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Cobia Culture

Since the industrial revolution our world has seen many changes, especially regarding the supply and demand aspect of the world food supply. As the human population has grown (doubling to more than 6 billion in the last 40 years alone), the demand for the healthy, delicious, high quality protein of fish has also increased.

Photo credit: Virginia Tech Aquaculture

Initially this demand was met by increasing the technology of commercial fishing fleets; however, our water bodies can only naturally produce so much biomass. As a result, wild fishery capture has leveled off since the mid 1980s at around 90-93 million tons, and a number of the most popular species have been overfished. To fill this supply gap, the controlled culture of aquatic animals and plants – aquaculture – has been envisioned as an inevitable "next step."

While aquaculture only accounted for 3.9 percent of global seafood production in 1970, by 2006 it accounted for around 43 percent, making it the world's fastest growing animal food sector. In the case of cobia, *Rachycentron canadum*, the lack of a significant global harvest combined with the high consumer appeal for this fish and it's suitability for controlled production result in a strong economic incentive to culture this unique species.

Cobia is a novel candidate species for aquaculture, and has been labeled the "warm water salmon." In fact, cobia grow at three times the rate of salmon (reaching more than 13 pounds in 12 months) and can utilize nutrients in certain ingredients more efficiently than salmon. The first research on culturing cobia was done in 1975, when juvenile fish were raised from eggs collected in tows off the coast of North Carolina. This pioneering research identified aspects of cobia biology that make them attractive for aquaculture, including rapid growth, adaptability to culture conditions and tolerance of a range of salinities and temperatures. In the early 1990s, efforts to spawn and raise larval cobia from

Photo credit: Virginia Tech Aquaculture

captive broodstock were initiated at U.S. and Taiwanese aquaculture facilities. Once artificial propagation and the technology of mass fry production were developed, a number of laboratories and hatcheries succeeded in spawning the species in captivity. The Taiwanese in particular dove into cobia aquaculture and quickly solved culture problems that can be identified only through commercial production.

In Taiwan, they found that sexually mature cobia (around age 2) spawn spontaneously year-round, with a peak in spring and autumn when water temperature is maintained at 23 – 27 ^{o}C. The floating eggs are easily collected and transferred to larval rearing tanks or ponds, where "green water" is maintained with an abundance of microcrustaceans: copepods and rotifers. Eggs hatch 21 to 37 hours after fertilization and survive for three days on the yolk-sac, after which their mouths open and they begin their voracious feeding. The larval stage lasts 20 days, at which time the fry are weaned onto pelleted feed and grow rapidly into fingerlings. Many of the fingerlings are stocked into either outdoor ponds or inshore cages, with 80 percent of marine cages in Taiwan devoted to cobia culture. This industry has met with some setbacks in the form of disease and typhoon damage, but many of these problems have been successfully addressed.

