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SPOTLIGHT ON FISH FARMS & HATCHERIES IN NEW ENGLAND

Spring Focus: Four Star Farms, Northfield Massachusetts

The L'Etoile family of Four Star Farms in Northfield MA sees an opportunity in fish farming at their 300 acre turf farm on the banks of the Connecticut River. Last year, looking to diversify their farm income, they approached UMass Extension to ask about possibilities in aquaculture. From these discussions, they grasped the idea of growing largemouth bass for the fingerling market. Largemouth bass are sought by sportsmen and, potentially, by the ethnic-Asian communities in New York, Boston and Toronto. Bass fingerlings are not commercially available within the state and, with VHS limiting the importation of fish from the Great Lakes states and other interstate restrictions, fingerlings are increasingly difficult to find in the northeast.

In the summer of 2006, the L'Etoiles completed construction of two quarter-acre ponds and initiated a half-acre pond. They released 100 mature bass into one pond, the males made nests and a small number of bass fry were recovered. Then Nathan L'Etoile, had an idea. In New England, bass spawn in June, leaving only about three months of warm water to allow for grow-out. If the bass could spawn indoors and if they could be induced to spawn during the winter, the resulting fry could reach a more marketable size by early summer, when people are looking to stock sport ponds or when fish growers are looking for stock. Raising several thousand fry in recirculating tanks would not be cost-prohibitive.

The L'Etoiles created a fish growing facility in their barn, with a recirculating system, based around two 4000-gallon tanks. They then captured their brood stock and moved them indoors. This winter, preliminary experiments have been conducted to determine whether manipulating light and temperature could induce early spawning. In addition, some fish have been treated with reproductive hormones to see if they have an affect on reproductive status. Results are promising but inconclusive as yet. UMass Extension hopes to continue working with Four Star Farms and other growers in the state to establish a local fingerling industry.

A Contribution to Aquaculture

The L'Etoile family recently contributed \$1700 to the UMass Aquaculture program in recognition for the program's assistance in their aquaculture project. Nathan L'Etoile explains, "We have been thinking of a way to give a little back to the university in appreciation for the hard work being done." Their contribution enabled the program to send extension technician Reagan Ellis to the World Aquaculture Society meetings in San Antonio, Texas, where she could learn more about largemouth bass spawning techniques.



Nathan and Eugene examine largemouth bass fry last summer.

Aquaculture Website Resources

www.aquanic.org, AquaNIC- Aquaculture Network Information Center is an invaluable resource for professionals and educators in the field of aquaculture. It contains the web's most comprehensive connections to aquaculture. This site includes:

- links to newsletters and publications
- discussion groups based on species and systems
- job services- where resumes and jobs can be posted
- site links with "thousands of links to a variety of academic, governmental, commercial, organizational, and private aquaculture sites"
- media information, news and calendars
- online courses

The Educator Information section contains many useful tools for anyone hoping to find teaching ideas, forms, and methods. There is an Extension section and a K-12 section. The items are broken down into very detailed segments providing definitions, lesson plans, and implementation discussions.

Highly Recommended.

Aquaculture Research and Outreach by University of Massachusetts Extension

This winter finds various members of the program working throughout the state. As mentioned elsewhere, a number of us are helping to see if we can get bass to spawn earlier in the season at Four Star Farms. Reagan Ellis and UMass intern, Julia Ryan, have been developing a small scale rotifer rearing system at Australis Aquaculture. Rotifers are important as for many species of young fry. Also at Australis is Hampshire College intern, Ned Phillips-Jones.

Tara Johnson has been working with Berkshire County schools in recruiting new ASERP (Atlantic Salmon Egg Rearing Program) classrooms, in which students grow salmon fry for release into the wild. Mt. Everett Regional School is working with Tara and the Berkshire Fish Hatchery to expand their aquaculture program with some young Rainbow Trout. Also, the Southern Berkshire Environmental Education Committee has welcomed Tara to the recent meetings where plans for a variety of spring environmental programs and events are being planned.

We are also completing a demonstration small scale recirculating aquaponic system at UMass Amherst with Keith Wilda designing and directing construction. This system will include largemouth bass and yellow perch, as well as herbs, greens and vegetables and will be available to students interested in learning the basics of aquaculture and aquaponics. As this system is completed, we will initiate construction of a small recirculating system for tilapia.

UMass Resource Economics student, Peter St. Marie is working on an enterprise budget for largemouth bass recirculating aquaculture systems in Massachusetts. With this budget, we should be able to answer the question, what kind of facilities can make money growing bass in the state? Later this year, we hope to conduct a marketing survey, targeting sportsman's clubs to better determine what fish are most needed in the state.

