HSWRI Aquaculture Program Research Report
**** August & September 2010 ****

HSWRI Aquaculture Program Set to Expand in Florida

In 2009, HSWRI opened its newly-renovated Coconut Point Laboratory (CPL) on the Indian River Lagoon (IRL) near Melbourne Beach, Florida (Figure 1). The conversion of the private residence, gifted to HSWRI by the Richard King Mellon Foundation in 1997, took just over a year to complete. The renovated facility includes a dock, a two-story building with offices, meeting rooms and temporary housing for visiting scientists, and a laboratory. The initial phase of renovation focused on accommodating the Institute's research in marine ecology, physiology and ocean health.

Figure 1. View of HSWRI's CPL from the dock on the IRL.

With a base of operations firmly in place, HSWRI immediately launched plans to establish a broodstock quarantine and holding facility at the CPL in support of the Florida Marine Fisheries Enhancement Initiative (FMFEI). The FMFEI is a cooperative effort among Florida Fish and Wildlife Conservation Commission, the Florida Institute of Technology, Mote Marine Laboratory, and Florida Atlantic University's Harbor Branch Oceanographic Institute to help replenish depleted stocks of marine fishes throughout Florida. The initial target species for this effort is the red drum or redfish (*Sciaenops ocellatus*) – a member of the family Sciaenidae that includes drums and croakers. This makes it a close relative of the white seabass (*Atractoscion nobilis*), which the Institute cultures for a similar replenishment program off southern California.

Figure 2. Site work underway prior to pouring concrete pad for broodstock tanks at CPL.

The CPL broodstock facilities are expected to be completed by the spring of 2011 (Figure 2). The site will accommodate four 5-m diameter holding pools, each on independent recirculating seawater systems

that are similar to those used by HSWRI for white seabass. One of the four pools will be dedicated to fish quarantine, and remaining three will be used to hold brood fish prior to transfer to a hatchery-based breeding center. Because these fish will support a stock replenishment program, large numbers of brood fish will be cycled through the program to ensure adequate mixing and genetic diversity of progeny. This translates into lots of fishing opportunities for those involved in collecting new fish!

Measuring Fecal Settling Rates in Striped Bass

As part of the Institute's ongoing investigations into the development of offshore aquaculture, HSWRI scientists under the direction of Mike Shane are collaborating with outside researchers on modeling the environmental effects associated with the culture of fish in cages (Figure 3). Our scientists are collecting data that will be incorporated into AqualModel, a modeling and information system developed by Drs. Jack Rensel, Dale Kieffer, and Frank O'Brien of Rensel Associates Aquatic Science Consultants. AquaModel simulates benthic and water column ecosystem processes associated with aquaculture, which allows an evaluation of the potential ecological effects of ocean farming. The latest model input parameter being investigated by HSWRI involves measuring the settling rates of fecal matter from species of fish that are good candidates to be grown in offshore cages in the southwest. Determining fecal settling rates is important in understanding how feces will be dispersed from cages depending on the depth and local ocean current conditions at a given farm site.

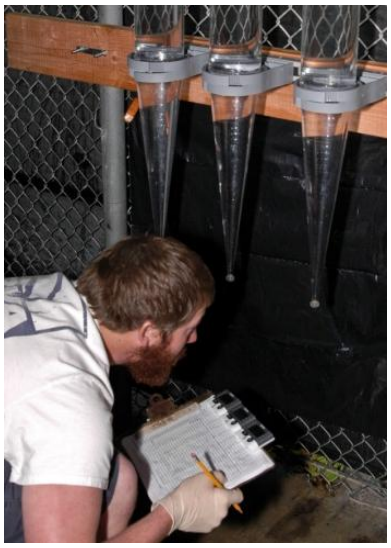

Figure 3. Student research assistant records fecal volumes in settling cones.

Figure 4. Liberating fecal material from a striped bass at the start of a trial.

We selected striped bass (*Morone saxitalis*) as the first species to be evaluated (Figure 4) and we constructed a series of settling chambers to measure fecal settling rates (Figure 3). The mean standard length and weight of the striped bass used in experiments was 16-cm and 86-g, respectively. The mean volume of feces extruded from 19 fish was 0.32 mL, with a mean settling rate of 2-cm/s. This mean settling rate is similar to other marine finfish species and lower than the mean settling rate of 3.2-cm/s reported for Atlantic salmon. As our striped bass grow, we will periodically re-measure rates of fecal settling to determine if settling rates vary with the size of fish.

Understanding the Role of Bacteria in Larval Rearing of Marine Finfish

David Eichorn joined HSWRI in July of 2010 as a graduate student intern, working with Research Scientist Kevin Stuart on improving larval rearing of California yellowtail (*Seriola lalandi*) and white seabass. David is originally from Dallas, TX, and his passion for the ocean began when he started diving with his father in 1999. In 2008, after receiving bachelor's degrees in both Biology and Psychology from Brown University in Providence, RI, David was recruited by the Three Seas Program of Northeastern University in Nahant, MA. David plans to graduate this December and in order to fulfill his school's requirements for a Master of Science in Marine Biology, he had to complete a six-month internship.

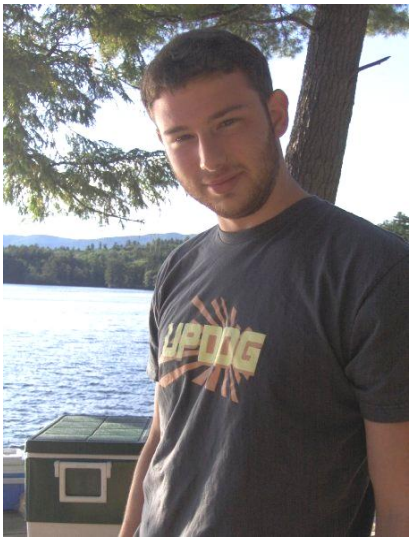

Figure 5. Graduate student intern David Eichorn.

Since his arrival at HSWRI, David has assisted with experiments designed to characterize bacterial loading rates during larval rearing of yellowtail and white seabass. In particular, David has focused on identifying bacteria in the genus *Vibrio*, which are commonly pathogenic. As an outcome of this investigation, David hopes to help HSWRI researchers mitigate pathogenic bacteria through improved production of live-feeds and water quality management in the rearing tank. David's preliminary results have shown that commercially available antimicrobial products like Hatch Controller from INVE can be used to significantly reduce *Vibrio* counts on *Artemia* prior to addition to the larval rearing tank. Bentonite clay added to the rearing tank also significantly reduced bacterial loads. However, further investigation of the use of clay is warranted because survival rates were low for both yellowtail and white seabass.

Acknowledgements

This document reports on aquaculture research projects at HSWRI that are supported by numerous grants, contracts and private contributions. It also represents the hard work of many dedicated staff and volunteers throughout southern California. This information was contributed by HSWRI staff and compiled by Aquaculture and Fisheries Research Coordinator Dr. Kristen Gruenthal under the direction of Senior Research Scientist and Aquaculture Program Director Mark Drawbridge.

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 Dr. Kristen Gruenthal at kgruenthal@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
- SeaWorld Parks and Entertainment
- 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
- National Institute of Food and Agriculture
- United Soybean Board
- San Diego County Fish and Wildlife Advisory Commission
- NOAA's Saltonstall-Kennedy Program

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