

# **Report on a Live Flounder Holding Project on the Eastern Shore of Virginia**

Sponsored by the Virginia Fishery Resource Grant Program

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## **Final Report**

**Project Title:** Can Live Fluke be held in Seaside tanks for later sales to markets when they are stronger?

### **Abstract Summary:**

The goals and objectives of this Grant Program were to ascertain if live fluke could be held in a "low tech" flow through seaside tank system and sold later when market prices were higher? We have also tried to determine how wild fluke will be affected by changes in temperature and climate and whether they can be trained to feed on raw fish or other feed? We sought to determine if weak and stressed fish can be identified and removed from the tank prior to affecting healthy fish in the tank? And if not, can any resulting disease in the fish be controlled in the tank?

Over the course of the Grant Program, we have collected data in order to show whether our goals and objectives were attained. We built a facility, constructed a circular tank, installed pumps and aerators, employed various methodologies relative to fish collection, transportation, and feeding, handled problems as they arose, and ultimately marketed our product in a timely manner and at a price sufficient to determine the project worthwhile. Ultimately we determined that fluke can be profitably held in a tank for sale in the live market at higher margins than can normally be obtained in the iced market.

### **Description of Project:**

At our site in Willis Wharf, a 25 ft. by 30 ft. corrugated metal building was erected on the concrete slab that used to support an oyster shucking plant. A stem wall was built on the slab and the building was attached to that foundation. Inside the building we constructed a 20 foot diameter holding tank out of 2 ft. by 6 ft. bracing, 3/4 inch sheets of plywood for decking, and 1/4 inch luan plywood for siding. The sides were 4 feet high with a center drain constructed of 3 inch PVC pipe that elbowed under the tank and exited the building through a side wall and into an adjacent creek. The inside of the tank, sides and floor, was covered in a chopped matting and coated with fiberglass resin. This construction has proved structurally sound for the purpose of holding fluke.



A galvalume steel building was built on a stem wall.



The finished building offered security and protection from the weather.

After the tank and building were constructed, we installed a pump for drawing water out of the adjacent creek along with the aerator and air stones that would be used to provide oxygen to the fish in the tank. Two intake lines were run from the creek to the tank. Both lines had check valves on the creek end of the flexible PVC pipe. This allowed us to run one line at a time without the other line losing its prime. By running just one line at a time we could allow the

other line to go anaerobic. Lack of oxygen then killed any bio-fouling that occurred inside of the pipe. When the dormant line was restarted again, it would then clean itself out. The intake lines had to be covered with some sort of filtering screen to prevent large particles of sediment from being sucked up into the pipe and into the pump. A plastic coated crab pot was used for that purpose. An outfall pipe was installed underneath the tank and back into the creek. Water flowed out of the tank by force of gravity.



A wooden tank was constructed and then covered in fiberglass.

**Capital Costs of the Project:**

Building costs were as follows:

Stem wall .....	\$ 3,000
Wiring .....	752
Prefab Metal building .....	5,280
Construction labor (approx.) .....	<u>2,000</u>
Total .....	\$ 11,032
Cost per square foot .....	\$ 14.70

Tank costs were as follows:

Wood .....	\$ 707
Fiberglass .....	885
Labor .....	<u>500</u>

Total ..... \$ 2,092

Plumbing System Costs were as follows:

Pump .....	\$ 445
Blower .....	418
Air Stones .....	134
Fittings, Pipe, check valves .....	950
Generator .....	<u>522</u>
Total .....	\$ 2,469

Total capital costs for the project were: ..... \$ 15,593



A water pumping and aeration system was installed.

### Catching the First Fish

Since the inception of the project we had planned on using pound net fluke. However construction delays made us late getting the building and tank constructed and we were also late

in getting the pump and aerator installed.. The fluke had already started their migration out of the Chesapeake Bay. Making matters worse, we were subjected to a series of northeast winds that kept the fish running down the center of the bay, rather than being pushed to the Eastern Shore side of the bay as is usually the situation with prevailing northwest winds in the Fall. Consequently, we missed the opportunity to harvest fluke from bay side pound nets in the Fall of the first year.

