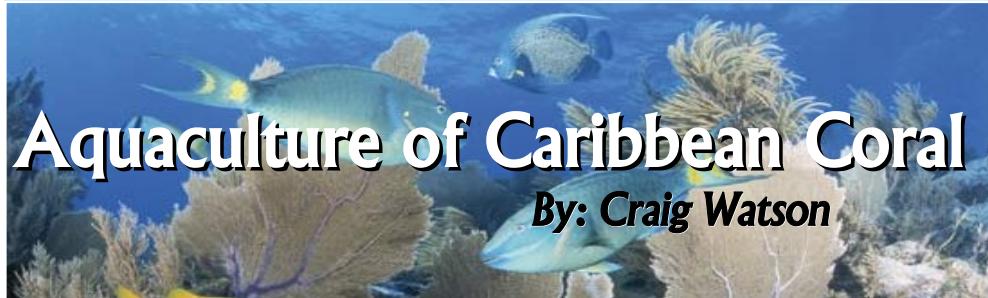


WATERWORKS



Newsletter of the UF/IFAS Department of Fisheries & Aquatic Sciences

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Aquaculture of Caribbean Coral

By: Craig Watson

Aquaculture in Florida is dominated by the production of ornamental species for the aquarium trade. The industry beginnings go back to 1930, with farms developing around Tampa and Miami. Today, the farms are spread throughout the state, especially in the southern half where winter temperatures allow year-round production. With advances in the marine aquarium hobby and discoveries in reproduction, husbandry and water quality management, one growing segment of the industry is marine ornamental species, including hard corals. Currently, commercial coral production is limited to Indo-Pacific species, as they are the only ones available for culture. All Caribbean and Atlantic species are protected by federal law, and possession is limited to research, education and coral colonies that have naturally settled on live rock cultured on lease sites.

Coral reef restoration is receiving considerable attention as the health of our nation's coral reefs is declining. While natural events, such as bleaching and storms are not considered causes for restoration to occur, ship groundings, anchor damage and other direct human effects require restoration as part of any good mitigation plan. The University of Florida's Tropical Aquaculture Laboratory (TAL) located in Ruskin, Florida developed a plan and established a team approach to exploring the possibilities for commercial production of several Caribbean coral species for restoration efforts.

A collaborative effort with colleagues at The Florida Aquarium, the Florida Keys National Marine Sanctuary, Mote Marine Laboratory, Florida Atlantic University, Healthy Reefs (a private live rock producer in the Keys), the Florida Fish and Wildlife Conservation Commission (FWC) and the University of South Florida, the project is entering its third year. In April of 2006, seven species of corals were rescued from a sea wall in the Truman Annex harbor of Key West that was scheduled for removal. The parent colonies were split into thirds, and then each third was fragmented using a tile saw to create 10 fragments, approximately 1 inch square each. All the fragments were attached using a 2-part epoxy to a 3 inch diameter concrete disk. One group of fragments went to TAL, one to Mote Marine Laboratory and the third group of fragments were secured directly to a damaged section of Western Sambo reef off of Key West, again using a 2-part epoxy. The fragments at TAL were allowed to grow for 6 months in a greenhouse recirculating system using Instant Ocean® synthetic sea salt, and the fragments at Mote were grown in outdoor, flow-through tanks at their Summerland Key facility.

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Notes & News

Tom Frazer has been named a UF Foundation Research Professor, in recognition of his nationally recognized research dealing with freshwater and coastal marine ecosystems and their responses to anthropogenic stressors. The three-year professorships recognize faculty members who have established a distinguished record of research and scholarship that is expected to lead to continued distinction in the field.

Craig Watson received an award from Coastal America, a partnership of 15 departments and agencies under the US President, for his collaborative work with the Florida Keys National Marine Sanctuary Coral Protection and Restoration Program. The annual award recognizes programs and their participants who provide an impact re. conservation and protection of the nation's coastal resources.

Paula Viveros, a PhD student working under the guidance of Professor Ed Phlips, received a NSF Fellowship Award under the South East Alliance for Graduate Education and Professorship Program (SEAGEP). The award will support her research on coastal marine phytoplankton.

WaterWorks is a quarterly publication of the UF/IFAS Department of Fisheries & Aquatic Sciences, aimed at providing current information to prospective students, alumni, stakeholders and partners. To contribute an article or information for a future issue contact the Editor, Karl Havens (khavens@ufl.edu)



Colorado River Fisheries: Summer Field Experiences of FAS Graduate Students

Mark Rogers, Towns Burgess and Jared Flowers, FAS graduate students, spent a part of their summer in 2007 as members of a team of scientists studying native fish in the Grand Canyon reach of the Colorado River. These students were assisting the USGS Grand Canyon Monitoring and Research Center (GCMRC) with ongoing native fish research. Several FAS faculty and students have been involved in fish research in Grand Canyon for nearly 10 years including faculty members Drs. Bill Pine and Carl Walters and FAS PhD student (and USGS fish biologist) Lew Coggins.

