

POMPANO MARICULTURE IN LOW SALINITY PONDS

**Michael F. McMaster, Thomas C. Kloth and John F. Coburn
Mariculture Technologies International, Inc.
P.O. Box 1020, Oak Hill, FL 32759**

**2nd International Sustainable Marine Fish Culture Conference and Workshop
October 19-21, 2005
Harbor Branch Oceanographic Institution
Fort Pierce, Florida**

Abstract

Breeding and hatchery technology developed by the authors in the 1970s has been continued and further developed at the Mariculture Technologies International (MTI) site in Oak Hill, Florida. The Oak Hill hatchery accomplished 2 Pompano spawns during the Spring of 2004 for MTI's genetic selection project, and a third spawn occurred in September 2005.

The MTI farm has available ground water at 19 ppt salinity and in that water has successfully raised pompano from fry to adults. Additionally, following the 2004 Hurricanes, juvenile pompano were placed into the Main Pond where they have continued with neither human intervention nor feeding. A surviving population inventory and characterization was conducted in July 2005.

During the remainder of 2005 and early 2006, MTI's technical staff plans to identify pond parameters and compatible Florida Pompano fry aimed at commercially viable, Pond Farming of the Florida Pompano. In the earthen pond habitat, monitored parameters would include, water exchange flow rates, temperatures, salinity, pH, oxygen and other water quality related compounds.

KEYWORDS: (1) Pompano (2) Ponds (3) Commercial

Introduction

The Florida Pompano (*Trachinotus carolinus*) is regarded as one of the nation's most desired high-value sea food with the ex-vessel value exceeding all other Florida marine fish. In the USA, there are major limitations to using natural sea water sources for mariculture but there are numerous areas throughout the Southern States where one finds subterranean salt water of various salinities. The Florida Pompano has been farmed in tanks and in ponds. It is generally understood that the least-cost method of farming fish is in ponds as opposed to recirculating tank farms or sea cages.

Mariculture Technologies International Inc. (MTI) and its President, Mr. Michael McMaster have been active in private mariculture development for over 30 years in the USA. During this time some of the most notable activities of MTI have been in the marine finfish science and farming technologies (McMaster, 1987). The firm has designed and built some of the largest state-of-the-art commercial mariculture farms in the northern hemisphere of the Americas. Today, MTI is involved in several commercial mariculture activities here in the USA (McMaster et.al., 2003 and Wray, 2003) and further information regarding these activities can be found at www.mariculturetechnology.com.

A continuing pompano project at MTI is directed at pompano grow-out in reduced salinity water (McMaster et.al., 2004). The life history of the Florida Pompano suggests that it may be possible to farm this species in lower than normal ocean salinities. In fact, during 2003/2004 it was demonstrated that pompano can not only survive long term but grow normally in 19-ppt water. In December 2003, pompano grown in 19-ppt water (5,000 liter tank) were harvested for analysis. The initial size of the pompano was 10 grams each. Acclimation from 32-ppt to 19-ppt

was accomplished over a two-week period. At the end of a four month growing period the average size was 110 grams with an average fork length of 16 cm.

The objective for the present phase of R&D is the determination of pompano compatibility to husbandry in earthen ponds with a salinity of approximately 19-ppt. To be successful commercially, the objective includes economic viability, access to site permits (jurisdictional acceptance) and a sustainable business structure for the industry.

Methods

The MTI Oak Hill Facility (see figure 1) is located at 860 South US Highway #1 near Oak Hill Florida. Located on the 4 hectare (10-acre) property are a Hatchery/Broodstock Facility, three structures (tent-buildings) associated with brine shrimp/rotifer/live food and limited laboratory/office space. Low salinity (19-ppt) water is provided by a 150-meter (490-ft) well and water management includes a 0.3 hectare ($\frac{3}{4}$ acre), 2.4-meter (8-ft) deep retention pond.

During September and October 2004, the facility was struck by three hurricanes including Hurricane Charlie and Hurricane Frances. Severe interruptions of operations occurred which was compounded by widespread destruction of utilities, services, and access throughout Eastern Central Florida. Two of the buildings suffered damage but fortunately only one was extensive enough to be classified as moderate. A significant amount of repair, however, was required to resume operations including overnight shipping of heavy gauge wiring from New Jersey.

The Pond and its inhabitants were devastated by the torrential rainfall. There was total loss of pompano stock from the Pond as a result of freshwater flooding and oxygen depletion. Since those incidents, pond salinities from heavy rainfall have been measured as low as 12-ppt without observation of any pompano mortality.

