

HSWRI Aquaculture Program Research Report

*** October - November 2015 ***



Wild Fish Health Surveys Underway to Establish Health Parameters for Cultured Marine Fish

The goals of the Hubbs-SeaWorld Research Institute (HSWRI) aquaculture program are diverse, including commercial food production, research, and replenishment; research on fish health and disease prevention is important for all of these. In 2015, we received a grant from the Joseph S. and Diane H. Steinberg 1992 Charitable Trust to expand our aquatic animal health laboratory and initiate disease studies in wild stocks of several fish species being cultured by HSWRI. The primary goal of this project is to better understand natural disease processes that occur in wild fish populations. It is the vital preliminary step to managing disease agents that may pose a risk to cultured finfish. In year one, we set up the laboratory and began collecting samples in conjunction with HSWRI field surveys and broodstock collection trips. Blood and tissue samples were collected from live (anesthetized) and dead white seabass for laboratory analyses. While initial sampling attempts have focused on white seabass, we plan to expand this research to include other important finfish species such as California yellowtail and California halibut. In the coming year we will partner with the fishing community in southern California to help increase our sampling effort.

The goals of our program include development of a normal hematology database that can be applied to juveniles in a culture setting, and documentation of disease prevalence in wild populations. Ultimately, we hope to understand disease and health trends in wild stocks off the southern California coast so that we can more effectively manage the health



Figure 1. White seabass necropsy at sea (top); blood draw (bottom).

of cultured marine finfish populations. Baseline information on diseases in wild populations is critical for risk assessment and planning in the hatchery setting, whether the fish are being produced for release into the ocean or direct human consumption.

Broodstock Nutrition and Egg Quality in California Yellowtail

Over the last three years, HSWRI has been collaborating with NOAA partners on a project funded by the Western Regional Aquaculture Center to study egg quality in three different marine fishes cultured for food (see also Jan 2014 and Jan 2015 newsletters). Part of this project involves feeding California yellowtail brood fish formulated diets so that the ingredients can readily be manipulated and the resultant effects on egg quality documented. In February of 2015, the groups of yellowtail were fed diets with or without arachidonic acid supplementation (ARA), with all the diets being produced at HSWRI. ARA is a polyunsaturated fatty acid that has been shown to positively affect egg and larval quality in some species of fish when provided in brood diets at optimal levels – i.e., too much can be detrimental. In April of 2015, our yellowtail began spawning in 4m diameter x 1.2m deep flat bottom tanks. Eggs were collected at each spawning event and egg and larval quality parameters such as fecundity, egg viability and hatching rates were recorded. A subsample of eggs was also saved from each event for proximate and fatty acid analyses.



Figure 2. Participants from a recent nutrition workshop review HSWRI methods for producing formulated “sausages” to be fed to broodstock.

Over the course of the spawning season, the two ARA treatment groups had a total of 30 spawn events and produced over 13 million eggs with a mean viability of 55%. The control treatment groups produced over 18 million eggs from 53 spawn events and had similar mean viability of 57%. There were no differences among the egg and larval quality measures taken for each spawn, however biochemical analyses have yet to be completed. This trial was successful in showing that yellowtail broodstock will accept a formulated diet as well as spawn in relatively small tanks. This success is important because it will facilitate replication in broodstock trials and allow further ingredient manipulation in future nutrition trials. In 2016 HSWRI will be collaborating with researchers from Auburn University on a new broodstock nutrition study funded by the National Sea Grant program. In this study, we will focus on inclusion of the amino acid taurine in the broodstock diet and evaluation of its resulting effects on egg and larval quality.

New Postdoc Helps Spearhead Dick Laub Fisheries Replenishment Program

With the recent formation of the Dick Laub Fisheries Replenishment Program at HSWRI (April-May 2015 newsletter), Ruairi MacNamara has joined HSWRI as a Postdoctoral Research Associate in Fisheries Biology/Ecology in a joint appointment with the University of San Diego. Ruairi is from Ireland and he received his PhD from the National University of Ireland Galway where his dissertation research involved a variety of approaches (e.g., field, laboratory and modeling) to inform conservation strategies for the critically-endangered European eel. Prior to joining HSWRI in October, Ruairi spent two years as a Postdoctoral Research Fellow at the Center for Fisheries, Aquaculture, & Aquatic Sciences, Southern Illinois University, Carbondale evaluating the control strategies for the invasive Asian carp in the Illinois River. There, Ruairi's primary responsibility was the design, implementation and analysis of mobile hydroacoustic surveys throughout the Illinois River to determine the demographic responses of Asian carp to anthropogenic (e.g., commercial harvest) and environmental factors. While at HSWRI, he will be helping to evaluate the suitability of candidate species and develop stocking strategies for enhancement of various marine species in southern California, as well as expanding our regional fisheries ecology program. In his leisure time Ruairi enjoys kayaking and fishing. Welcome aboard Ruairi!



Figure 3. New Postdoc, Ruairi MacNamara, takes a break to pose for a picture.

Acknowledgements

This document reports on aquaculture research projects supported by numerous grants, contracts and private contributions. It also represents the hard work of many dedicated staff and volunteers throughout southern California, as well as collaborators around the country. This information was contributed by HSWRI staff and compiled by Senior Research Scientist and HSWRI Aquaculture Program Director Mark Drawbridge.

The aquaculture research program has been active for more than 35 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 aquatic farming. Please direct any questions to Mark Drawbridge at mdrawbridge@hswri.org.

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

- Avalon Tuna Club Foundation



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- Cabrillo Power/NRG
 - Chevron Corporation
 - Der Fruchtbaum Family Trust
 - Dorothea Laub; Dick Laub Fisheries Replenishment Program
 - Edison International
 - Fisherman's Landing
 - H & M Landing
 - Los Angeles Rod & Reel Club Foundation
 - Frank and Kathy LoPreste
 - NOAA's Saltonstall-Kennedy Program
 - Point Loma Sportfishing
 - Poseidon Water
 - San Diego County Fish and Wildlife Advisory Commission
 - Santa Monica Seafood
 - SDG&E Environmental Champions
 - Seaforth Sportfishing
 - SeaWorld Parks and Entertainment
 - SeaWorld San Diego
 - Sempra Energy Foundation
 - Joseph S. and Diane H. Steinberg 1992 Charitable Trust
 - The California Department of Fish and Wildlife's Ocean Resources Enhancement and Hatchery Program
 - The Catalina Seabass Fund
 - The Fletcher Foundation
 - The Shedd Family
 - The U.S. Fish and Wildlife Service's Sport Fish Restoration Account
 - United Soybean Board
 - USC Sea Grant
 - USDA National Institute of Food and Agriculture
 - Western Regional Aquaculture Center (WRAC)

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