
HSWRI Aquaculture Research Newsletter

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Finfish Health Research at HSWRI

The HSWRI Aquaculture Program's approach to fish health is a pro-active one. Our fish health program includes:

- husbandry and preventative veterinary medical protocols and 'best practices' documents that are reviewed and updated regularly,
- regular inspections and examinations by HSWRI and non-HSWRI veterinarians,
- oversight and inspections under two different programs within USDA/APHIS, a Fish Health Management Team, an Institutional Animal Care and Use Committee, and the California Department of Fish and Wildlife.

Our team of veterinarians and scientists conducts health research across a range of topics related to disease prevention, detection and treatment, and general husbandry.

One recent project involved investigating the use of an alternative anesthetic, Aqui-S 20E, in marine fish and



Figure 1. HSWRI veterinarian Dr. Connie Silbernagel (center) performs an annual health assessment on a yellowtail brood fish while researchers look on.

elasmobranchs. Immersion anesthetics are used by veterinarians, field biologists, and laboratory researchers to aid in handling finfish for medical procedures, research purposes and moderating perceived stress responses. Only a subset of drugs available to aquatic animal veterinarians can be used with the species that HSWRI works with, because they are considered food animals with special restrictions designed to prevent accidental human consumption of fish medications. The only FDA-approved anesthetic for food fish, tricaine methanesulfonate (MS-222), requires a 21-day withdrawal period prior to harvest and consumption. The

withdrawal period reflects the amount of time needed for an animal to completely metabolize an administered therapeutic.

For many years, HSWRI has participated in the Investigational New Animal Drug (INAD) program, overseen by the U.S. Fish and Wildlife Service, to develop new and/or improved drugs for health management of the fish in our care. Ten percent eugenol (AQUI-S 20E) is currently being tested as a fish anesthetic under the INAD program. It has been gaining momentum for FDA approval because of its 0-day withdrawal time if fish are not of harvestable size within 72 hours of exposure.



Figure 2. Testing for a pain/stimulus response in an anesthetized leopard shark

We performed hatchery-based trials to determine appropriate AQUI-S 20E anesthetic doses for two cultured marine finfish (white seabass and California yellowtail). Based on those results we conducted field trials with wild spotted bay bass, barred sand bass and California halibut, and two species of sharks (leopard shark, grey smooth-hound shark). The results of this research appear in the Journal of Wildlife Diseases Special Supplement (April 2016): Advances and Improvements in Wildlife Welfare. AQUI-S 20E appears to be a safe and effective drug for use in marine finfish anesthesia at low doses. Although our sample size was small, the results were not as clear for the sharks we evaluated as there were more complications than expected. AQUI-S 20E appears to be a promising anesthetic not only for the production setting, but also for field biologists due to its 0-day withdrawal time for fish not of harvestable size, and very short withdrawal time for larger fish.

SeaWorld's Rising Tide Conservation Program Expands in Southern California

We reported on this exciting project in our May 2015 newsletter, and happily the story continues to get even better! The Rising Tide Conservation (RTC) program is an initiative of the SeaWorld & Busch Gardens Conservation Fund (SWBGCF). The program's mission is to protect reefs by developing techniques



Figure 3. HSWRI researchers meet with aquarists at Birch Aquarium to discuss egg collection options from one of their tropical reefs. Small egg collectors are visible floating at the surface.

for rearing marine ornamental fish and promoting commercial production to provide alternatives to reef collection (<http://www.risingtideconservation.org/>). With a grant from SWBGCF this past spring, we have expanded our efforts to contribute to this conservation effort. One objective involves collaborating with public aquariums in southern California to collect eggs from ornamental species that spawn naturally in their display tanks. Aquarists from SeaWorld, Birch Aquarium, and the Aquarium of the Pacific have all indicated their willingness to participate. Initial efforts will focus on assessing spawning frequency and volume in various tanks in order to understand what culture methods and systems will be most effective to apply for larval rearing. The biggest challenge will likely be getting adequate numbers of eggs to work with given inherently low survival of fragile early life stages.

The second objective of this research program is to establish breeding populations of select species at HSWRI. We recently completed the initial installation of eight 250L tanks supplied by a heated and sterilized flow thru water supply. Initial populations of flame angelfish (*Centropyge loricula*) and bicolor angelfish (*Centropyge bicolor*) were graciously donated by Quality Marine of Los Angeles and quarantined at SeaWorld before being stocked into tanks at HSWRI.

So far the fish are thriving on a mixed diet as we anxiously await successful pairing and mating. HSWRI researcher Federico Rotman has experience raising flame angels in Hawaii more than a decade ago, so the learning curve will not be as steep as we shift gears from large, highly fecund coastal species to marine ornamentals.

In the next phases of the project, the emphasis will be on larval rearing with eggs collected either in-house or externally from the aquarium partners. That effort will



Figure 4. (top) newly designed breeding center for marine ornamentals at HSWRI; (middle) bicolor angelfish; (bottom) flame angelfish.

create a cascade of other unique challenges at HSWRI related to feed requirements and optimized rearing conditions. Fortunately, many general husbandry practices are transferable among species and the Rising Tide community of researchers operate in a very collaborative fashion.

Acknowledgements

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The aquaculture research program has been active for more than 35 years at HSWRI. The primary objective of this program is to develop sustainable culture practices for marine organisms that yield healthy products for display, release or human consumption. Please direct any questions to Mark Drawbridge at mdrawbridge@hswri.org.

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- Poseidon Water
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- SDG&E Environmental Champions
- Seaforth Sportfishing



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- SeaWorld & Busch Gardens Conservation Fund
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