
HSWRI Aquaculture Program Research Report

*** August & September 2007 ***



HSWRI Launches Multi-National Offshore Demonstration Project with Support from NOAA

HSWRI received a grant from the National Sea Grant Program's, National Marine Aquaculture Initiative in 2006 to conduct an experimental project in partnership with the largest tuna farming operation in Mexico, Maricultura del Norte (MDN), located just south of Ensenada in Baja California.

Permitting In the fall of 2006 we received authorization from the Mexican government to conduct the project. The authorization allows us to work not only with California yellowtail (YT), but also striped bass (SB), white seabass (WSB) and California halibut.



Figure 1. Weight sampling of juvenile YT.

Hatchery work Hatchery production of YT was limited to less than 10,000 fish in 2006 and increased to 25,000 juveniles in 2007. Hatchery production in 2007 was very promising as cohort survival increased to 5% through refinements in live feeds and systems management, as well as handling and grading procedures. Plans are being implemented to increase spawning biomass for the 2008 season in an effort increase egg production, which declined from 2006.

In order to help offset the shortfall in YT production and still meet the key objectives of this study, we are complementing the study with an evaluation of the offshore culture of striped bass, *Morone saxatilis*. Striped bass are grown commercially in California and elsewhere in the United States, so juveniles are readily available in large numbers.



Figure 2. Juvenile YT in culture tank.

Growout work In May 2007 we stocked 350 SB at a size of 920 g into one of two square 250 m³ nets. We stocked 2,400 juvenile YT of 510 g average weight into the second net. Fish were transported from San Diego to Ensenada, Mexico in the live-wells of a commercial fishing vessel. Post-transport mortality was 1.3% for YT and 0% for SB.

Fish were fed to satiation twice per day using a 9.0 mm Skretting Marine Grower diet. Water temperature ranged from 12 to 21°C. Several periods of intense red tides occurred with no apparent detrimental effects to the fish. Fish health was good in both species and no treatments were required. Individual YT increased by 260 g during the 112 day growout period (2.3 g per day) and we observed an FCR of 2:1. Very few SB were sampled from the cages owing to their reluctance to take a baited hook, which was used for subsampling. The few fish that were sampled followed the same linear growth trajectory that they did in tank culture, increasing at a rate of 2.6 g per day.



Figure 3. YT transported to test cage for pilot growout trial.

A 3,000 m³ submersible SeaStation was installed on site in September and it will be complemented with the installation of a comparably sized surface cage (circular salmon-type) for side-by-side comparison of growout of SB. Two medium sized 500 m³ cages are also being installed in preparation to receive the 2007 cohort of YT. Baseline environmental monitoring is scheduled for October.



Figure 4. SeaStation cage assembly.

Ocean Resources Enhancement and Hatchery Program (OREHP) Update

During 2007, thirty-one hatchery-reared WSB were recovered. Eight of these were juveniles recovered in the OREHP nearshore gillnet sampling program with periods at liberty ranging from 69 to 698 days. The remaining tagged individuals were recovered from commercial markets (13), recreational fishermen (8) and spearfishermen (2). Tim Conerty led HSWRI surveys at the commercial markets, which yielded the three oldest white seabass recovered in the history of the program. All three were more than 13 years in age and were released from the same growout pen in Santa Barbara during October 1994. Their lengths ranged from about 104 to 119 cm (41-47"), with weights between 11 and 13.5 kg (24-30 lb).

HSWRI Hosts Annual Meeting of the United Soybean Association (USBA)

In September the USBA held its annual "Soy-in-Aquaculture" stakeholders meeting at HSWRI. During their visit, the USBA toured the HSWRI hatchery facilities in San Diego and Carlsbad, CA, as well as the HSWRI/MDN demonstration project in Ensenada, Mexico. The USBA is seeking to diversify markets for its products and aquaculture is a natural fit. By supplementing commercial diets for cultured fish with a

soy-based protein source, less fishmeal is required. When applied on a large scale, this approach will help allow aquaculture to expand to meet increasing demand for seafood with less impact to the wild baitfish stocks that are used to produce fishmeal. Determining the specific level of soy protein supplementation that is acceptable to the fish requires testing on a species-by-species basis. HSWRI and USBA are currently discussing potential collaborative projects for evaluating soy-based protein supplementation for several of the marine finfish species being cultured in San Diego.



Figure 5. USBA representatives visit the HSWRI/MDN demonstration farm in Ensenada, Mexico.

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The Aquaculture Research Program has been active for more than 20 years at HSWRI. The primary objective of this Program is to evaluate the feasibility of culturing marine organisms to replenish ocean resources through stocking, and to supply consumers with a direct source of high quality seafood through traditional aquatic farming. Please direct any questions to Mark Drawbridge at mdrawbr@hswri.org.

Aquaculture research at HSWRI is currently supported by these major contributors:

- The California Department of Fish and Game's Ocean Resources Enhancement and Hatchery Program
- Cabrillo Power/NRG
- The U.S. Fish and Wildlife Service's Sport Fish Restoration Account
- Chevron Corporation
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