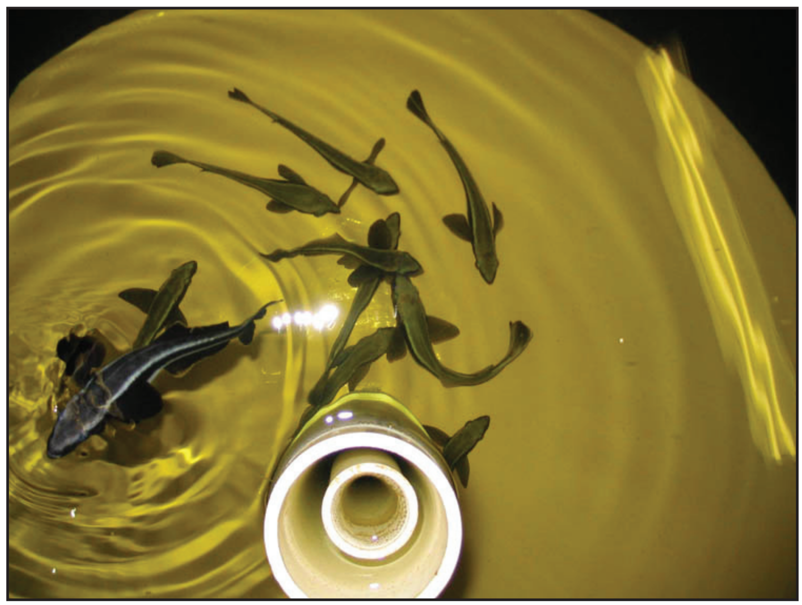

Photo credit: Virginia Tech Aquaculture

In the U.S., cumbersome regulations and permitting procedures have held back offshore cage culture development. However, the Offshore Aquaculture Act currently in Congress looks to alleviate some of the headache by streamlining the approval process (from multi-agency to one agency – NOAA) and establish guidelines for permitting and stronger environmental standards. Recently, an offshore cage culture demonstration project in Puerto Rico utilized governmental (NOAA), academic (University of Miami and University of Puerto Rico) and industrial (Snapperfarm) resources to grow cobia in newly-designed, high-tech, fully submersible cage systems. This state-of-the-art technology allows cage systems to be located far from shore in deep waters with steady currents, which serves the dual role of maintaining the aesthetics of the site and providing good water quality and nutrient dispersal. The result was a cage system that withstood severe storms (including Category 4 Hurricane Frances) without damage and environmental assessments that showed no significant change in the area around and beneath the cages.

This demonstration project was able to rear market size fish (8 to 13 lbs) in one year, with a feed conversion ratio of 1.8, meaning 1 lb of fish was produced from 1.8 lb of feed that contained 50 percent fish meal. Taking into account that energy loss between trophic levels in nature results in an ecological efficiency of only around 10 percent, the production of cobia using this fish meal based feed can be 3.7 times more efficient than the transformation of forage fish to market size cobia in nature. Nevertheless, the need to reduce and perhaps eliminate the use of fish meal in aquaculture feeds is widely recognized, and steps are being taken to investigate alternate protein sources.

Perhaps the most exciting development in the U.S. cobia aquaculture world is the recent collaboration between Virginia Tech and the newly formed Virginia Cobia Farms. Plans are to grow cobia in low salinity, indoor, recirculating aquaculture systems. The advantage to this type of system is the ability to locate inshore, far from the expensive real estate on the coast. This system also affords more control over the culture conditions with traceability from the egg to the finished product. The researchers have begun to identify the proper lipid, energy, protein and amino acid feed requirements of cobia, as well as investigate organic alternative ingredients (e.g. NuPro – a yeast based protein source). This combination of factors could make production of this high-value fish into a sustainable, environmentally friendly reality.

Although the cobia aquaculture industry is still in its infancy, its prospects are favorable. This “warm water salmon” may pave the way for many other marine species to be cultured in the U.S. with economically profitable and environmentally sustainable methods; reducing the strain on our fully-realized natural fisheries.

-Craig Gothreaux

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Aquaculture Center of the Florida Keys – www.aquaculturecenter.com

Snapperfarm – www.snapperfarm.com

Virginia Cobia Farms – www.virginiacobiafarms.biz

Virginia Tech Aquaculture – www.fw.vt.edu/fisheries/Aquaculture_Center

Photo Source:
Virginia Tech Aquaculture – www.fw.vt.edu/fisheries/Aquaculture_Center

Cobia Fishing in Louisiana

Most people are intrigued by the unusual and fishermen are no exception.

There is something special about cobia, *Rachycentron canadum*, also known as ling or lemon-fish, that gets an angler’s heart pounding. Although quite common in the northern Gulf from late spring through early fall, this unusual fish is always viewed as a reward from the sea when landed. Another reason for excitement is it’s excellent table fare. The flesh of the cobia is white, flaky and mild flavored, making it a desirable ingredient in many fish recipes.

Cobias are not only an unusual looking fish but are also the only living species in their family and they have no close relatives.

Found almost worldwide in tropical, subtropical and warm temperate waters, they are open-water fish but tend to locate around pilings, buoys or drifting objects. They are often found around floating objects and may rise and position themselves under boats or make inquisitive cruises around boats. Cobias also appear to be attracted to noise.

They range from saline bays inshore to offshore waters 4,000 feet deep. They are found over mud, sand, and gravel bottoms, over coral reefs and in mangrove sloughs.

