HSWRI Aquaculture Program Research Report
**** June & July 2009 ****

Do Public Aquariums Hold the Secret to Mating Captive Rockfish?

Over the last five years we have collected and attempted to breed four species of *Sebastes* rockfish (cowcod, bocaccio, starry, and vermillion), thanks to funding from the Chevron Corporation. To date we have only seen signs of reproduction in two female cowcod and one female Starry, with only the female starry releasing larvae. In an attempt to "jump start" mating among these species, we recently teamed up with several public aquariums, following the successful model Dr. Mike Rust of NOAA Fisheries in Washington developed with the Seattle Aquarium.

Figure 1. Starry rockfish at the Birch Aquarium at Scripps Institution of Oceanography

Earlier this year we sent Starry rockfish to the Birch Aquarium at Scripps Institution of Oceanography in La Jolla, vermillion and bocaccio to the California Science Center in Los Angeles, and cowcod to the Monterey Bay Aquarium in Monterey. We kept several male and female cowcod and bocaccio to continue our efforts at HSWRI. The aim of the new partnerships is to see if the fish will mate in larger, more natural tank environments. The fish will be monitored carefully for mating behavior and signs of pregnancy. If they become pregnant, aquarium staff will attempt to remove them from the exhibit to another holding tank where they can release the larvae. Those larvae will then be transported to HSWRI for rearing.

Figure 2. Cowcod at the Monterey Bay

All of the fish transported well to their respective facilities and all are on exhibit except for those at the California Science Center, which will be on exhibit in 2010.

Sea Lions Recover HSWRI Oceanographic Equipment!

We have been measuring ocean currents using an acoustic Doppler current profiler (ADCP) at the proposed location of our offshore aquaculture demonstration project. The site is five miles offshore in 100 m of water. The direction and speed of the currents are being used to model the potential environmental effects of the farming operation. After a four month deployment, numerous unsuccessful attempts were made to locate and recover the ADCP. After one unsuccessful trip the SeaWorld marine mammal curatorial staff contacted the Space and Naval Warfare Systems Center Pacific (SSC Pacific) to see if they could assist. The request went through the chain of command and final approval was granted to use SSC Pacific's Mark 5 "QuickFind" Marine Mammal System (MMS). The MMS employs California sea lions to recover submerged objects much more quickly than by "traditional" methods. The very next day, the Mark 5 "QuickFind" team was on site with four sea lions ready to locate and retrieve the ADCP. The precise coordinates for the ADCP location were given to the team and in less than 30 minutes the ADCP was located. Upon confirmation of the ADCP location, the sea lions then made several dives to attach the recovery line to the unit. The ADCP and all the associated ground tackle were retrieved. Everyone safely returned to the dock within two hours of our start time (Figure 3). This effort truly epitomizes the definition of "QuickFind"!

Figure 3. HSWRI research scientist, Mike Shane, with his new "best friend" and the recovered ADCP.

A Faster Way to Tag Fish

With production of white seabass (WSB) reaching a level of 350,000 fish annually, we realized that it was necessary to improve and streamline the process of tagging. Before WSB are released, a coded wire tag is inserted in the check muscle of each fish. With inspiration from North West Marine Technologies (NMT), creators of the tagging equipment, and a spinoff of a multi-station layout created by the Florida Fish and Wildlife (FFW), we designed our own purpose-built system from the ground up.

The tagging process involves three basic steps of 1) sedating, 2) tagging and 3) recovery, which have not changed in our design. What has changed is the custom fabrication of a completely integrated 5-unit tagging station. We used expanded PVC sheets as the primary building material because it is seawater resistant, light weight, inexpensive and easy to work with. The new tagging station was built in its own room and emphasizes

comfort and ergonomics for the tagger (Figure 4). Our station allows for up to five taggers to work simultaneously, with support from a station manager. The station manager oversees quality control and makes sure that the taggers are supplied continuously with anesthetized fish. The anesthetized fish are delivered to each tagger in water via a channel system with gates that are controlled by the taggers. Because the fish are delivered in water and handling is minimized, high standards of fish health are maintained. The system is designed so that tagged fish leaving the hatchery are sluiced in water to our outdoor raceways for delivery to net pens. As always, the tagging process is used as a critical quality control point to remove fish that are not suitable for release. Because the station is permanently established, machine set up and clean up time is greatly reduced each day. Through-put of fish varies but is expected to be approximately 25 person hours per 10,000 fish when three existing tagging units are working.

Figure 4. Purpose-built tagging station accommodates up to five taggers at a time.

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The Aquaculture Research Program has been active for more than 25 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 mdrawbridge@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
- SeaWorld San Diego

- The U.S. Fish and Wildlife Service's Sport Fish Restoration Account
- Chevron Corporation
- The Catalina Seabass Fund
- The Shedd Family
- The Fletcher Foundation
- California Sea Grant
- NOAA Fisheries
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- United Soybean Association
- San Diego County Fish and Wildlife Advisory Commission