

The Story and Significance of Shellfish Aquaculture in Cedar Key





This publication is a series of essays about the sustainable benefits of shellfish aquaculture in Cedar Key. Clam farming has enabled this small island to continue with an industry connected to the sea and remain a working waterfront community. Photos by Carlton Ward Jr. (above) and Eric Zamora (below).



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TOP: Cedar Key's isolation from the rest of the world becomes clear as one drives west for miles on State Road 24. LEFT: Upon reaching the island community, pine forests open up to an expansive view of salt marshes, tidal creeks, and mangrove-fringed keys. ABOVE: Just past the Number Four Channel Bridge, a municipal sign boasts that the area is the USA's number one producer of farm-raised clams. This claim was based on the results of the first aquaculture census conducted by the U.S. Department of Agriculture (USDA) in 1998. In the next USDA census conducted in 2005, Florida's production fell behind another state's. Yet, the sign remains as a symbol of pride and hope for the future. Photos by Eric Zamora.





Foreward

By Cynthia Barnett

Journalist and author of Blue Revolution: Unmaking America's Water Crises and Mirage: Florida and the Vanishing Water of the Eastern U.S., Gainesville, Florida

My husband and I drove our first baby home from the hospital to our tiny house on Cedar Key on a late afternoon in September 2001. As we crossed the No. 4 bridge, an enormous flock of oystercatchers burst into the sky like noisy black-and-white confetti, as if to celebrate the island's newest resident. The big red sun had ignited the grass flats to flaming gold – beacon to a Florida disappeared everywhere but here.

We lived next door to Miss Ida Belle Davis, matriarch of a local fishing family, who had been born in 1921 in the yellow-pine house at 3rd Street that is now Cedar Key Bed & Breakfast. During our years on the island, Miss Ida Belle, her children, and her grandchildren treated us with unforgettable generosity, a five-generation fishing family bringing two newcomer-writers into the shared space that Michael Jepson well describes in the first essay of this book.

On this big day, when the big sun dropped a little lower, Miss Ida Belle and her family sent over dinner featuring fresh-steamed shrimp, along with a bouquet of hurricane lilies, their whimsical golden petals furled like ribbon on a birthday present.

Hurricane lilies bloom magically in late summer, often following a hard rain. They tend to grow on old homesteads, their bulbs passed along neighbor-to-neighbor. You cannot walk into a Home Depot and buy one. And you cannot cross a bridge to any other community in Florida to find a place as extraordinary as Cedar Key.

Different people may be drawn to the island for its namesake trees, historic architecture, or white pelicans that crowd the crab-pocked mud flats in wintertime. But more than anything else, Cedar Key is defined by the fishing families who built the industry here in the early twentieth century and overcame huge odds to keep it thriving in the twenty-first. While the rest of coastal Florida was busy dredging grass flats, razing water-front businesses to make way for condos, and replacing century-old oaks with common golf courses, Cedar Key's watermen and women protected the island's cultural and ecological heritage with hard work and quiet fidelity to history and place.

In so doing, they have given all Floridians, indeed the world, an exceptional gift. Now, it's up to the rest of us, the residents and visitors who love Cedar Key as one of Florida's last authentic places, to cherish what we have been given. The essays herein are meant to inspire such reciprocation – to help us help the watermen and women keep this magical island and its way of life as original as a hurricane lily blooming after late-September rain.

For more information, visit www.cynthiabarnett.net.

FAR LEFT: Cedar Key, Florida. Aerial photograph of the historic fishing community on the northern Gulf of Mexico coast, just south of the mouth of the Suwannee River, now a leading producer of farm-raised clams in the United States. Photo by Carlton Ward Jr.







Shared Space & Sense of Place

By Michael Jepson, Ph.D.

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In a world where we frequently travel through spaces that are often artificial, we occasionally come upon a place that beckons us to stay, at least for a while. These places are usually not artificial and were built to last. They evoke a sense of meaning and purpose. Cedar Key is such a place. Surrounded by protected sanctuaries, salt marshes, and barrier islands, this place and space are inextricably tied to one another.