In the Gulf of Mexico, cobia winter in the Florida Keys and move north and west along the Gulf coast to Louisiana and Texas in the spring. The cobia fishery reflects these migratory habits. In south Florida, cobia are fished mostly in the winter. Off of Louisiana, the fishery takes place in spring and summer. Some research indicates that cobia also move offshore to deeper waters during cooler months.

Cobia grow rapidly, reaching 7 inches in a matter of months and 13 to 15 inches by one year old. Cobia are known to live at least 10 years and may reach 15 years of age. The world record for rod-and-reel-caught cobia is a 135-pounder from Australia, although 150-pound fish have been reported.

Cobia can be aggressive feeders, often taken by anglers using methods from trolling to bottom fishing. However, they can be extremely tight-lipped, with many anglers sharing stories of frustration when cobia are seen, dropped baited offerings and only to swim away in disinterest.

A food habits study done in the lower Chesapeake Bay area found 28 different species of animals in the 78 cobia stomachs examined. But swimming crabs were by far the number one item in volume and number, making up 78 percent of cobia diet.

-Kevin Savoie

Source: http://www.seagrantfish.lsu.edu/resources/factsheets/cobia.htm

Fishing Participation Falling

A few years ago, the U.S. Fish and Wildlife Service reported that participation in recreational fishing had fallen rapidly between 1991 and 2001 – from 35.6 million to 34.1 million.

Fewer anglers means less money into fisheries improvements from tackle add-on funds, less interest in fishing access improvements and less interest in legislation to support fishery habitats and fishing. Recently, an update was published that explains some of the factors that caused 1.5 million fewer people to fish, even though the population of the U.S. grew 13 percent during the same period.

A significant proportion of the decline in fishing occurred in younger people, which is the most important group when considering that those who learn early usually stay involved. In 2005, around 10 percent fewer 6-19 year olds had ever fished than had in 1995. This fishing initiation rate declined twice as fast in households with incomes under $40,000 than in those over $100,000. As might be expected, initiation into hunting and fishing is lowest in urban areas.

Initiation of children into fishing also varies with geographic region. The highest rate is in the west north central states (Missouri through North Dakota; 61 percent) and lowest in the Pacific west (California to Alaska; 32 percent). Louisiana is grouped with the west south central states, where about 45 percent of kids are taught to fish.

About half of first-time fishermen were under 10 years old, but still, surprisingly, about a third of first-time anglers (and hunters) are over 21. Half of the latter group was 30-45 years old! Fishing is definitely an activity for which it's never too late to start.

"Dropping out" of fishing is still a worrisome trend. In 1990, 65 percent of everyone who had ever fished was still active in the sport. By 2005, only 57 percent of this group remained active.

Why did people quit fishing? The most common reasons for anglers who have stopped fishing were that they didn't have the time or had too many family or work obligations. Only a few people cited the cost or changing regulations, but health reasons did affect some of this group.

All the news in these reports isn't bad. While fishing retention rates are still dropping, they aren't dropping as fast as they did during the early 1990s. Hopefully, these data indicate a turn-around in this trend, and fishing will gain in popularity.

This information shows us how critical it is to bring young anglers into the sport if it is to remain a vital element in how we protect and improve our waters.

Sources:
Fishing and Hunting Recruitment and Retention in the U.S. from 1990 to 2005. Addendum to the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. U.S. Fish & Wildlife Service Report 2001-11 February 2007.

http://federalaid.fws.gov/surveys/surveys.html

The Ripple Effect of Shark Depletion

Sharks have had a tumultuous relationship with humans. Yet in the end, humans hold the fate of these vitally important animals in their hands.

Ever since the human race has undertaken sea voyages, the fear of sharks has been imprinted in our brain. The fear generated by these apex predators has been described by fishermen, sailors and survivors of shipwrecks. It is easy to understand how the movie "Jaws" instigated widespread and callous destruction of many of these supposed killer beasts. Now, ironically, the removal of excessive numbers of these keystone predators could inevitably bring their surrounding ecosystems down with them.

The concept of keystone species, a species (in this case a predator) that makes a disproportionately strong impact on community structure, is compared to the role of a keystone in an arch, which if removed collapses the whole structure. There have been many examples of keystone species in action, including American alligators, grizzly bears, elephants and beavers, ever since the concept was popularized by ecologist Robert Paine in the 1960s.