In late October 2004, following recovery from Hurricane Frances, 190 of the F1 pompano survivors from the Hatchery were placed into the pond. The pond was (and continues to be) populated with forage organisms such as saltwater grass shrimp (*Palaemonetes vulgaris*) and small bivalves and no supplemental feeding is conducted. Supplemental aeration is provided through three 15-cm (6-inch) glass-bead airstones. A water exchange rate of 114 Lpm (30 gpm) is provided from the 150-meter (490-ft deep) saltwater well (well water temperature 26C (78 F)).

Results and Discussion

After the pompano had been in the pond for nine months (July 28,2005), the pond was seined twice with a 61 meter x 3 meter x 3.8 cm (200 ft x 10 ft x 1 ½ inch) mesh net (figure 2). The result of the aggravating exercise was capture of 32 pompano to serve as population samples (figure 3). During each seining attempt, there were at least twice as many pompano jumping over the float line as there were eventually caught in the net. Also, many fish were observed digging under the lead line. An accurate measure of the survival rate would require draining the entire pond which would have interrupted operations with respect to other species in the pond.

The average weight of the pompano sample was 330 grams (11.63 ounces) and a fork length of 25 cm (9.69 inches). This performance was significantly less than the MTI Standard Growth Curve (500-550 gram) (18-20 ounces)(figure 4). Of the two most likely explanations for this observation: Winter pond temperatures lower than that on which the Standard Growth was based, and Feeding relying on natural forage versus designer feed, we believe that it was the Temperature variable which resulted in slower growth. The lowest recorded winter temperature of the pond was 13 degree C (56 degree F) which corresponded to an air temperature in the low single digits C (40s F). On the average, the winter pond temperature remained in the mid teens C (low 60s F). Experience has indicated that the lower lethal temperature for Florida pompano is 10 degrees C (50 degrees F) and that temperature was never observed nor was mortality related to cold weather events. On the other hand, these temperatures are significantly below the 27 degree C (80 degree F) environment on which the Standard Growth Curve is based.

No mortality was observed that would appear related to disease. From time to time, pompano were observed laying on the banks of the pond. Although these sightings numbered less than 10 fish over the year period, future pond designs will be aimed at eliminating this jumping behavior mortality. On one occasion, an osprey was observed to dive into the pond and capture a 15 to 20 cm (6 to 8 inch) pompano.

As part of the now ongoing pompano operations at the MTI Oak Hill facility, pond temperatures are now logged hourly beginning with July 5, 2005 (figure 5). As Summary Of the Day (SOD) data for the Titusville Florida Weather Station is made available through the NOAA Climate Data Online Service, the two data streams will be correlated to generate the capability to gauge long term temperature expectations. As colder temperatures occur during the Winter 2005/2006, variable amounts of well water will be used to ameliorate temperature extremes.

Until recently, Well operation was assumed to be relatively constant and therefore not subject to quality control measurements. Our concern that seasonal variation along with the impact of pump rates constitute an uncontrolled variable has led us to give high priority to developing Well Water Quality Assurance parameters.

In September 2005, wild captured pompano were spawned in the MTI Oak Hill Facility. This spawn demonstrates how late in the year pompano spawn in the wild. It is operationally important for servicing wild and mature broodstock.

MTI is continuing its active contact with other businesses with commercial interests in the production of market pompano. The majority of these contacts is with companies outside of the continental US.

MTI's plans for the Oak Hill Facility include construction of two additional ponds and estimates have been received from the selected contractor. If construction proceeds (both financial and technical considerations), earth moving would begin in the late spring 2006. Opportunities have also been presented for cooperative agreements for pond operations on Partner Sites and these also are under consideration.

We believe that results from the low salinity earthen ponds at the Oak Hill facility will lead to confirmation or improvement in Pompano pond design and operation. Coupled with operating economics and capital requirements, investment and business decisions can be made regarding the viability of earthen ponds. MTI has a continuing interest in sea cage operations as well and is not ignoring intensive aqua farming. The same can be said regarding siting, permits, environmental requirements, and food safety.

Literature Cited

McMaster, M.F., 1987. Pompano Mariculture: Past Success and Present Opportunities. Caribbean Aquaculture and Trade Expo. Puerto Rico.

McMaster, M.F., Kloth, T.C., and Coburn, J.F. 2003. Prospects for Commercial Pompano Mariculture – 2003. Aquaculture America 2003, February 18-21, 2003. Louisville, Kentucky.