Ken Bergstrom, former director of the Western Massachusetts Center for Sustainable Aquaculture, is working with us and the Southeastern Massachusetts Aquaculture Center to provide information for farmers about potential aquaculture opportunities in Barnstable County. A program is planned for this spring.



Barramundi

Greener Fish to Fry

The founders of a Massachusetts aquaculture company believe they've found the ideal species to raise.

Barramundi have white bellies, silvery sides, and a tasty white flesh high in omega-3's. In the U.S. they are known mostly amongst seafood chefs and foodies. But [Australis Aquaculture](#), a western Massachusetts-based company that has been farming the fish in indoor tanks since March of 2005, aims to change that. Initially the company shipped 3,000 pounds of fish a week, mostly to select seafood restaurants. But currently, 20,000 pounds of Australis' barramundi make their way weekly to restaurants and grocery stores, including Whole Foods.

"Aquaculture is the wave of the future," says Dr. John Volpe, a fisheries scientist at the University of Victoria, "we just have to come to some conclusion about how we're going to execute it."

Volpe points out that by raising fish in tanks, farms like Australis avoid environmental problems that plague coastal fish farms—when these farmed fish escape they expose wild fish to disease, compete with them for resources, and mate with them, which reduces genetic diversity.

Australis Aquaculture is the result of a partnership between Stewart Graham, an Aussie businessman and Josh Goldman, a New England fish farmer. The two believe they've developed an ideal way to farm fish—and the ideal fish to farm. Barramundi are docile, not picky eaters, and reproduce easily in captivity. By adjusting salinity, temperature, and light Australis induces breeding year-round (fish spend about a year in Australis' tanks, until they weigh one to two pounds).

In the wild, barramundi spawn in the salty waters of estuaries but spend much of their lives prowling shady freshwater streams for shrimp, crab, and small fish. Some fishery scientists believe that carnivorous fish such as barramundi and salmon are ill-suited for farming because most of their feed comes from wild fish species. Critics say that fishing the ocean to provide food for farmed fish makes little sense—they point to vegetarian fish like catfish and tilapia as more sustainable alternatives.

Goldman argues that barramundi are more sustainable than other carnivorous fish because their diverse palate means their diet can be supplemented with canola and soy-based feeds. But some say feeding a mostly carnivorous fish a more vegetarian diet may have its drawbacks. "If you use soy meal the fish tastes like soy," says Dr. Daniel Pauly, director of the Fisheries Centre at the University of British Columbia.

Some epicureans are more forgiving. "They're not as flavorful as wild fish, but it's a version of the wild," says Jeremy Marshall, owner and head chef at Aquagrill, a New York City seafood restaurant that serves both farmed and wild barramundi.

Corey Peet is a fisheries expert at Seafood Watch, a group that evaluates the ecological sustainability of seafood (the group considers barramundi a "best choice," their highest rating).

"If aquaculture is going to feed the world it's not going to be with carnivorous fish," says Peet, "but Australis' model represents a great innovation."

Extracted from an article by Justin Nobel, March 5, 2007
<http://www.plentymag.com/blog-mt1/mt-tb.cgi/1137>

2020 - An Aquaculture Odyssey

Free-range farmed fish. Sea cages that sail off to the south and deliver their fish by themselves. Large autonomous fish farms that float unmoored in the sea. This could be the aquaculture of the future.

At SINTEF Fisheries and Aquaculture, research scientist Pål Lader lets his imagination run wild with the many possibilities that technology can offer the aquaculture industry. "We are thinking of a fish farm that runs itself", Lader says. "It is only our imagination that sets the limits on the development of open-sea fish farming."

Lader and his colleagues are thinking along the lines of what is being discussed internationally. The spring 2004 issue of the magazine "Wired" included an article entitled "The Bluewater Revolution", which discussed how the oceans will have to be exploited for fish farming. In the autumn of the same year, a conference was organized in Ireland on the subject of "Farming the Deep Blue", attracting participants from the USA, Canada, New Zealand and several European countries, including Norway.

"The fish should be able to graze, just like sheep in the mountains. The sea cages should be autonomous and locate themselves wherever it is best for the fish at any given time. If food is available a few kilometers to the east, the sea cages would move there, so that their occupants can eat. If the waves are high, the cages they would move deeper under the sea. Fish can actually become seasick, and they do not appreciate being in sea cages that are being flung up and down by ten meter high waves. If a vessel approaches, the sea cage will submerge in order to avoid a collision", says Lader. However, the sea cages will never be completely independent. They will be able to attach themselves to one of the stations along the four arms of the base.

"The ultimate step would be that the fish didn't even realize that they were living in captivity. That's what we are working towards", says the SINTEF marine scientist.