Cedar Key is a natural resource community where the rhythm of nature dictates work schedules and everyday life.

The history of Cedar Key is written by the harvesting of fish, oysters, sponges, cedar trees, and cabbage palms. It is a place where generations of watermen have an intimate knowledge of nature's forces that govern work and recreation. An approaching storm affects both work and home; occasional floods have the potential to destroy a year of hard labor on the clam leases. Yet, the people of Cedar Key persevere and celebrate the bounty they harvest from the sea, well aware that quality seafood comes from a healthy environment.

In this place of shared space, a fisherman's home is also a staging area where boats set out and return, and equipment is mended. It is where mesh clam bags lay in the driveway for cleaning as passing vehicles dislodge attached oyster spat. It is where nets hang and crab traps are stacked. This use of space is customary in natural resource communities. Home is both a place for work and rest. Their relationship with the water pushes the boundaries of the community beyond city limits. On a daily basis they toil where the "community" extends – into the bays and rivers around the city.

Cedar Key is a place where neighbors recognize this shared space; a place where differences in lifestyles are respected because they have meaning for those who live and work in the community. We all attach some meaning to our space and place. The degree to which that attachment resonates is a matter of time and experience. For those who live and work in this community, and those who visit, Cedar Key is a special place with many different meanings. It is a space to share and a place to belong.

TOP LEFT: Shawn Stephenson and Daniel Rone prepare clams for processing and shipping. Photo by Eric Zamora. LOWER LEFT: Shawn Stephenson shares some time with his son William. Photo by Eric Zamora. Commercial and recreational boats share dock space at the Number Two Channel. Photo by Carlton Ward Jr. Pedestrians stroll Cedar Key's 1st Street, a popular thoroughfare. Photo by Eric Zamora.





ABOVE RIGHT: Oyster harvesting at Seahorse Key offshore of Cedar Key, Florida, with Jeanine and Nancy Beckham. Photo by Carlton Ward Jr. ABOVE FAR RIGHT: Outnumbered three to one, clammer Doug Telgen expertly works his boat among three tourists' boats as he sets out for his clam leases. "Shared space" is the buzz word for people in Cedar Key hoping to educate outsiders spending time and money in the community. They are hoping to teach tourists about Cedar Key's waterfront heritage. With knowledge comes appreciation, and with appreciation comes compatibility. Photo by Eric Zamora. BELOW: Kevin Beckham, a full-time clammer, takes time to cast net "a mess of fish." Less than two decades ago his family and other fishing families in Cedar Key relied upon gill nets to harvest roe mullet for a living. Photo by Carlton Ward Jr.









In the past, rural coastal communities of the Big Bend were intrinsically linked to and economically dependent upon commercial fishing. But when voters passed a statewide gill net ban in 1994, harvesting of mullet and other marine fish, as well as a way of life, came to an end. Today, crabbing remains an important trap fishery with annual landings of blue crabs, both hard and soft, and stone crab claws estimated at over one million pounds in Levy and Dixie counties. Oysters are extensively harvested with around 100,000 pounds landed annually.



ABOVE: Earl Brown has been crabbing for 46 years. He was born in Cedar Key and has been crabbing there longer than anyone else. On February 2, 2006, we went 4 miles offshore to collect four 80 lb baskets of blue crabs to fill an order from a local fish house. We filled the order from just 30 traps. Earl is now retired from working on the water. Photo by Carlton Ward Jr.





LEFT: Shawn Stephenson mends his clam bags at his home so he may reuse them to plant another crop. BELOW: Shawn Stephenson lays recently harvested clam bags in his driveway so passing vehicles will help break loose oysters and other fouling organisms attached to the surface of the bags. Photos by Eric Zamora.





