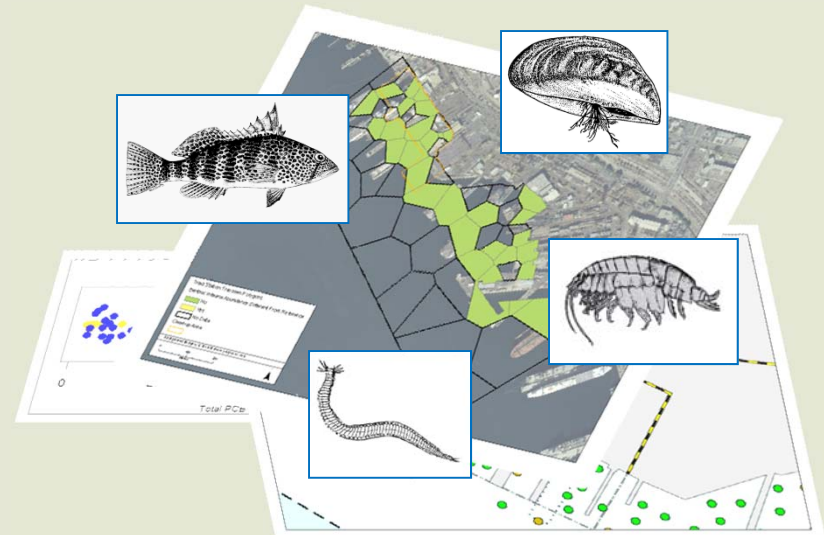


Alternative Cleanup Levels

San Diego Shipyard Site

Dreas Nielsen

On behalf of BAE Systems



CAO Method for Alternative Cleanup Levels

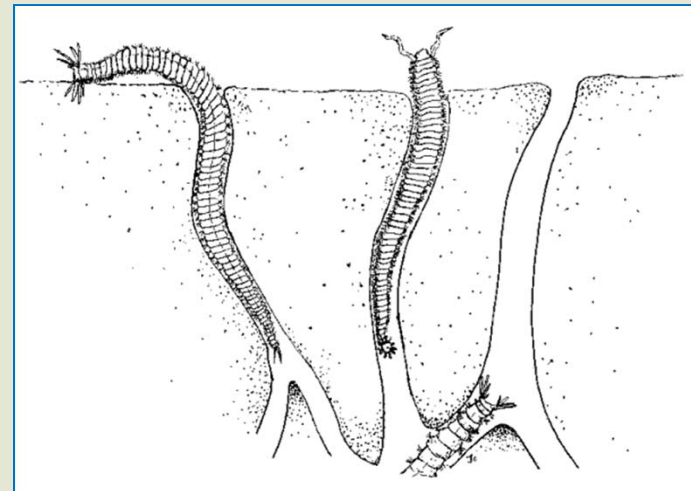
- Sitewide exposure estimates
- Multiple chemical thresholds
- Site-specific chemistry and biology
- Consistent with (lower than) the lowest AET

