AFA 2008 Abstracts
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Feasibility of Hard Clam Aquaculture in Grand Bay, Alabama.

Jonathan Jackson and **LaDon Swann**. Auburn University Shellfish Laboratory, Dauphin Island, AL 36528.

The northern hard clam, *Mercenaria mercenaria*, has proven to be a profitable aquaculture species along the Eastern seaboard as well as the west coast of Florida. The potential for M. *mercenaria* aquaculture in the North Central Gulf of Mexico has not been thoroughly investigated. The biological and production feasibility of clam culture was analyzed using two growout systems in the coastal waters of Grand Bay, Alabama. Clams were stocked into mesh bags in a belt system placed on the bottom and in bags suspended from an adjustable longline system. The stocking densities used for each treatment were 188/m², 375/m², 750/m², and 938/m². Each bag density was replicated three times for the adjustable longline system and five times for the belt system on bottom. The mesh bags placed on the bottom allow clams to burrow into the sediment as they would naturally. The clams placed in the longline system were suspended mid-water column approximately 0.5 m from the bottom. The belt system and the long-line system were stocked with clams of an average size of 15.3 mm and 17.9 mm, respectively. After a period of 5 months the average size for clams in the belt system was 19.2 mm with 42.6 percent survival. The average size for clams in the long-line system after the same time period was 20.3 mm with a 24.3 percent survival.

Using fish otoliths to explore mercury bioaccumulation patterns in coastal fish populations in the Mobile-Tensaw River Delta, Alabama

Farmer T.M.*, Wright R.A., and DeVries D.R. Auburn University, Department of Fisheries and Allied Aquacultures, Auburn, AL

Gagnon J.E., and Fryer B.J. University of Windsor, Great Lakes Institute of Environmental Research, Windsor, ON Canada

Mercury (Hg) is a harmful bioaccumulative heavy metal to which humans are exposed primarily through fish consumption. Several consumption advisories for mercury have been issued for fish species along the Atlantic and Gulf coasts of the U.S., including the Mobile-Tensaw River Delta in coastal Alabama. Mercury cycling in estuaries is complex and affected by a suite of abiotic and biotic variables. As a result, little is known about the extent of mercury bioaccumulation in the diverse fish populations within the ecologically dynamic Mobile-Tensaw Delta, Alabama. Using traditional tissue analysis techniques in conjunction with otolith microchemistry and dietary analyses we

investigated seasonal and spatial trends of mercury accumulation in largemouth bass, *Micropterus salmoides*, and southern flounder, *Paralichthys lethostigma*, inhabiting the Delta. Adults of both species were collected at sites across an upstream-downstream seasonal salinity gradient during spring and fall of 2005 and 2006

Size-normalized largemouth bass mercury tissue concentrations for 2005 and 2006 increased significantly from downstream to upstream locations with little seasonal variation. Southern flounder mercury tissue concentrations were uniform across the sample area and were lower than those of largemouth bass. Otolith microchemistry analysis showed Sr:Ca ratios may be useful indicators of salinity exposure which may correlate with lowered mercury accumulation. Specifically, Sr:Ca ratios across transect ablations on fish otoliths showed annual patterns for both species that may reflect lifetime salinity exposure. Efforts to detect mercury directly in the otoliths of both species as a way to measure lifetime mercury accumulation trends have met with limited success.

Gray triggerfish, *Balistes capriscus*, in situ recruitment to artificial habitats, and laboratory competitive interactions with red snapper, *Lutjanus campechanus*

Simmons, Carrie M. and Stephen T. Szedlmayer, Auburn Marine Fish Laboratory, 8300 State Hwy 104 Fairhope, AL 36532. mackic1@auburn.edu

