Development and Application of Aquatic Toxicology Studies for the Assessment of Impacts Due to Chemical Stressors Using Non-Standard Indigenous Organisms

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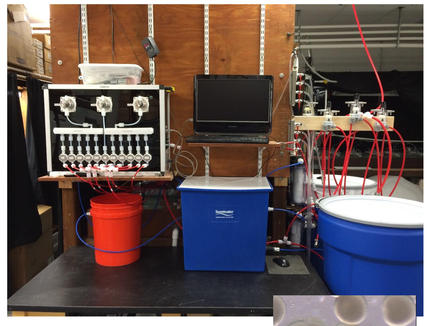
Goals

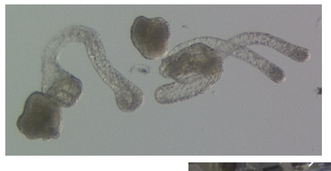
- Demonstrate the use of non-standard indigenous organisms in classical ecotoxicological testing
- Apply endpoint data to relate toxicity to a real-world scenario including risk assessment
- Use a new model organism in ecotoxicology (starlet anemone)
- Try new endpoints to detect impacts of chemical exposures at sublethal exposure levels.

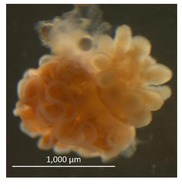
Examples of non-standard organisms used. Clockwise from top left: Red drum, *Sciaenops ocellatus*; Florida pompano, *Trachinotus carolinus*; starlet anemone adult, *Nematostella vectensis*; Spotted seatrout, *Cynoscion nebulosus*; Blue crab, *Callinectes sapidus*; moon jellyfish, *Aurelia aurita*; starlet anemone juvenile.

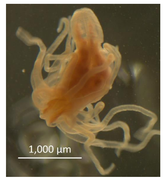
Research Methodology

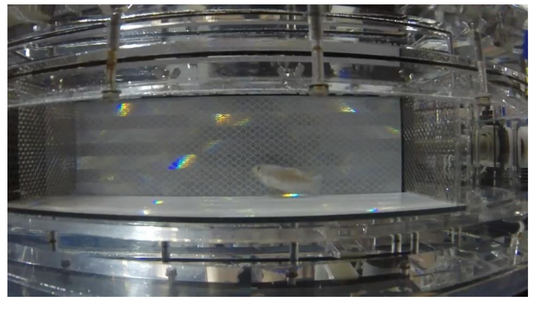
- Apply classical ecotoxicological techniques to new species of organisms relevant to an environmental disaster assessment (NRDA)
- Probabilistic risk assessment to determine risk from classical ecotoxicological endpoints using real-world chemical data
- Acute toxicity trials with metals on the estuarine starlet anemone; stress matrix development along with recovery to determine true death; early life stage embryological development trials
- Swimming performance trials with sheepshead minnows and Florida pompano using crude, weathered, and dispersed oil mixtures





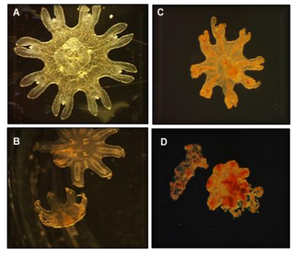


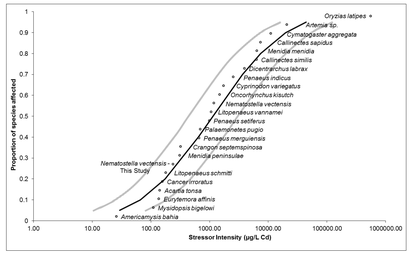


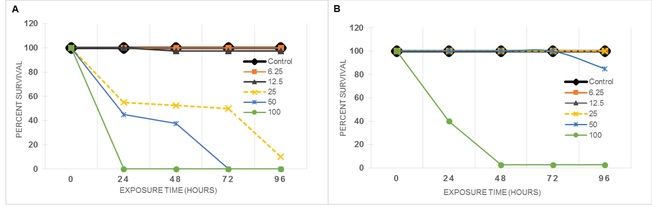


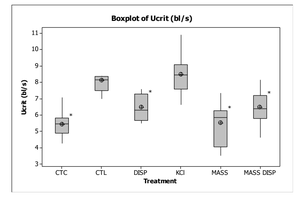
Results

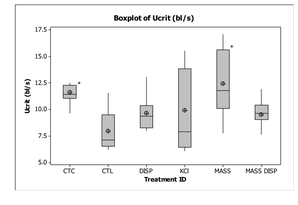
- LC50s, EC10s, NOECs for toxicants & petroleum mixes in terms of TPAH
- SSDs for cadmium and copper for the starlet anemone
- Stress/Response matrix for anemone juvenile & embryological development
- Swim performance as a sublethal endpoint shows promise but more detail on fish fitness condition may help standardize data











Figures A-D and A/B taken from Echols et al., (2016) *Chemosphere*.

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