Contaminants affect juvenile and adult Pacific lamprey and general thoughts about recovery planning

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Larval Lamprey Exposed to Portland Harbor Superfund Sediment

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Portland Harbor Lamprey Toxicity Study

Pilot Study Objective:
Methods to determine effects of contaminated Portland Harbor Superfund sediment on ammocoetes.

Long Term: Growth & Physiology
Short Term: Behavior
  • Burrowing Time
Pilot Study Rationale

Life History Characteristics
- Protracted larval period
- Fine sand & silt habitats
- Filter-feeding/sediment uptake

Conservation and Ecological Implications
- Effects of long & short term exposure unknown.
Lower Willamette River, Oregon
Portland Harbor Superfund Site

Reference
(non-cont.)

Swan Island (PAHs, DDx)

RM-23

Gasco (PAHs)
Corral Trial – Round Containers

1’ diameter
Contaminated Sediment
60 Day Exposure

60 Days
-25%
-20%
-15%
-10%
-5%
0%
5%
10%
15%
20%
25%
Gasco OSU Pond Siletz
Wet Weight % Change

60 Days

Wet Weight % Change
-25%
-20%
-15%
-10%
-5%
0%
5%
10%
15%
20%

Gasco OSU Pond Siletz
Sediment Preference Trial

Burrowing Behavior

Ammocoete burrowing
Siletz sediment: Immediate
OSU pond and Gasco: Protracted
Experimental Design: Exposure Trials

- 1 sed. type/tank
- Sed. Exposures rotated
- 30 min acclimatization
- Added serially to each tank
- 1 min. in plugged funnel
- Record time to initiate & complete burrowing
- Containers inspected after 24 hr
Burrowing Trials

Reference

Gasco
8 of 14 total individuals in the Gasco exposure group were found unburied after 24 hrs.
Atrazine’s Effect on Pacific Lamprey (Lampetra tridentata) Olfaction

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Question of Interest

Do forest herbicides (atrazine) affect lamprey’s ability to migrate and spawn?
Objectives

- Does atrazine alter behavior?
- Does atrazine affect activity levels?
Model

- Paired
  - Control vs. Atrazine
  - Environmentally relevant conc.

- Attractant
  - Effluent
Time Spent in Arms of Y-maze

- **Control**
  - Pheromone
  - Non-pheromone

- **Atrazine**
  - Pheromone
  - Non-pheromone

Seconds
“Life History Stages”

- **Ripe**
  - Females
    - engorged egg sack
  - Males
    - penis

- **Active**
  - Found swimming
  - Wide Dorsal Distance

- **Non-Active**
  - Never found swimming
Time Spent in Pheromone Arm by Stage

- Ripe: n=10
- Active: n=10
- Non-Active: n=5

Comparison between Control and Atrazine treatments.
Activity

Crossing into Arms of Y-maze

Crossings

- Control
- Atrazine

Pheromone
Non-pheromone

0 10 20 30 40 50
Recovery/Conservation Plans

Independent Multidisciplinary Science Team
Plan Reviews
1. Climate change

Water temperature
Hydrological regimes
2. Human population & economic growth & impacts on natural systems
3. Ocean conditions

Regime shifts, predator, prey, productivity, hypoxia, acidification
4. Fish population definition rules

Genetic, life history, dependent vs. independent populations
5. Monitoring

Detailed plans & designs, spawners, recruits, water quality, physical habitat structure, prey base, indicators
6. Habitat rehabilitation

Catchment-scale, reach-scale
7. Predictive modeling

Alternatives
Selection process
Assumptions
Verification, Validation
Data needs
Confidence limits
8. Adaptive management

Detailed plans, action alternatives, monitoring, action levels