

Salinity Tolerance of Ocean Plan Toxicity Test Protocols

Brian Anderson

UC Davis – Dept. of Environ. Toxicology

Marine Pollution Studies Laboratory – Granite Canyon



Task 1: Experimental Question

- **What is the upper salinity tolerance of each protocol?**

Brine prepared from frozen seawater – all tests (US EPA 1995 (EPA/600/R-95/136))

Brine prepared from Tropic Marin™ sea salt – one range-finder test for comparison

Toxicity Test Protocols

US EPA 1995 (EPA/600/R-95/136)

Abalone *Haliotis rufescens* 48h embryo development

Kelp *Macrocystis pyrifera* 48h germination and growth

Mussel *Mytilus galloprovincialis* 48h embryo development

Mysid *Americamysis bahia* 7 d survival, growth, and fecundity*

Topsmelt *Atherinops affinis* 7 d survival and growth

Urchin *Strongylocentrotus purpuratus* 72 h embryo development

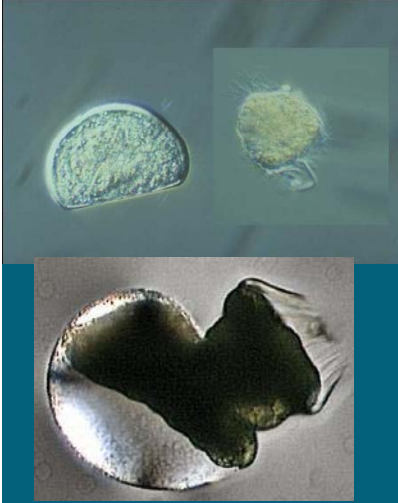
Urchin *Strongylocentrotus purpuratus* 20 min fertilization

Sand Dollar *Dendraster excentricus* 72 h embryo development

Sand Dollar *Dendraster excentricus* 20 min fertilization

*US EPA 2002 (EPA/821/R-02-14)

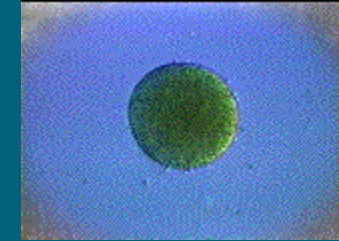
Mussel and Abalone - embryo development



Sea Urchin and Sand Dollar - embryo development



Sea Urchin and Sand Dollar - gamete fertilization



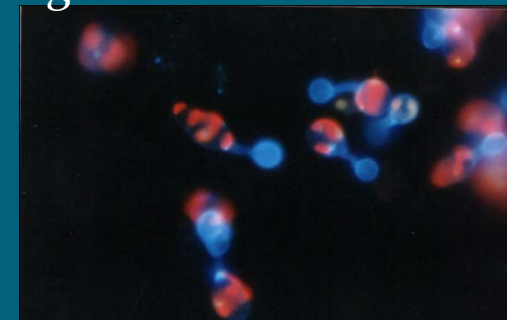
Mysid neonate - Survival, growth, and fecundity



Topsmelt larvae - Survival and growth



Kelp spore - Germination and growth



Experimental Approach

- One range-finder test
- Two definitive tests
- Each test will include ambient seawater and a series of 5 salinities bracketing the LC₅₀
- Task 2: NOEC, LOEC, LC₅₀ calculated for each protocol

Additional Testing

TASK 3: Conduct Toxicity Tests Using Desalination Facility Sample

Brine Effluent Tests

Effluent: To Be Determined

Protocols (Tentative): Kelp, Mussel Development, and Topsmelt.

Each toxicity test will be conducted at ambient salinity (control) and five effluent concentrations.

TASK 4: Produce Draft and Final Reports

Timeline

Complete all testing: December 2011 – March 15, 2012

Draft Final Report: May 31, 2012

Final Report: July 31, 2012