Native fish populations are a great concern in Grand Canyon due to population declines possibly related to hydrologic changes in the river following the construction of the Glen Canyon Dam. Currently only four of eight native species reside within this portion of the Colorado River and one of the remaining species, humpback chub (*Gila cypha*), is a federally listed endangered species. Ongoing management actions designed to aid the recovery of humpback chubs include experimental flows and the experimental removal of non-native fishes, primarily rainbow trout, which may prey upon juvenile humpback chub or compete with chub for available resources. Cold-water species have historically been the main suite of non-native fish in Grand Canyon, but recently this has changed. The ongoing drought in the Colorado River basin has lowered reservoir levels in Lake Powell, resulting in warmer water passing through the dam and in turn warmer water flowing into Grand Canyon. The warm water has led to the expansion of a new suite of non-native species leading to renewed concerns over the potential effects on native fish. Because of the ecological, cultural, and power generating values from the Colorado River ecosystem, federal and state agencies invest considerable time and money for research and monitoring of Grand Canyon's resources. FAS's involvement with these agencies represents a unique learning opportunity for everyone involved.

The students offer perspectives on this experience -

Mark Rogers, Ph.D (2007)

I was invited to join the Grand Canyon electro-fishing trip with the Arizona Game and Fish Department (AZGFD) in conjunction with the GCMRC in September, 2007. This trip was part of an ongoing electro-fishing monitoring program to collect data for multiple projects that included monitoring abundances and

distributions of both native and non-native fishes within the river. We set out downstream of the Glen Canyon Dam with two large rafts (36 feet long!), two 16' inflatable electro-fishing boats and all the gear needed for 28 days on the river including food, personal gear, spare generators and outboards. I have considerable field experience, but this trip gave me a new appreciation for preparation and logistics because there is no going back to the truck or office for forgotten items.

We spent our days traveling down river, setting up base camps and electro-fishing at night. Running rapids and having several hundred foot high rock cliffs towering over me added a new twist to my electro-fishing experiences. Sampled fish were enumerated, we measured lengths and weights, evaluated fish for marks and marked fish according to protocols of the multiple ongoing programs for estimating population sizes and other research objectives. The diversity of habitats was greater than I expected within the Canyon and included sand bars, backwater eddies, boulder filled rapids and deep vertical rock faces. I was fortunate to see all four of the remaining native fish in the system (blue head sucker *Catostomus discobolus*, flannelmouth sucker *Catostomus latipinnis*, speckled dace *Rhinichthys osculus*, and humpback chub) as well other fascinating sights of the Canyon such as Desert Bighorn Sheep *Ovis canadensis*, side canyon hikes, indigenous cultural sites and amazing geology. The boat drivers did a great job of getting us safely down the river and they shared their wealth of knowledge about the Grand Canyon ecosystem.



Boat drivers Stuart Reeder (foreground) and Steve Jones (background) in inflatable electrofishing boats.

Towns Burgess and Jared Flowers, MS Students

During June 2007 we assisted cooperators from AZGFD and GCMRC with research on warm water fish monitoring on the Colorado River, AZ. Warmer water conditions in the Grand Canyon reach of the Colorado River have caused concern among resource managers over the potential impacts

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of non-native warm water species including smallmouth bass *Micropterus dolomieu*, striped bass *Morone saxatilis*, and channel catfish *Ictalurus punctatus* on native species – particularly the federally listed humpback chub. Our involvement with this sampling trip was assisting a field project designed to estimate capture probability and movement patterns for channel catfish in the Colorado River using a variety of gears that are part of the ongoing native and non-native fish monitoring programs in Grand Canyon. We were asked to participate in this project because of our extensive experience with a variety of telemetry gear from our research at UF. In cooperation with Dr. Bill Pine and Dr. Steve Walsh (USGS, Gainesville), Towns Burgess developed a technique to surgically implant sonic telemetry tags in channel catfish that prevents tag expulsion from the body cavity, a common problem with catfish.