Paine's experiment involved the removal of the dominant benthic predator, a sea star of the genus *Pisaster*, from the rocky intertidal zone on the coast of Washington state. At the control sites (with the sea star) there was a lower occurrence of the mussel *Mytilus* and a higher overall biodiversity. When the sea stars were removed the mussel dominated and significantly decreased the presence of the other species (biodiversity) of invertebrates and algae.

The classification of sharks as a keystone predator has often been theorized, but the proof has been difficult to quantify. A recent publication in the journal Science provides a scenario where the impact of chronic overfishing of 11 species of large sharks on the Atlantic Coast is realized not only in population depletions, but also in indirect ecosystem effects. The researchers provided evidence that depletion of the large sharks resulted in expansion of populations of other elasmobranchs (rays, skates and small sharks) on which the large predators fed. The final result in this ecological cascade was the collapse of the century-old bay scallop fishery in the Chesapeake Bay area. They found that over the last 35 years the decline of predatory sharks has allowed the rise of a prey species, the cownose ray (also found in the Gulf), which in turn helped to decimate the scallops during the ray's seasonal migrations.

The cause of the reduction in shark numbers worldwide is attributable to a number of factors. Directed commercial fishing for sharks has been a factor, particularly along the Atlantic coast. Shark bycatch in other longline fisheries has also been a factor. But many recent studies have shown that perhaps the biggest impact on shark populations is occurring from recent expansion of the harvesting of sharks merely for their fins.

The decline of these top predators, especially aggregating female adults, is particularly detrimental due to their K-selected life strategy. K-selection refers to the concept that some species (bears, whales, elephants, humans) can be characterized by a long lifespan, long maturation time, late reproduction and few offspring per individual; as opposed to R-selected species (rabbits, sunfish, cockroaches) which have a short lifespan, reproduce quickly and opt for smaller and more numerous offspring.

The northern Gulf of Mexico appears to have fewer impacts from the rogue shark finning boats that have plagued other areas. And, fishery managers here have begun the process of identifying and addressing possible problems of shark overfishing.

Research (discussed in the September 2006 issue of Lagniappe) has demonstrated that Louisiana waters are serving the valuable role of nursery for a number of shark species (primarily blacktip, Atlantic spinner and bull). As stewards of the sea we must take into account all elements of our impacts and develop precise ecosystem-based management plans that target the well-being of the system as a whole. These new studies demonstrate that even the oft-cursed sharks have a key role in marine ecosystems and are essential to the overall health of the system that supports our popular recreational fishery populations.

-Craig Gothreaux

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Dissolved Oxygen Levels Affect the Hooking Mortality of Bass

So…you're fishing in a tournament and you've found a fishing pattern that has the bass "jumping in the boat." You hook a few keepers from one area, crank up the motor and run to the next spot. Then you replace the smaller fish in your livewell with bigger ones to upgrade the weight of your limit. Ever wonder what happens to those bass you let go? Survival may be better than you think—if you release the fish into the proper habitat.

Researchers at LSU conducted a hooking mortality experiment to determine if dissolved oxygen (DO) levels affect survival of bass that were caught and released. The study took place in the Atchafalaya Basin and involved two habitats: The well-oxygenated (normoxic) waters of Grand Lake and the low-oxygen (hypoxic) waters of West Fork Bayou.

One hundred and six bass were caught on hook-and-line from either Grand Lake or West Fork Bayou, held in livewells and released into net pens. Some bass were released into pens in the same habitat from which they were caught, while others were transported to pens in the other habitat. As a control, bass were collected by electrofishing and held in Grand Lake pens. None of the 48 control fish died during the 14-day study period, despite not being fed.

Mortality rates for most of the fish taken by hook-and-line were also low, considering the study was conducted during July and August—normally the time of year when hooking mortality is highest. Mortality rates for three of the four experimental conditions ranged from 3 to 10 percent during the two-week period. The number of days the fish survived was not statistically different among the three conditions.

However, the number of days survived was significantly lower for fish caught from the relatively high DO of Grand Lake transported to the hypoxic waters of West Fork Bayou. Overall, these fish suffered a mortality rate of 40 percent. Apparently, many of the bass caught from Grand Lake were not able to acclimate to the abrupt decrease in DO levels at West Fork Bayou.

