An Overview of Intensive and Pond Production Technologies for Commercial Production of Spotfin Shiners (*Notropis spiloopterus*) for the Baitfish Industry at the UWSP Northern Aquaculture Demonstration Facility

Gregory J. Fischer
UWSP-NADF Facilities Manager
Spotfin Shiners (*Notropis spiopterus*) are a native baitfish that are utilized by anglers in the North Central Region (NCR).

Spotfin Shiners exhibit many aspects that make them ideal for use as baitfish such as: native species, tolerant of handling and transport, exhibit good body form and “flash” that anglers are looking for, accept commercial feed, and are fractional spawners throughout the summer.

This presentation will describe three years of research (2007-2009) that was conducted at the UWSP-NADF involving indoor intensive culture utilizing a recycle water system and extensive outdoor pond rearing of spotfin shiners from egg to adult.
Materials and Methods

Broodstock

- Broodstock were collected in spring 2007 with Joe Morris and Rich Clayton in Iowa. We also secured additional adult broodstock from MN baitdealers and Jeff Gunderson in 2008 and 2009.

- Adult broodstock were fish health certified and transported to the facility.
Broodstock were placed into water recirculating systems for spawning. To promote spawning, water temperature, current, and photoperiod was manipulated.

Multiple tanks of various sizes were setup for holding, spawning, and incubation of eggs.

Systems were maintained to provide adequate water quality levels for all lifestages.
# Water quality parameters RAS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Average Value</th>
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</thead>
<tbody>
<tr>
<td>Temperature (°C)</td>
<td>20.0</td>
</tr>
<tr>
<td>Dissolved oxygen (mg/L)</td>
<td>&gt;6.0</td>
</tr>
<tr>
<td>pH</td>
<td>7.7</td>
</tr>
<tr>
<td>Carbon dioxide (mg/L)</td>
<td>&lt;20</td>
</tr>
<tr>
<td>Total ammonia nitrogen (mg/L)</td>
<td>0.011</td>
</tr>
<tr>
<td>Nitrite nitrogen (mg/L)</td>
<td>0.061</td>
</tr>
<tr>
<td>Calculated unionized nitrogen (mg/L)</td>
<td>&lt;0.0125</td>
</tr>
<tr>
<td>Total suspended solids (mg/L)</td>
<td>2</td>
</tr>
<tr>
<td>Alkalinity (mg/L)</td>
<td>151</td>
</tr>
</tbody>
</table>
Materials and Methods

Spawn Substrates

Four types of substrates were utilized for collecting fertilized eggs in the spawning tanks:

1. Flat style (19” x 4.0” x 2.5”) cedar shingles layered horizontally with 2-5mm crevices suspended in tank on rope.
2. Square vertical (6.0” x 6.0” x 5.0”) cedar shingles layered w/ 5-10mm crevices on threaded rod that was hung on side of the tank.
3. Cinder blocks (12” x 12” x 15”) with smaller blocks placed inside with crevices 3-8mm.
4. Aluminum siding (19 x 4.0 x 2.5”) layered horizontally with 2-5mm crevices and suspended in tank on rope.
Materials and Methods

Spawning Video
Materials and Methods

Spawning Substrates
Materials and Methods
Experimental hatching setup
Materials and Methods

Fry Rearing

Fry size ≤ 5mm
Materials and Methods

Fry Rearing
Materials and Methods

**Intensive Fry Feeding**

Types of starter diets utilized:

- Biomarine Artemac
- Inve Proton
- Silvercup
- Purina
- Pond water (indoor)
Intensive Fry Rearing

Survival from fry to fingerling <10%

24 days 12mm

29 days

44 days

52 days

68 days 32mm

68 days

Survival from fry to fingerling <10%
Multiple spawning on artificial substrates in RAS.
Hatching of eggs and rearing of fry.
Fry/fingerling feeding on artificial diets.
Fish alive for multiple years in hatchery.
2007-2008 Problems

- Collecting adequate broodstock at appropriate times.
- Collecting adequate fry at appropriate times.
- Larvae/fry acceptance and survival on formulated feed.
- Fish health issues:
  - Mycoboleus
  - Ich
2009
Applying what we learned

- Successfully spawned spotfins utilizing techniques and systems developed in 2007-08 with modifications.
Intensive Spawning

Water Current

6x6x5” substrate (2-5mm crevice)

Water Temp >20°C
Incubation and Hatching

- Dated substrates
- 24 hour lighting
- Directional water flow
- Water temp >20°C (RAS)
Incubation and Hatching

Fine screen

High densities w/egg substrates

No adults or fingerlings
Move Fry to Ponds
Outdoor Pond Production

- 0.4 acre fertilized pond
- Stocked with approx. 25,000 fry
- Several separate stockings
Pond reared fingerlings at 58 days
Pond reared fingerlings at 58 days

12mm - 40mm
Pond Harvest
Backswimmer treatment
Pond Harvest

• Harvested approx. 20,500 spotfins from ponds
• Ranged in size from 13-44 mm
• Fry to fingerling % survival >95% in ponds
• Placed into indoor RAS for further growout
Final growout in RAS

>51mm in 60 days
OVERVIEW

Best Results to Date:

• Indoor spawning w/RAS

• Separate egg incubation/fry rearing tanks

• Outdoor fertilized ponds fry rearing

• Indoor final growout on commercial feed in >70°F RAS
Acknowledgements

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QUESTIONS????????????????????

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