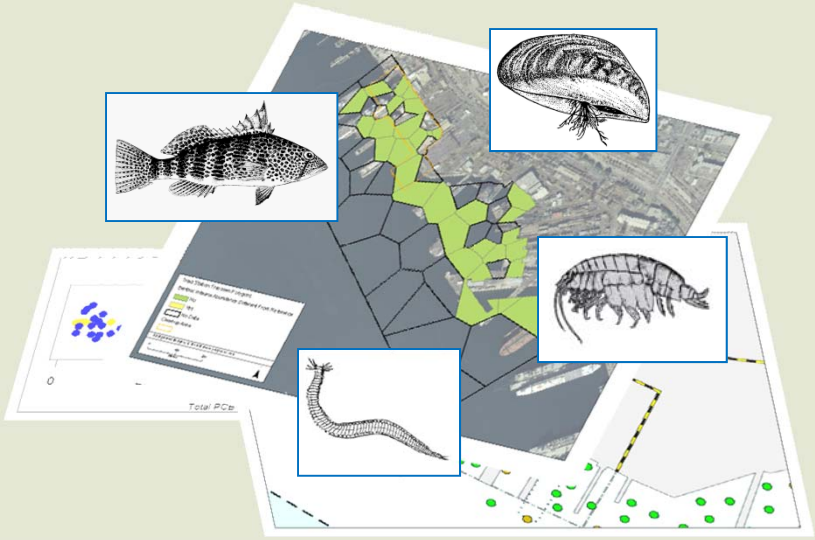
Alternative Cleanup Levels

San Diego Shipyard Site



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CAO Method for Alternative Cleanup Levels

- Sitewide exposure estimates
- Multiple chemical thresholds
- Site-specific chemistry and biology
- Consistent with (lower than) the lowest AET

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Toxic Unit Approach

- Uses site-specific pore water data
- Uses non-site-specific effects thresholds
- TU is the ratio between the two
- Rationalized as a causal approach

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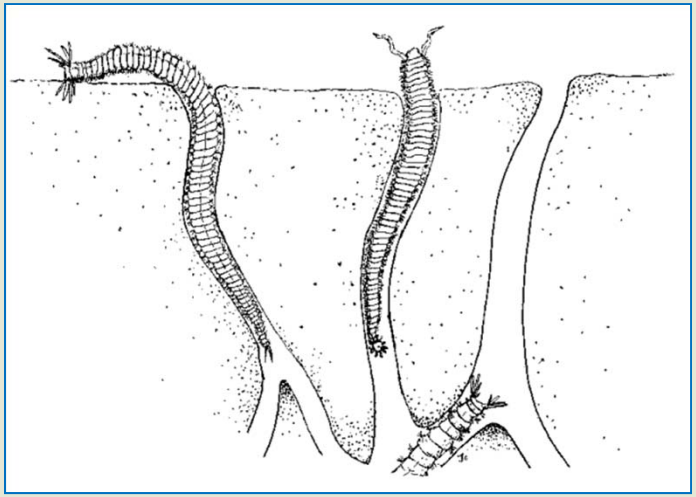
TU Toxicity Thresholds are Not Relevant

- Developed for aquatic, not benthic organisms
- Do not account for differences in
  - Exposure mechanisms
  - Chemical bioavailability
  - Species exposed