It appeared that the project would be put on hold until the following Fall, but rather than leave the tank empty we decided to try trawler caught fluke from the ocean. We wanted to select high quality specimens as they came out of the trawl and hold them in Bonar boxes on deck using a deck pump to keep water running through the tank. The idea was to only capture the animals from the last couple of tow's since they had the best chance of survival. We selected a vessel, the Susan Rose, who was captained by Captain Joe Rose, a man with some experience in catching live trawl caught fish. So in February of 2003, we outfitted a pickup with a Bonar box with air stones, oxygen tanks, and fill lines to determine the weight of the fish by water displacement. We made arrangements with Captain Rose to buy selected pieces of his catch. We made the trip to Chincoteague on three occasions over the next month and a half, filling our box to various levels each time and overall purchasing about 300 pounds of fish. The fish were badly stressed and



We took our boat to the pound and worked directly with the fisherman to select the right flounder

really did not have a fighting chance for survival. We only managed to save about 10 fish from the initial harvests. Shortly after we were able to stabilize our tank, Va Tech called and offered us about 35 juvenile Cobia to grow in our tank. These were hatchery produced fish and we were excited to receive them.

For the next several months our fluke and cobia were compatible co-inhabitants. We had purchased approximately 1500 pounds of frozen silver-side minnows and about 600 pounds of small bait fish that we cut into small pieces for food. Throughout the summer and into early

September our fish were fed on a regular regiment of 3 to 5 pounds of feed, twice per day. The flounder did not appear to grow very much, but the Cobia showed significant growth over that period of time. On September 18<sup>th</sup>, when Hurricane Isabel blew through the Eastern Shore, our Cobia were weighing between 5 and 7 pounds. Our flounder were 5 to 10 pounds. We had severe winds, high tides, and storm surge that beat off our doors and submerged our pump and aerator. Unfortunately the storm was of such significance that our tank was inundated with debris from all over the area resulting in a combination of killing forces. By the time we were able to drain down our tank and replace its water, break down our pump and wash and clean it's connections and reduce our aerator and clean it, the fish were overcome by toxins that had collected in our tank. There was nothing left for us to do but discard what fish we had in the tank.

It took five days for the electricity to be restored to our fish tank. The time was spent scrubbing and cleaning, repairing lines, rehangng doors, securing parts of the building, changing the head cover of our intake lines to allow more flow of water, and basically doing all maintenance projects that we needed to complete before we received any more fish. By the beginning of October we were ready to begin harvesting fish out of Bayside pound nets. For approximately the next six weeks we worked periodically with our pound net fishermen collecting animals every two or three days, weather permitting. There were weeks when we would have as much as 5 or 6 day intervals in fishing due to strong winds or storms. On those occasions, the fish would show signs of stress more readily due to being trapped in the nets for so long a time. Since it was evident that handling the fish caused undue stress, we devised a method of only having to handle them twice. We simply situated our box in the floor of our boat, secured the oxygen tanks with the regulator and air stones to the steering console, and loaded the boat on the trailer.



With live fish on board we trailered the boat directly to the tank to reduce the number of times the live fish were handled.

When we returned to the landing after fishing the nets, we simply loaded the boat back on the trailer without touching the fish and transported the boat, trailer, box, and fish all together back to our holding facility. It was then just a matter of backing the boat along side the tank and dipping the fish out of the box and into the tank.

Even with the minimal handling of our fish, we still encountered high levels of stress and thus, high levels of bacteria. Because the fish were not as plentiful as we had anticipated in the nets, we were not as selective in harvesting as we should have been opting to gather more quantity and not concentrating so much on quality.

After a week or so of high levels of bacteria and excessive death loss, we collected samples and took them to Dr. David Crosby at Virginia State University. He performed studies and determined that high stress levels had contributed to high levels of bacteria. He prescribed steps to eliminate the bacteria, which we followed to the letter. In a matter of days, we had cleared up most of our problem and our fish were showing daily signs of improvement. As our animals improved, so did their appetites. We continued to feed our fish on a daily regiment of two feedings a day. With the water temperature steadily decreasing, however, we noticed a reduced consumption of food which resulted in our reducing the amount of food per feeding and finally the amount of feedings as well. By the time the water temperature had reached about 42 degrees, we had reduced the amount of feed to about one or two days per week.