"This industry is still in the Stone Age where technology is concerned. We are going to try to take a step further and look at the possibilities for fish farming of the future. Today's systems are primitive, in that they largely consist of a pipe formed into a ring, from which a net is hung. By using cybernetics we can develop more suitable systems. Today we put a lot of effort into building structures capable of withstanding heavy stresses, but in the future we will make use of smart structures that can adapt to their surroundings. A sea cage made up of flexible components could change its shape and location as required by the environment and thus offer the fish better living conditions".

Nonetheless, Lader emphasizes that a surface-based base station is still no more than a vision, with questions that remain to be answered and problems to be solved. "We have only been working on this project for a year, and we still have a long way to go. We hope to end up with some sort of prototype system by the time that the project is finished, or perhaps a component that can be connected to existing systems to place them under automatic control. We can use parts of the technology to meet partial targets on the way. We cannot take one single large step from today's systems to sea-going base stations, but within 15 or 20 years, I believe that we will be deploying aquaculture plants that will be very similar to what we are envisioning today".

June 25, 2006

By Aase Dragland

[Alphagalileo](http://www.alphagalileo.org/) <http://www.alphagalileo.org/>

Educational Programs in Western Massachusetts

Mt. Everett Regional School officially became part of the ASERP program February 15 after receiving their Atlantic Salmon egg delivery. With Berkshire Fish Hatchery water filling their aquariums, they are off to a promising start. Asha VonRuden, Cassandra Urrichi, and Christine Fenner are the teachers who decided to take on the program's pilot year in their school system.

Students will observe the eggs as they hatch over the first week or two. As they continue to grow and develop, the young salmon will be fed hand-raised brine shrimp. The shrimp will sustain the fry until they are ready to be stocked in late spring.

Thanks to Berkshire Hatchery Foundation Board Members Phil Gunzinger and Chuck Mielke for their help with the transportation of over 100 gallons of water from the Berkshire Fish Hatchery to Mt. Everett and into the three aquarium tanks placed throughout the school.

UMass Exension's Aquaculture Team will be on hand at Earth Day events at the Berkshire Fish Hatchery and Mt. Everett Regional School to provide information on our outreach programs. Also, Tara Johnson will be helping the Mt. Everett ASERP classes to present their programs at the Berkshire Environmental Educators Network Student Expo being held at their school in mid-May.

Important Dates in Aquaculture

- **Earth Day**, Berkshire Fish Hatchery, Monterey, MA April 20 & 21
- **13th Annual Recirculating Aquaculture Shortcourse**, Ithaca, NY - July 31-August 3
- **33rd Annual NOFA Summer Conference**, Hampshire College, Amherst, MA August 10-12



Using ultrasound to examine the ovaries of a largemouth bass. Does it work? We don't know yet.

First endangered fish species recovers -- and in New York City's Hudson River

For the first time in U.S., and probably global, history a fish identified as endangered has been shown to have recovered -- and in the Hudson River, which flows through one of the world's largest population centers, New York City.

The population of shortnose sturgeon, which lives in large rivers and estuaries along the Atlantic coast of North America, has increased by more than 400 percent in the Hudson River since the 1970s, report Mark Bain, associate professor of natural resources at Cornell, and his colleagues in the online publication PLoS ONE. However, the shortnose sturgeon is still endangered in other rivers, Bain said, and will not necessarily be removed from the endangered species list by the U.S. government.

In the past 100 years, 27 species of fish have been died out in North America and four have become extinct. The U.S. government currently protects 149 fish species and subspecies and a total of 1,311 species under the U.S. Endangered Species Act.

"Endangered and threatened U.S. fish outnumber mammals, reptiles, birds, etcetera," said Bain. Since 1966 when the federal government started identifying threatened species, only 16, including the American alligator, American peregrine falcon and brown pelican, have recovered. "Recovery is very rare," said Bain, who has been monitoring the shortnose sturgeon's population since the mid-1990s and has access to data on the populations since the 1970s.

"The nature of this species, its habitat and evidence for a large and secure population are an example of successful protected species management," said Bain. "Scientists and legislators have called for changes in the U.S. Endangered Species Act; the act is being debated in Congress and has been characterized as failing to recover species."

However, he said, recovery of the shortnose sturgeon suggests the combination of species and habitat protection with patience can successfully recover threatened species, even next to one of the busiest cities in the world.

The study will appear in the Jan. 24 edition of PLoS ONE, an international, peer-reviewed, open-access, online publication from the Public Library of Science.

Jan. 24, 2007

By Susan Lang

<http://www.news.cornell.edu/stories/Jan07/RN.fish.saved.sl.html>

UMass Extension Aquaculture Program

For more information on this program please contact Craig Hollingsworth at chollingsworth@umext.umass.edu

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shortnose sturgeon