McMaster, M.F., Kloth, T.C., and Coburn, J.F. 2004. Pompano Mariculture – 2004. Aquaculture Magazine 30 (4): 25-29

Wray, T. 2003. Pompano is 'Potential Giant'. Fish Farming International, 30 (4): 24-25

List of Figures

1. MTI Oak Hill Facility, Aerial Photo
2. Pond Seining at Oak Hill, Photo
3. Netted Pompano Sample, Photo
4. Pompano Standard Growth Curve
5. Temperature Log, Oak Hill Pond



Figure 1. MTI Oak Hill Facility, Aerial Photo



Figure 2. Pond Seining at Oak Hill, Photo



Figure 3. Netted Pompano Sample, Photo

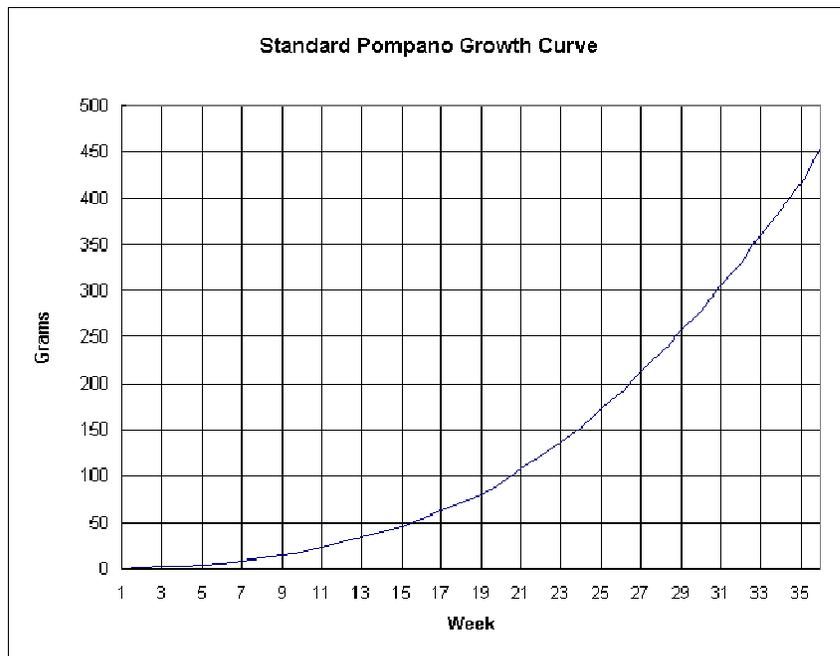


Figure 4. Pompano Standard Growth Curve

Downloaded Data - Monday, August 22, 2005

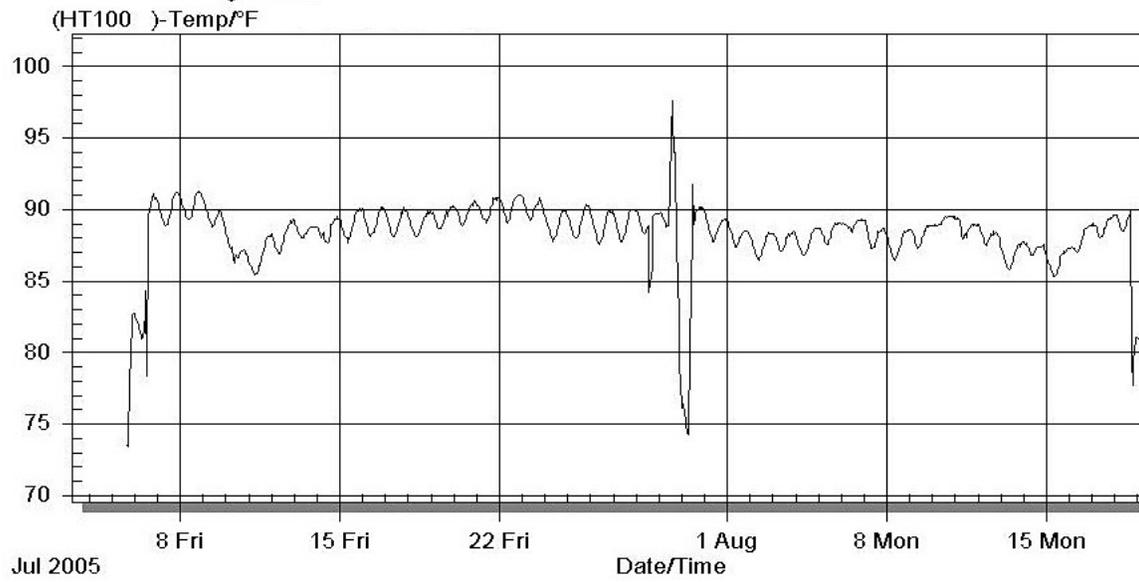


Figure 5. Temperature Log, Oak Hill Pond