At this point, we determined it was time to market our fish. We had the name of several Washington, D.C. area live distributors. We sold most of our fish to one of them and also to the distributor's brother from Atlanta. Both outlets provided their own transportation with live wells, oxygen tanks, and stacking crates. On harvest days, we lowered the water in our tank and using a plastic coated wire mesh screen, corralled the fish to one side of the tank and hand dipped the fish out with our knotless net. The fish were put in plastic containers, weighed, and stacked in water filled boxes on the buyer's trucks. Our customers were extremely happy with the size and quality of our fish. As a matter of fact, within two days of our fish reaching their respective market areas, I had inquiries from other companies in those areas requesting product. Unfortunately, we were out of the marketable size animal. We did, however, keep some of the smaller fish to study their reaction to water temperature over the remainder of the winter. We needed to see how those fish would survive as the water temperature progressively dropped in January. As the temperature approached freezing, the fish were still alive, but at 30 degrees they all died. Of course a scientific study would have to be undertaken to actually determine what combination of temperature and time fluke could actually stand.





The pound net produced very high quality fish.



After 10 to 12 weeks in the tank the flounder were netted

### Marketing Results

During October and the first part of November we bought fish six times and purchased a total of 1350 pounds of fish at an average price of \$2.73 per pound. We paid the fisherman a good premium over the ice market.

We sold 1196 pounds of fish which gave us a cost of \$2.90 per pound on fish coming out of

the tank. All fish were sold at \$7.00 per pound leaving a gross margin on the fish of \$4.10 / lb. Gross margins do not include labor or capital costs. In order to obtain the margins there was over \$15,000 invested and many hours of labor to get the fish in the tank.

However, margins like these can not be obtained in the iced fish business. In the past year we acquired enough information to construct capital budgets for the live fish holding business so as to expand this experiment. Overall I was impressed enough so that I am currently considering whether I should make my own investment in a commercial size facility. There are a number of questions I will have to answer before making a final commitment.

## Conclusions

Can live Fluke be held in a shore side flow-through tank and sold later when markets are stronger? The answer is yes. Will live fluke condition themselves to feed in a captive environment? The answer is yes. Can non-feeding fish and stressed and sickly fish be identified and culled to control mortality? The answer is yes. Can diseases be controlled? The answer is yes, to the degree of our experience at least. Does water temperature affect feeding and survivability of the fish? The answer is yes. Can fish be marketed profitably? The answer again is yes? But, is this really a viable business opportunity to allow watermen to experience a higher dollar outlet for their product and also to allow the aquaculturalist a venture that will generate year round sustainable profitability? That of course would depend on the quantity of fish you can put in your tanks.



The fish were weighed and put in live haul trucks which delivered to Washington and Atlanta.

Virginia Marine Resource Records indicate that a total of 35,142 pounds of fluke were caught in pound nets in Northampton County in 2002. Of these fish, less than 18,000 pounds would probably be suitable for our purposes and it is unlikely we could buy them all. There is a limited

window of opportunity for harvesting and the ultimate catch is predicated on weather, migration, and ultimately the fisherman. Fluke are available in the fall of the year when they are harvested from pound nets as they exit the Chesapeake Bay for deeper wintering waters. We fished three pound nets over a period of approximately six weeks and were only able to harvest about 1350 pounds of fish. There are only six licensed pound net fishermen on the Eastern Shore. We need to find a way to supplement supply either with trawl fish or another legal catching method within the bay. Each year substantial quantities of Bay commercial quota's go unused. If we could successfully harvest at least 20,000 pounds of fish annually, I think we can make this a self-sustaining commercial venture.

We still believe there exists an opportunity for fish farmers on the Eastern Shore. Finding a way to increase the numbers of live fish available to farmers through alternative harvesting methods at different times of the year could greatly improve the potential for success. Alternating species such as growing hatchery produced Cobia from spring to fall then replacing those fish with fluke from fall to winter could be a possibility. Warming the water slightly in a recirculating system would make it possible to obtain even better margins because the fish could be sold even later. Even looking at sea bass, tautog, or striped bass as alternative species might enhance the opportunities for a successful venture. We have answered quite a few questions with this project. Unfortunately, we created more questions to be answered.

In closing, I want the Fishery Resource Grant Program personnel to know of the tremendous efforts extended by the advisory people at Virginia Tech's research facility in Hampton, Virginia. Dan, Mike, David, and the rest of the staff at the lab were constantly available to assist me in all phases of this program. From the initial proposal, to the construction stages of our building and tank, to harvest, to feeding and maintenance, to problem solving, to harvesting fish, and to marketing and shipping, they were always available. Either by phone or in person when the situation called for it, I had someone to help.

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Wec Terry, Project Manager

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Date