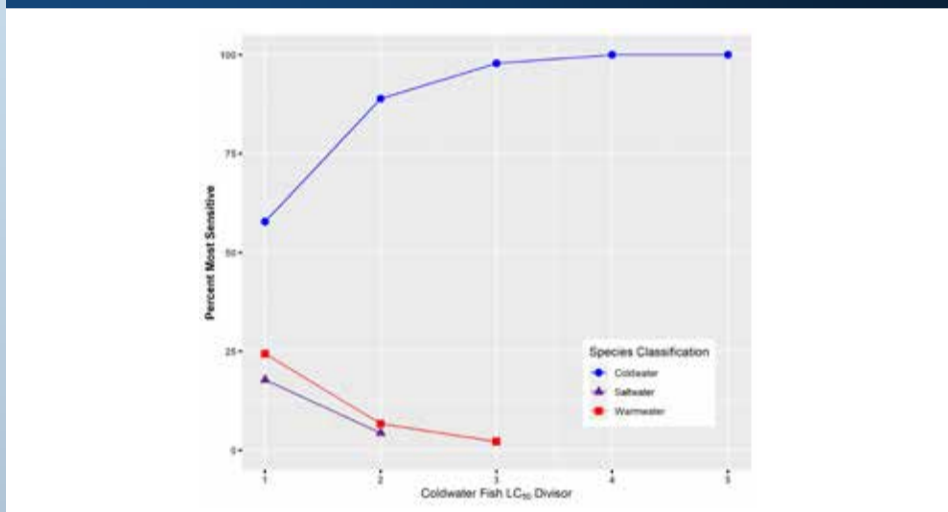


Figure 3. LC50 Values and Functional Equivalence\*



\* The circles in this figure are representative of the general distribution of the functionally equivalent (blue dashed circle) and non-functionally equivalent (green circle) analysis groups. Each of the three categories are distributed throughout the graph.

Figure 5a. Coldwater Spread

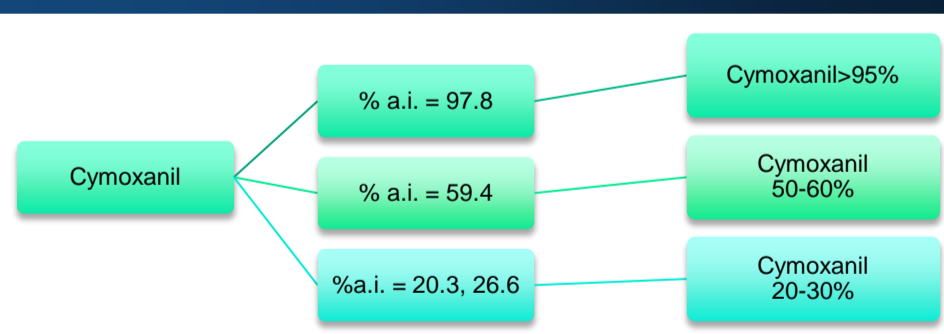


\* The y-axis in this figure shows the percent of analysis groups where the most sensitive species is included by the divisor.

## Datasets and Analysis Groups

- The initial data set included acute fish toxicity data for pesticide active ingredients (AIs) registered from 1998 to 2016. The 762 studies included:
  - 291 substances (AIs, formulations, and degradation products).
  - 181 pesticide AIs.
- Analysis groups were created (Figure 2) by binning substances according to:
  - Percent AI.
  - Specific formulation: e.g., chlorantraniliprole DPX-E245 35WG was binned separately from DPX-E2Y45 20SC.
- Analysis groups were excluded if they did not include an acceptable study on each of the three species.
- The final data set included 87 analysis groups

Figure 2. Creation of Analysis Groups



## Three Categories of LC50

- Analysis groups were characterized as containing data points (Figure 3) that were functionally equivalent, non-functionally equivalent, or unclear.
- Functionally equivalent** (n=33): for risk assessment purposes, the results from the three species would be considered equivalent because all three produced > LC50 values.
- Non-functionally equivalent** (n=45): the most sensitive species category can be determined.
- Unclear** (n=8): One or more LC50 values made it uncertain which of the three species groups was most sensitive.
  - e.g., LC50s are >89, >90, 95

## Identifying the Most Sensitive Species

- For the 45 analysis groups that were non-equivalent, either a cold or warmwater fish was most often (37/45) the most sensitive species tested (Figure 4).
- For the 8/45 groups where saltwater fish were the most sensitive, the chemicals tended to be of lower toxicity than others in the dataset:
  - In the U.S. Environmental Protection Agency (EPA) classification system, all 8 substances fell into the "moderately toxic" (3/8), "slightly toxic" (4/8), or "practically nontoxic" (1/8).
  - In the Globally Harmonized System's hazard categorization system, these substances fell into the "toxic to aquatic life" (2/8), "harmful to aquatic life" (3/8), and "not classified" (2/8) categories.