To examine gray triggerfish, *Balistes capriscus* recruitment, we built artificial habitats with concrete blocks (10 to 12 per reef, 41x20x20 cm) in June 2003, October 2005, and August 2007 in 20 m of water 20 km south of Dauphin Island, Alabama. All reefs were surveyed in the spring, summer and fall by SCUBA divers to record number and size of gray triggerfish. In contrast to previous literature gray triggerfish recruited to reef structure earlier than expected, as age-0 fish. Peak recruitment of age-0 gray triggerfish occurred from September–December with first recruits early as August. Significantly more age-0 gray triggerfish versus age-1 fish were found on reefs in October 2003 and 2007, and in December 2006 and 2007. Also showing similar recruitment timing to these same habitats were substantial numbers of age-0 red snapper, *Lutjanus campechanus*. If habitat is limiting we might expect interspecific interactions between these two species. We examined this potential for competitive interactions between gray triggerfish and red snapper in a series of laboratory experiments. Each fish was weighed (0.01 kg), measured (mm), and implanted with passive integrated transponder tag. Captive fish were randomly assigned to one of three treatments: 1) mixed species - 3 gray triggerfish and 3 red snapper, 2) single species - 6 red snapper, and 3) single species - 6 gray triggerfish. Fish were fed to satiation every 2 d over 30 d periods in 8 trials (new individuals for each trial). Despite laboratory artifacts that could mask competition, we were able detect significantly faster growth rates for red snapper in the absence of the "highly aggressive" triggerfish, which indicated that competition in the field may occur even with unlimited food resources.

Age determination through shape analysis and validation of otolith annular increments in red snapper, *Lutjanus campechanus*

Beyer, S.G. and S. T. Szedlmayer. Auburn Marine Fish Lab, Department of Fisheries and Allied Aquacultures, Auburn University, 8300 State Hwy 104, Fairhope, Alabama

The periodicity of otolith growth rings from adult red snapper was examined through a mark and recapture study. In 2005-2007, red snapper (n=251) were caught hook-and-line, injected with oxytetracycline, and released 15-20 km south of Dauphin Island, Alabama. Fish were recaptured one year after release (n=4). Sagittal otoliths were dissected, sectioned, and the number of growth rings past the OTC mark was compared to time at liberty of the fish. Preliminary findings support an annual periodicity of growth ring formation, however, all recaptured fish were less than 6 years of age and age validation of older red snapper (>10 years) is still needed.

Otolith shape analysis was applied to otoliths taken from hatchery reared known-age red snapper. Morphological shape indices were able to distinguish among age-0, age-1 and age-2 otoliths. Significant differences in the aspect ratio, box x/y, and radius ratio showed juvenile red snapper otoliths grew faster along the anterior-posterior axis compared to the dorsal-ventral axis. A discriminant function analysis and cross-validation showed an age classification success of 70% based on shape variables alone. The addition of otolith weight to the discriminant function increased classification success to 93%. Based on this data, we believe otolith shape analysis is a potential new method for ageing young red snapper at least to age-2. This is significant in that the determination of age in young red snapper from annular increments in otoliths is problematic.

A comparison of fish and epibenthic communities on artificial reefs with and without copper-based anti-fouling paint

Dianna R. Miller and Stephen T. Szedlmayer, Marine Fish Lab, Department of Fisheries and Allied Aquacultures, Auburn University, 8300 State Highway 104, Fairhope, Alabama, 36532

Artificial reefs (n = 60) were constructed in 20 m of water approximately 15 km south of Dauphin Island, Alabama, in the Hugh Swingle reef-building zone. Reefs were built in October 2005 (n = 20, Reef Set 1) and in July 2006 (n = 40, Reef Set 2). Each reef consisted of twelve concrete blocks (20 x 20 x 41 cm) on a plywood base (1.5 m^2). Reefs were either painted with copper-based anti-fouling paint (n = 30) or unpainted (n = 30). Fish and epibenthic communities were compared between painted and unpainted reefs.

Reef Set 1 (n = 20) was surveyed at 1 week, then 2, 7, 10, and 14 months after deployment. Reef Set 2 (n = 40) was surveyed 11 months after deployment. During each survey, two SCUBA divers visually estimated the abundance and size (length in 2.54 cm intervals) of all fish species. Break-away samples were removed from reefs for later identification and measurement of epibenthic organisms. We observed 35 different fish species, with 25 species on unpainted reefs and 31 species on painted reefs. Red snapper, *Lutjanus campechanus*; wrasse, *Halichoeres* spp.; gray triggerfish, *Balistes capriscus*; pigfish, *Orthopristis chrysoptera*; bank sea bass, *Centropristis ocyurus*; rock sea bass, *Centropristis philadelphica*; blenny, *Blenniidae* spp.; and Atlantic spadefish, *Chaetodipterus faber*, showed significantly higher abundance on unpainted compared to painted reefs. Abundance and coverage of epibenthic organisms (invertebrates, algae, *Blenniidae* spp.) were significantly higher on unpainted compared to painted reefs. Similar to past studies, epibenthic communities affected recruitment of fishes to artificial reefs. These results further support the contention that artificial reefs result in increased fish production not simply attraction.