Bass from West Fork Bayou survived well regardless of the release site, indicating they were acclimated to hypoxia. Hypoxia acclimation was further evidenced one afternoon during the study, when researchers caught 17 bass on buzzbaits and lipless crankbaits in West Fork Bayou while the DO level was well below the accepted lethal level for largemouth bass.

What does all this mean for anglers? Their safest bet is to release fish immediately back into the habitat from where they came. Unfortunately, it's not that simple during tournaments, when anglers may catch fish from normoxic areas and release them into hypoxic areas.

In water bodies such as the Atchafalaya Basin, where the transfer of fish between the two habitat types is likely, tournament organizers should consider holding "paper" tournaments. In a paper tournament, a fish is caught, its length recorded and the fish is released as quickly as possible. Often, a tournament partner is required to verify the length or a photo is taken of the fish on the measuring board. In lieu of an actual weigh-in, fish weights are calculated based on length-weight tables. Of course, paper tournaments involve the honor system to some degree and usually aren't popular when substantial prizes are involved.

Fortunately, tournament organizers can reduce mortality after traditional weigh-ins by ensuring the fish are released into a normoxic habitat. Dissolved oxygen meters, which can be purchased for as little as $50, or test kits can be used to measure the DO of potential release sites (preferably at dawn, when DO levels are normally at their lowest). As for culling fish on the water, if you don't own a DO meter, try to avoid releasing fish caught from brown or green waters—typical of normoxic areas—into areas with dark, clear water that is typical of hypoxia. These simple precautions can reduce the mortality of released bass, so you won't have to feel guilty about hauling that big sack of fish to the weigh-in.

-Dave Hickman

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Gulf Council to Conduct Public Hearings on Aquaculture Amendment

The Gulf of Mexico Fishery Management Council has scheduled a series of public hearings to solicit public comment on a draft Aquaculture Amendment. The draft Aquaculture Amendment will require persons to obtain a permit from the National Marine Fisheries Service in order to participate in aquaculture by constructing an aquaculture facility in the Exclusive Economic Zone of the Gulf of Mexico.

Each application for permit must comply with many permit conditions related to recordkeeping and operation of the facility. These permit conditions will assure the facility has a minimal affect on the environment and on other fishery resources.

Public input is an important part of the amendment process. It offers the public an opportunity to have ideas heard and possibly included as alternatives presented to the council for consideration. Therefore, the council strongly encourages public participation. Copies of the draft Amendment and other related materials can be obtained by calling 813/348-1630.

Meetings begin at 6 p.m. and will conclude no later than 10 p.m. at the following locations:

<u>July 9, 2007</u>

Best Western Cypress Creek
7921 Lamar Poole Road
Biloxi, MS 39532
228/875-7111

Doubletree Beach Resort
17120 Gulf Boulevard
N. Redington Beach, FL 33708
727/391-4000

<u>July 10, 2007</u>

City of Orange Beach Parks and Recreation
27235 Canal Road
Orange Beach, AL 36561
251/981-6028

W Hotel
333 Poydras Street
New Orleans, LA 70130
504/525-9444

July 11, 2007

Embassy Suites Hotel
300 North Shoreline Boulevard
Corpus Christi, TX 78401
361/883-5111

San Luis
5222 Seawall Boulevard
Galveston, TX 77550
409/744-1500

July 12, 2007

Best Western Marina Grand
570 Scenic Gulf Drive
Destin, FL 32550
888/745-8832

THE GUMBO POT
Trout Almondine

Melissa Butler

4 fillets trout
1 cup milk
1 t salt
1/8 t black pepper
1/2 cup flour
8 T butter
1/2 cup almonds, finely chopped

Dip fillets in milk seasoned with salt and pepper. Coat with flour. Melt 4 teaspoons butter in 10-inch skillet. Brown fillets on both sides. Remove fish and set aside. Melt remaining butter in skillet and saute' almonds. Serve over fillets. Garnish with lemons, parsley and cherry tomatoes.

Serves 2.

Reprinted from *A Louisiana Seafood Cookbook*, available for $6 from Louisiana Sea Grant. Make checks payable to Louisiana Sea Grant College Program, 105 Sea Grant Building, LSU, Baton Rouge, LA 70803.

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