They Need It!

Training Bonytail to Avoid Fish Predators

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Predator Avoidance Training

• Non-native fish predation may be a major factor contributing to stocked fish mortality

• Previous work suggests razorbacks and bonytail can be trained to recognize predators (Mueller, Ward)

• Training will reduce predation (?)

• How scale to production ponds?
2 Tricks

• Train fish more effectively by adding alarm pheromone
• Hinder predators so no actual predation occurs

• Train fish at a large scale
• Use large predators at Bubbling Ponds
Recognizing Predators

• Predator awareness is well documented in Ostariophysi, especially in cyprinids (von Frisch 1938; Pfeiffer 1963)

• Variation in behavior with differing doses of alarm substance - more hiding with increasing dose (Frisen and Chivers 2006; Jachner and Rydez 2002)
• Predators
  – Brought in from the wild
  – Purchased from out-of-state vendor

• Bonytail (2011 stock) from Dexter and self-produced
Alarm Pheromone Collection

4 Bonytail
500 mL water

Alarm Pheromone
**Preparation**

1 Week Acclimation

20 Bonytail

http://www.uitfwd.com/species.htm

20 Bonytail
20 Bonytail

Alarm Pheromone

1 Hindered Bass

Training

20 Bonytail

5 Minute Training Period

20 Trained fish

20 Untrained fish
Survival Trials

- 20 Trained Bonytail
- 4 Starved Largemouth
- 20 Untrained Bonytail

24 Hours
Preliminary Conclusions

Percent Survival

<table>
<thead>
<tr>
<th></th>
<th>Untrained</th>
<th>Trained</th>
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</thead>
<tbody>
<tr>
<td>Trial 1</td>
<td>95</td>
<td>90</td>
</tr>
<tr>
<td>Trial 2</td>
<td>85</td>
<td>90</td>
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Preliminary Conclusions

Percent Survival

<table>
<thead>
<tr>
<th>Untrained</th>
<th>NO TRAINED FISH</th>
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<tbody>
<tr>
<td>Trial 1</td>
<td>48</td>
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<td>Trial 2</td>
<td>33</td>
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Preliminary Conclusions

Percent Survival

<table>
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<tr>
<th>All Untrained</th>
<th>50% Trained</th>
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<tbody>
<tr>
<td>Survival</td>
<td>40.5</td>
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2 Trials each

Follow the School

And hope someone in the school is smart
Future Directions

• Separate trained and untrained trials
• Multiple predator species
• Species specificity
• Training techniques (dose, timing, etc.)
• Larger habitat
• Habitat effects
• Behavior changes
Bird Deterrence

• Cormorants documented to take 5 12cm channel cats per hour, 28 fingerlings per hour (Mississippi, Stickley et al. 1992)

• Predation can virtually shut down hatchery operations where cormorants are resident (FWS EIS, 2003)
Bird Deterrence

• Whistlers and cracker shells have been moderately effective in controlling cormorants, mergansers and other predators at BPH

• Typically birds will fly to another pond, hours spent chasing birds around the facility

• Lethal control not yet approved
Bird Deterrence

• Whistlers and cracker shells disrupt visitors and other birds on an important migratory stopover

• Goes for most other techniques as well
Bird Deterrence

• Harassment stands a good chance of working on migratory cormorants
• Less likely to be effective on resident birds
• Less disruptive to non-targeted birds and visitors
Effectiveness

• Only one interaction with a cormorant (October 2012)
  – Bird left immediately after helo flight and did not return to BPH

• No cormorants seen since
Effectiveness

• Chase great blue herons 2-3 days/week
  – Initially (first 2 months) birds would leave hatchery property immediately upon sight of aircraft and not return
  – Now birds leave the hatchery for the day, but return within a few days
  – Anecdotally, heron presence increased dramatically while Josh and I were on vacation
# Aircraft Options

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<th>Maintainence costs</th>
<th>Flight training difficulty</th>
<th>Speed</th>
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<tr>
<td>Helo</td>
<td>Very high</td>
<td>Easy</td>
<td>Slow</td>
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<tr>
<td>Apprentice (Trainer)</td>
<td>Almost none</td>
<td>Hard</td>
<td>Fast</td>
</tr>
<tr>
<td>Coota (Seaplane)</td>
<td>Very low</td>
<td>Very hard</td>
<td>Very fast</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Flight stability</th>
<th>Ease of hatchery operations</th>
<th>Safety</th>
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<tbody>
<tr>
<td>Helo</td>
<td>Poor</td>
<td>Easy</td>
<td>Great</td>
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<tr>
<td>Apprentice (Trainer)</td>
<td>Great</td>
<td>Moderate</td>
<td>Good</td>
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<tr>
<td>Coota (Seaplane)</td>
<td>Good</td>
<td>Easy</td>
<td>Okay</td>
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Future uses

• Continued heron deterrence

• Anxiously awaiting cormorant visits

• Quantify bird presence

• Protection of stocking sites
Planes vs helicopters

- Helicopters easier to learn to fly, but slower, less stable, far more expensive to maintain
- Aircraft are more difficult to learn, more difficult to operate at the hatchery (landing), fast enough to chase birds, easy to maintain
- Seaplane is much harder to fly, less stable in the air, requires more repair and maintenance than trainer, easier to land in ponds
Planes vs helicopters

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