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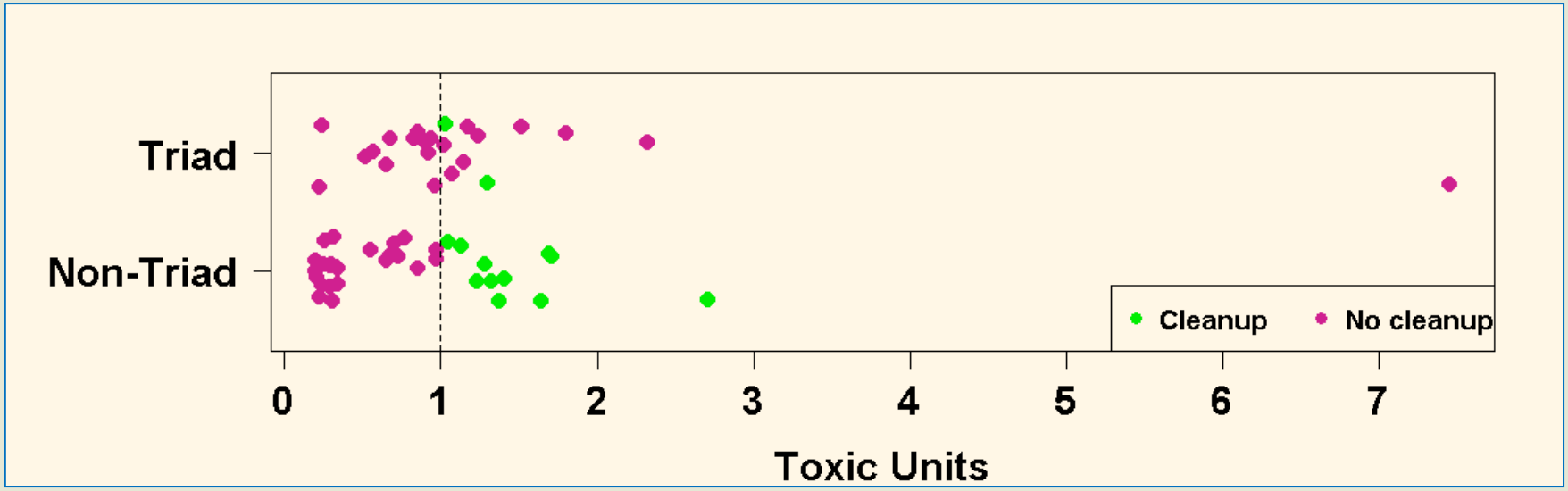
Results of the TU Approach are Inconsistent

- Interpretation differs at Triad and non-Triad stations



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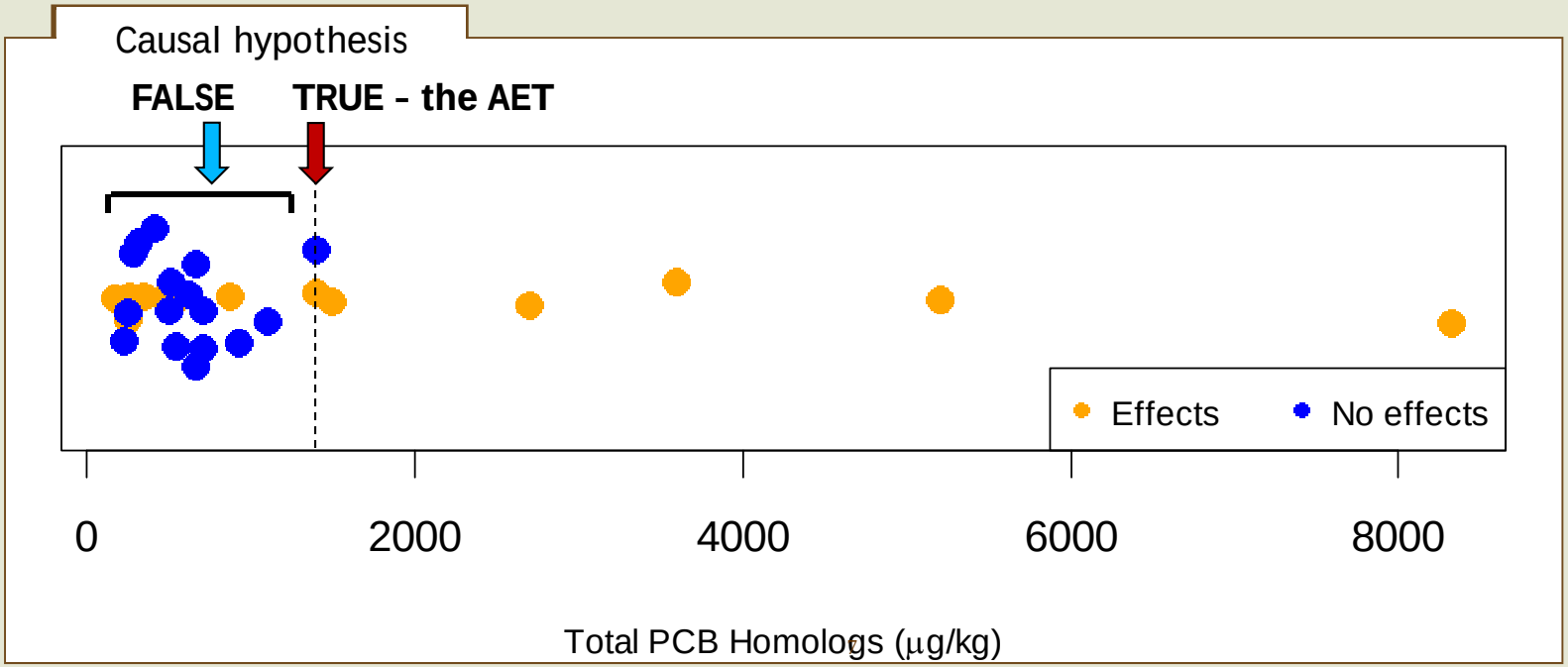
Causality