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

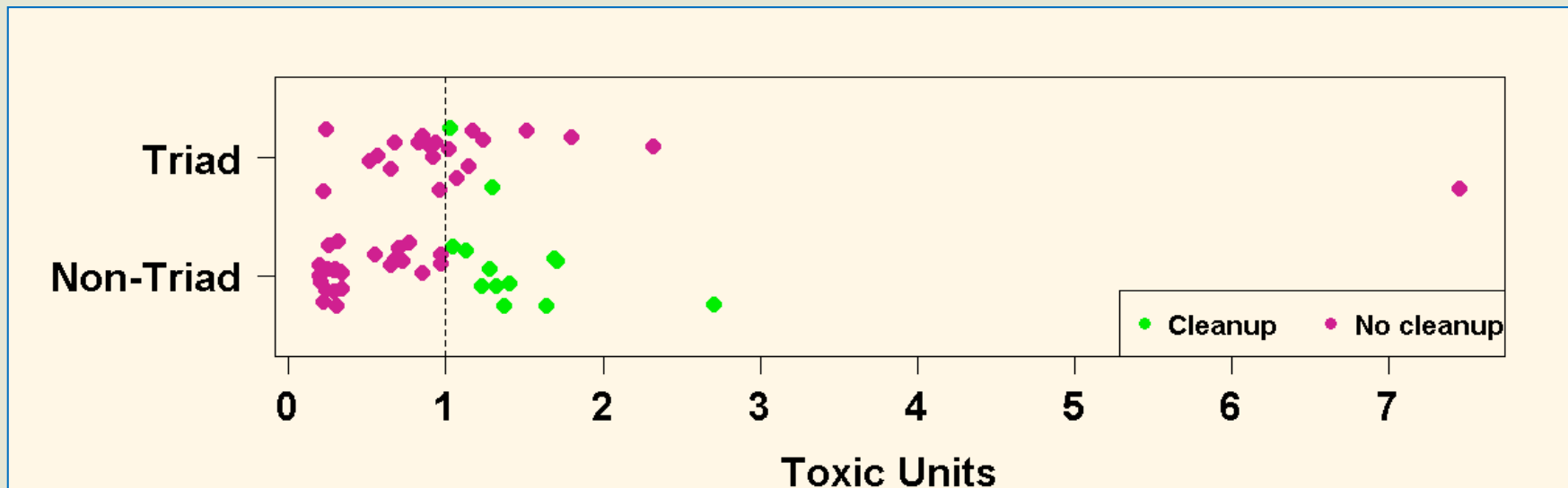
TU Toxicity Thresholds are Not Relevant

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



Results of the TU Approach are Inconsistent

- Interpretation differs at Triad and non-Triad stations

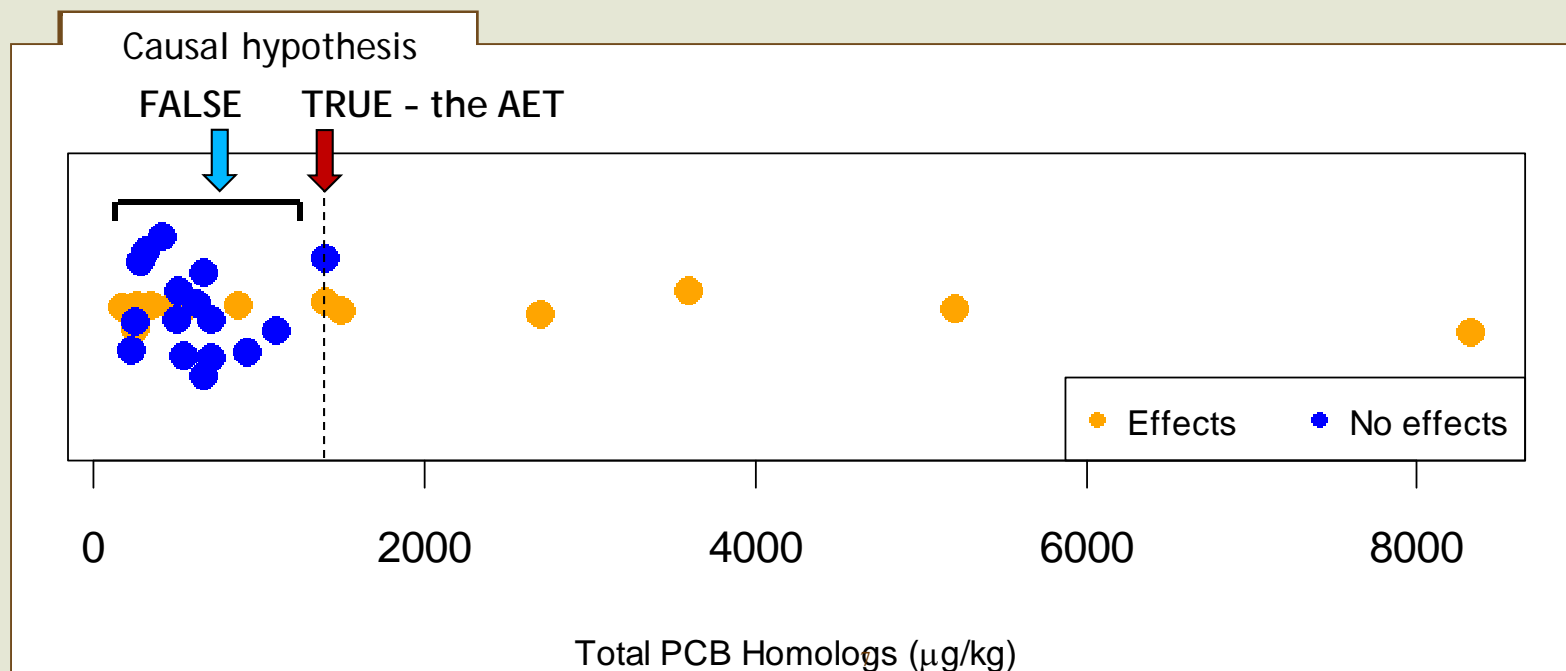


Causality

- 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

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

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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