Figure 4. Most Sensitive Species for Non-functionally Equivalent Groups

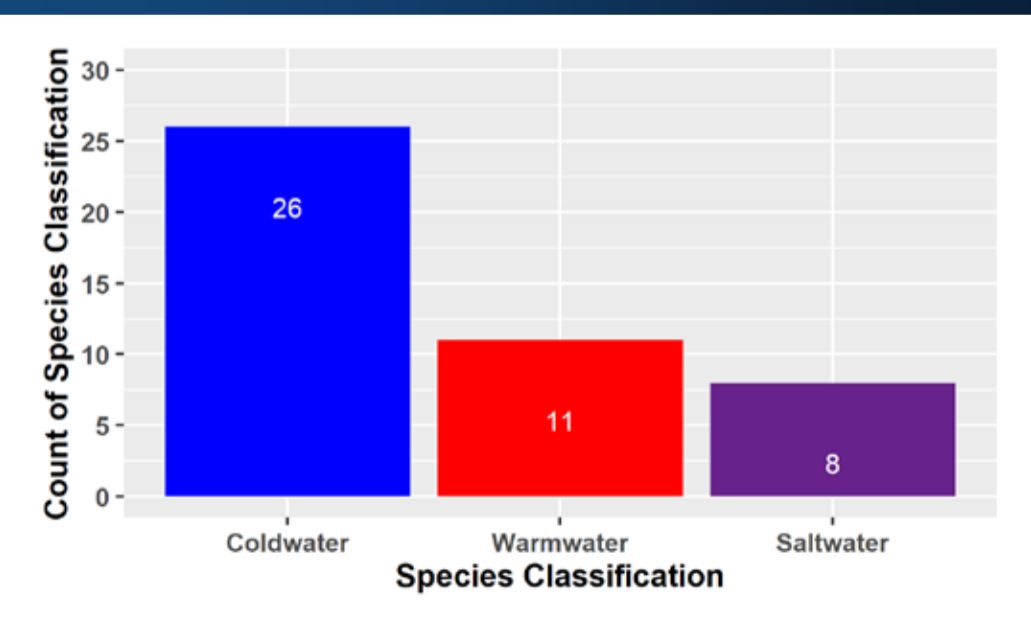
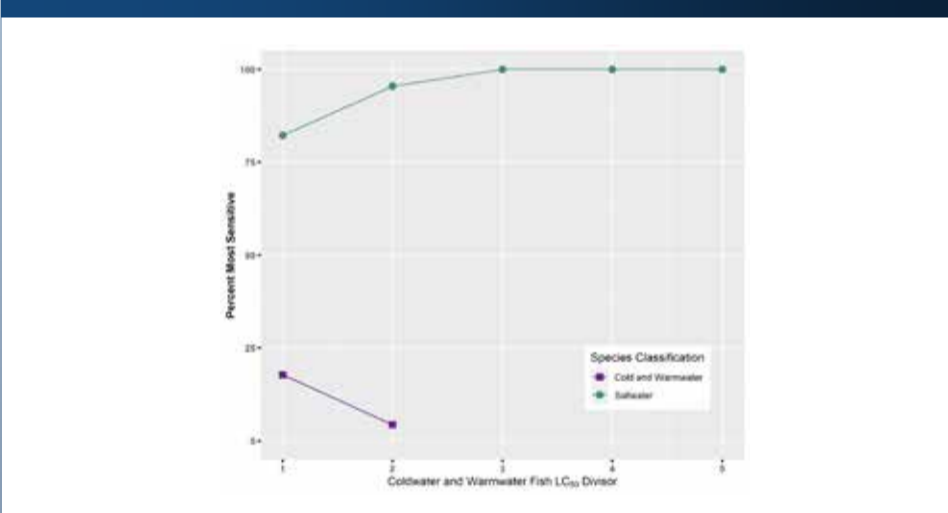


Figure 5b. Cold and Warmwater Spread



\* The y-axis in this figure shows the percent of analysis groups where the most sensitive species is included by the divisor.

## LC50 Value Spread

- We evaluated the spread between the LC50 values across all the analysis groups to determine:
  - How often the most sensitive species was with 2, 3, 4, or 5X of the coldwater fish LC50 value (Figure 5a).
  - We also evaluated whether a similar approach could be applied to coldwater and warmwater fish (Figure 5b).

## More Information

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A summary of NICEATM and ICCVAM activities at the Eleventh World Congress is available on the National Toxicology Program website at <https://ntp.niehs.nih.gov/go/wc11>

- For more information about NICEATM and EPA projects to reduce animal use for acute fish toxicity testing, visit <https://ntp.niehs.nih.gov/go/fishtox>
- Subscribe to the NICEATM News email list: <https://list.nih.gov/cgi-bin/wa.exe?SUBED1=niceatm-I&A=1>

