

Lets All Go to Summer Camp!!

In the marine aquaculture sector there is an increasing need to expand the number of species available for commercial production. Advances in aquaculture technologies are being investigated to support replenishment of local fisheries, develop marine food fish farming opportunities and to increase seafood production globally. In the United States (US) recreational fishing is a multibillion (US) dollar industry where the economic output from saltwater sport fishing in Florida alone was valued at over \$4.9 billion in 2011. As one of the three most popular inshore sport fish in Florida, common snook have long since been an economically important part of Florida's saltwater recreational fishing industry. Their popularity, however, has a downside: fishing pressures have placed snook on the state's list of "species of special concern" and resulted in the need for fishing restrictions and careful monitoring. Bag limits and limitations on size and seasons for snook harvest have been implemented and a sizeable investment has been apportioned for fisheries managers to develop an effective marine fish stocking technology for rapid restoration of depleted stocks. In addition to common snook, Florida pompano are also of interest for aquaculture in the Gulf coast region of the US. Currently, they are part of a small but growing commercial fishery where the demand is continuously increasing and higher than the supply. Despite recent breakthroughs in the spawning of captive broodstock and advances in larval rearing protocols, a number of key bottlenecks remain, restricting the commercial-scale culture of both common snook and pompano fingerlings for restocking or food production. These included the failure of females to ovulate without hormonal manipulation, reduced milk production in males, inconsistent supply of high quality eggs; high incidence of larval mortality and limited knowledge of nutritional requirements. In order to investigate some of these problems; collaborations were formed between several research teams including the Reproduction (Prof. Migaud) and Nutrition (Profs. Tocher and Bell) Groups at the Institute of Aquaculture

and Mote Marine Laboratory's Center for Fisheries and Aquaculture, Sarasota, Florida USA, with two PhD actively involved (Nicole Rhody and Marion Hauville).

Project successes included a scoping study which was undertaken to explore the potential of DNA profiling for monitoring mating outcomes in captive common snook. Since snook are relatively new to aquaculture, little is known about their spawning characteristics. Spawning success was monitored among wild harvested broodstock that were undergoing hormonal treatment to induce



spawning. DNA profiling of microsatellite markers was employed to detect and quantify individual parental contributions for larvae obtained from the three captive populations. During this study, new information regarding requirements for broodstock husbandry, mating patterns and spawning periodicity of captive common snook broodstock were obtained. Spawn contribution data 1) provided a confirmation of hormonal (GnRHa) treatment efficacy in female snook with a minimum stage of oogenesis required for successful spawning; 2) identified a potential impact of handling on maturation and spawning in male and female broodstock; 3) confirmed that, through photothermal conditioning, captive common snook broodstock can spawn over consecutive days and several times per year including outside of their natural spawning season.

Additional highlights from a study which focused on the environmental and endocrinological control of maturation in wild fish included the development and validation of real-time quantitative RT-PCR assays for

gonadotropin genes (*fsh β* and *lh β*) from the pituitaries of sexually mature male and female common snook. Temporal expression patterns of *fsh β* and *lh β* during the reproductive cycle were evaluated in relation to sex steroid production, LH blood plasma levels, gonadal development and tidal cycle. Histological observations of gonads collected during this study showed a diurnal rhythm of follicular development in female common snook strongly associated with the tidal cycle.

Finally, new insights on Florida pompano early nutritional requirements were acquired. In this study, three microdiets were tested on weaning of Florida pompano larvae and significant differences were observed in fatty acid composition of the diets and larvae between treatments. Results from the enzyme analysis suggest that fishmeal is suitable as the main protein source for Florida pompano larvae compared to krill meal. Additionally, the full functionality of the pancreas at 16 days post hatch was demonstrated, opening possibilities of an earlier weaning time.

In summary, the knowledge gained from the collaboration between the Institute of Aquaculture and Mote Marine Laboratory has improved commercial-scale production capabilities for both common snook and pompano by: providing a better understanding of the of environmental, nutritional, behavioral and social conditions that promote spontaneous spawning; improving the genetic management of captive broodstock; creating tools to better understand broodfish requirements in tank systems; and identifying larval nutritional requirements. New opportunities are being sought to continue the partnership and help promote the expansion and development of aquaculture technologies needed to raise new finfish species with a high market value and/or recreational demand.

