



Nanticoke River Shad Hatchery

City of Easton, Delaware River Shad Fisherman's Association

Seaford, Delaware

April 30th, 2010

Hatchery Visit

Attendees:

Nanticoke River Hatchery:

- Mike Stangl
- Eric Cottman
- Jack Knowles

DRSFA:

- Ron Marks
- Roger Ratushny
- John Berry

City of Easton:

- Brian William Gish
- R. Michael Topping



Members of the Delaware River Shad Fisherman's Association with Mike Stangl

Facility Overview

- Site chosen from several possible locations
- Close run to Nanticoke River
- Site with nearby surveillance to prevent theft/vandalism
- 8 – 12 months to acquire necessary permits
- State, Army Corps of Engineers approval was required
- Likely DEP, PF&BC, NCCD approvals necessary in Easton
- Building roughly 24'x32'
- Clear ceiling panels to allow natural sunlight
- Roughly \$260,000 (in 2005) when constructed



Shad hatchery building

Catching the Shad

- Nervous, skittish fish
- Circular, 6' diameter, ~400 gallon, irrigated tank, with air stone in center
- 1" Honda circulating pump
- Will kill themselves in corners without round tanks
- Fish given MS222, a mild anesthetic to reduce stress
- Insulated with reflective, bubble-wrap type wrapper
- Up to 50 shad able to be held in tank with sedation
- Heavy-duty, 5 ton trailer
- Tank weighs approximately 3,800 lbs loaded
- Tank colored black on inside to reduce stress
- Fish stunned electrically from boat, then removed by net
- Held temporarily by tub in boat
- Care taken to keep fish from being sucked into water circulator's intake
- Fish sexed at capture, females marked with hole punch
- Ideal ratio of 3 males to 2 females
- Females rarer, so all are kept



Shad transportation tank and trailer

Water Exchange System

- Direct exchange with river
- Aluminum cage with round pipe for water exchange in middle of Nanticoke River
- Line enters pump house via 3" diameter line
- Pump house roughly 3'x6'x3', about 100' from river
- 2HP pump
- Sanitized with ultraviolet filter, removing most bacteria, fungi, and parasites from inflow
- Water pumped to 1,200 gallon elevated water tank
- Tank allows several hours of gravity feed in the event of power failure
- Back-up generator in the event of long-term loss of power
- Blower adds ambient air to water to provide oxygen
- Line equipped with water chiller for use in hot weather; heater may be needed for ideal spawning temperatures in colder years
- Water filtered for coarse particulates
- River water use ideal for shad (shad aren't trout/salmon)
- Filter issues from silt
- Fish better able to imprint with river water, rather than spring/well water
- Problems with imprinting with fish raised in spring/well water
- Water measured for pH, dissolved solids, dissolved oxygen
- Water exchange limits build-up of nitrate, nitrite and ammonia



Nanticoke River



Pump house



Ultraviolet sterilization system



Water monitoring system and oxygenation tanks



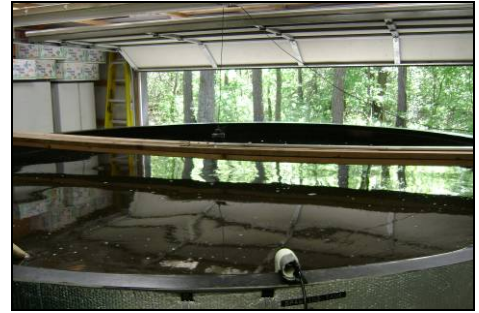
1,200 gallon elevated water tank



Water outflow collected and returned to the Nanticoke River

Spawning Tank & Egg Collection

- Only shad 5 mortalities to date with 126 shad
- 80% to 90% live release rate
- Pure oxygen added via compressed tank to increase survival rate in spawning tank
- All spawning takes place at night
- Best spawns take place at 67°F - 68°F
- 126 fish in 15' diameter tank
- Tank colored black to reduce stress
- Turbidity actually helps to calm fish vs. clear water
- Eggs collected through drain
- Drain water passes through mesh sock
- Sock checked every morning for eggs
- Eggs sieved and rinsed with colander several times to remove debris
- Remote operated camera lowered in center of tank



15' Spawning Tank



Boom over tank, from which remote camera is suspended

“McDonald Jars” (Egg Incubators)

- Egg jars (incubators) are filled halfway with water and then eggs added
- Measurement taken to check volume of eggs, in increments of 1/16” fluid level
- Eggs treated with parasiticide/fungicide
- Typically incubate for 3 days
- Incubators made of roughly 8” diameter, 2’ long clear pipe
- Aerated water circulated via 1” diameter center pipe
- Fertilization rate checked via sample under stereoscope



“McDonald Jar” incubation stand



Incubation jar with fertilized eggs

Culture (Fry Maturation) Tanks

- Fry given 3 days to mature
- Tanks roughly 4' diameter
- Fry swim into outflow of incubator, with unfertilized eggs remaining in jar
- Fry not fed
- Released after yolk sac absorbed
- Otoliths (fish ear bones) marked chemically for identification on day 3 with Oxytetracycline (OTC), a swine antibiotic
- OTC creates distinct line on otolith
- OTC added with defoaming agent and sodium bicarbonate (to neutralize water acidity) with water circulation stopped
- Allowed to soak in OTC mixture for 4 to 6 hours
- Cooperative agreement with State of Maryland to check otoliths of subset of spawning shad
- Roughly 1 in 4 of otoliths in Nanticoke River come back with marks identifying hatchery birth
- Fry viewed under stereoscope to check level of maturity before release



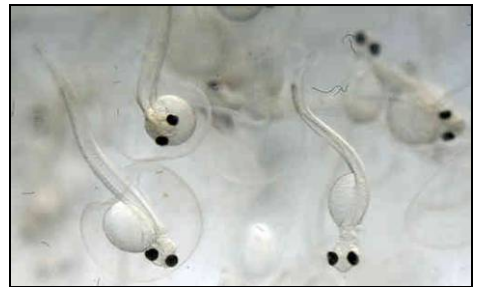
Fry released from incubator into culture tank by swimming into water flow; unfertilized eggs remain at the bottom



Maturation tank with incubator removed

Fry and Adult Release

- Fry released after roughly 3 days in maturation tanks
- Fry collected from tanks, and placed in clear plastic bags
- Air injected into bags, followed by bags being tied off
- Bags placed in styrofoam coolers
- Coolers taken to river, where fry are released



Shad fry nearing a viable stage for release