- General: "Whenever *A* happens, then *B* always happens."
- Specific: "Whenever concentrations are above level *A*, then effect *B* always happens."

Apparent Effects Thresholds are Causal

- Causal hypothesis: When concentrations are above level *A*, then effect *B* always happens
- Test hypothesis at all stations
- The lowest level *A* concentration is the AET



Apparent Effects Thresholds

- AETs are derived using the scientific method
  - Establish hypotheses
  - Test them
  - Accept the hypothesis that can't be proven false
- AETs are protective
  - Set at *no-effect* levels
- DTR alternate cleanup levels are equivalent to 60% of the LAET

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The Toxic Unit Approach is Not Causal

- No causal hypothesis or test is used
- The TU approach is *mechanistic*
  - Based on observed relationships between water chemistry and biological effects
    - But not at the shipyards
    - And for surface water, not pore water
  - And an assumed mechanism linking the two

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The TU Approach is Unnecessary and Insufficient

- The rationale for the TU approach is flawed
  - The TU approach is not truly causal
  - But the CAO alternative levels are consistent with a causal approach
- The TU approach uses non-site-specific data and assumptions
- The TU approach does not use the copious site-specific effects data

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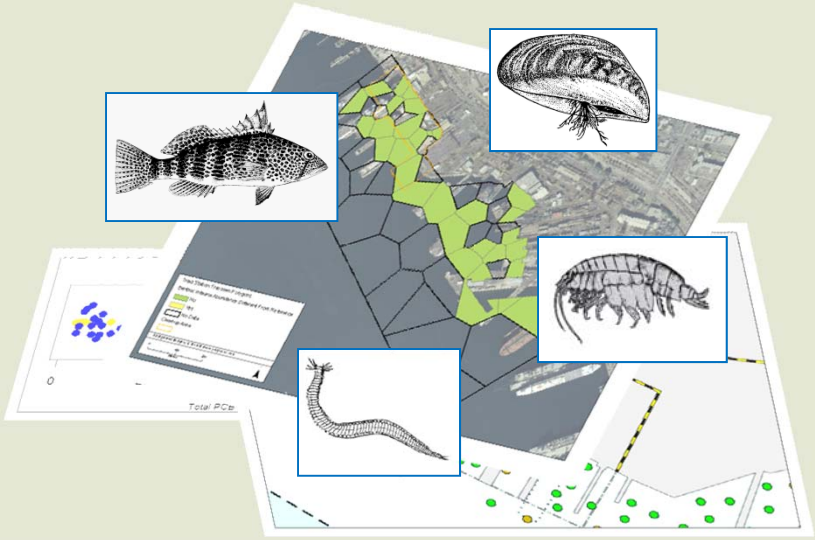

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