For this two week field trip we launched from Diamond Creek, one of the few access points to the Colorado River in Grand Canyon, and floated about 15 miles downriver to our camp on the upper river reach of Lake Mead. We set up camp on a sandbar that provided enough room for all of our campsites, boat landings and a large kitchen area. The field crew consisted of 12 people, including a variety of technical boat drivers and biologists from three different management agencies. We collected and tagged 60 channel catfish using a variety of gear types and monitored a 1.2 mile reach of the river to confirm presence of tagged fish in the study stretch and estimate movement patterns (diurnal and linear) and habitat use during our two weeks on the river. This river reach was also divided into three segments where we tested different recapture methods: electro-fishing, angling and hoop nets.

The environment in the Grand Canyon provided working conditions that we were not fully accustomed to. The extreme midday heat (115 F+, which could ruin LCD screens and caused batteries and soda cans to explode) forced us to work primarily in the mornings and evenings into late-night. The heavy loading of coarse sediments in the river, scraping along the rock canyon walls, played havoc with our telemetry equipment. However, with considerable brainstorming, trial-and-error, and duct tape, we were able to find solutions to most of these problems. This experience challenged us to find ways to address problems when they arose in the field under difficult conditions. We also learned the value of being well prepared when the closest hardware store is, well, not even close!

In addition to our work, we had a fantastic experience collaborating with new people in Arizona and learning about conservation issues in the southwest. Even though the field camps are quite remote, the logistical support from GCMRC is amazing and the meals are a highlight including steak, halibut, and great coffee. In downtime we had time to sit, tell stories, and discuss new ideas with a diverse group of biologists and boatmen.

The most interesting aspect of this communication was in realizing that even though the systems appear different many of the same problems exist in Florida, such as introduced species and drought & stream flow issues, and the approaches to address these problems are similar to those in the southeast. This perspective is something that could only have been fully appreciated by experiencing it. We both agree that this was one of the best field experiences we have ever had.



Unloading supplies at the Grand Canyon camp along the Colorado.



A birds eye view of the camp with all of its creature comforts.

Aquaculture of Caribbean Coral (Cont'd from Page 1)

During this time, the veterinarians at the TAL and the Florida Aquarium, working closely with FKNMS and FWC personnel, developed bio-security guidelines and a health assessment protocol for issuance of a health certificate for corals. The purpose of this health certification process is two-fold: first, to insure that any cultured corals released as part of a restoration are as robust as possible and will have the best chances of survival and growth; and second, to insure that any re-introduced corals will not transmit infectious pathogens into the wild.

The health certification process is a living document, and is intended to provide guidance for any future re-introduction work. In December 2006, all the fragments that passed the health certification process were placed on the Western Sambo reef site and a monitoring trip was conducted in May 2007.

While the study is still in its early stages, the project aims to determine if aquaculture production of corals for restoration can be done successfully and responsibly. The vision is that someday, cultured corals may be available whenever an event dictates the need for a supply of large quantities of coral colonies, and the costs associated will be part of any mandated mitigation order. Current research is focused on continued monitoring of the colonies transplanted to Western Sambo reef and further refinement of the health certification process.

Additional studies now include development of health diagnostic tools using microbial community structure within the coral mucus as well as investigation of the genetic diversity of the colonies and the potential impact of aquacultured corals on the genetic diversity of wild coral populations in the Keys.

Craig Watson is Director of the Tropical Aquaculture Laboratory in the UF/IFAS Department of Fisheries and Aquatic Sciences, located in Ruskin, FL.

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A piece of coral is shown here in cross section



Small experimental segments are cut with a saw.



The experimental array in a culture system.

Managing Aquatic Plants in Florida Lakes

A new information circular has been developed by Florida LAKEWATCH to help citizen scientists, students and professionals understand the role aquatic plants have in lake ecology and lake management. The circular is divided into three sections: (1) aquatic plant biology, (2) aquatic plant management problems, and (3) aquatic plant management techniques. This information circular represents a summary of existing knowledge on aquatic plants and aquatic plant management strategies, highlighting the Florida situation.



Upcoming Seminars in FAS (Fridays at 3 PM, FAS Conf. Room)

Feb 15: **Bill Pine**, *Interactions among common fisheries management strategies*

Feb 22: **David Reed**, *Gulf of Mexico habitat characterization*

Feb 29: **Susan Gray**, *Science and management of Lake Okeechobee*

Mar 7: **Mark Butler**, *Reproductive success in spiny lobster*



Family Fishing Days: February 23 (Law Enforcement Appreciation Day)
March 29 (Rotary Club of Downtown Gainesville Fishing Tournament)
April 26 (UF Center for Autism and Disabilities Family Fishing Day)
May 17 (George Kirkpatrick Jr. Kid's Fishing Derby)