ABOVE: A solitary boater's wake mirrors the natural mosaic of marshes and sand bars that are part of the Suwannee Sound. Where the Suwannee River mixes with the Gulf of Mexico, the sound and surrounding Big Bend coastal region is one of the largest and most productive areas for marine fish and invertebrates in the Gulf of Mexico. The region supports the second-largest continuous area of seagrasses in the eastern Gulf, making it one of the most pristine places in Florida. The shoreline is predominantly salt marsh and tidal creeks with only a few beaches, protected by a myriad of oyster bars and rocky islands. These habitats provide near-shore



nurseries for many commercially and recreationally important species during their juvenile stages. The health and stability of these aquatic resources hinge on maintaining a balance between nutrients that support local productivity and nutrient pollution that can lead to destructive phenomena, like harmful algal blooms. Citizens in the Suwannee Basin and coastal residents must take an active role in protecting and preserving the region's environmental qualities and in supporting its natural resources-based economy. We, ultimately, will determine whether the Suwannee Sound will remain forever viable. Photo by Carlton Ward Jr. The Caber Coastal Connector near Cedar Key is on Florida Forever's list of top 21 land acquisition projects. If the 6,000-acre salt marsh and pine scrub habitat is purchased it will bridge the Lower Suwannee National Wildlife Refuge to the north and the Cedar Key Scrub State Preserve to the south. Photo by Eric Zamora.



Cedar Key and Surrounding Coastline

ABOVE: Over 1,300 acres of state owned submerged lands are dedicated to shellfish aquaculture leases in the coastal waters off of Levy and Dixie counties. These leases are surrounded by a mix of federal and state owned coastal uplands, as well as conservation areas and easements, providing a significant buffer to encroaching development while protecting shellfish and other marine resources from adverse land-use practices. This contributes to the uniqueness of the region, warranting its nickname "The Nature Coast."





ABOVE: Dowitchers search for food in the shallow waters of the Cedar Keys National Wildlife Refuge. The area provides habitat to a wide variety of sea and shore birds, including a large roosting colony of frigate birds on Seahorse Key. With two national wildlife refuges and two state preserves just beyond the city limits, Cedar Key is surrounded by nature. These protected areas form the foundation of the community's economic future. The clamming and tourism industries are thriving and wildlife has a permanent home. Photo by Eric Zamora.

Smart Growth = Sustainable Growth

By Greg Lang

Former City of Cedar Key Community Redevelopment Agency Director





ABOVE: Brian Mattice at Seahorse Key. Photo by Carlton Ward Jr.

The boom-to-bust story of Cedar Key's past was a classic example of unsustainable natural resource exploitation, coupled with poor planning and a lack of understanding of the natural systems that sustain the island today. Coinciding with the growth of the aquaculture industry, the community began to consider how land-based activities affect water quality and questioned if the two could coexist. The answer is "yes" as long as all the partners are committed to smart and sustainable growth. For Cedar Key, smart, sustainable growth means in part that all activity land and water based - needs to consider the three "E"s: Environment, Economy, and social Equity. Thanks in part to the aquaculture industries' engagement with the community, Cedar Key is learning and embracing the three "E"s and has added a fourth "E" perhaps the most important of all: Education. The aquaculture industry has become a model for outreach and education, educating its members, school children, tourists, citizens, policy and lawmakers, and anyone else willing to learn. The greatest lesson learned is that there will always be threats beyond the community's control. However, with commitment, education, action, and a willingness to partner, a smart and sustainable industry is growing in Cedar Key.

20 Cedar Key Everlasting

BELOW: Third Street in Cedar Key is part of the city's historical district and adjacent to commercial waterfront properties. The site was recently targeted for redevelopment, but the economic recession has put the Cedar Key Village project on hold. **BELOW LEFT:** The land-based nursery known as the "clam condos" houses hundreds of millions of baby clams being raised under semi-controlled conditions. **BELOW RIGHT:** Anthony Hinkle co-owns and works on the clam condos. Photos by Eric Zamora.









The Cedar Key Story

Leslie N. Sturmer¹ and Suzanne Colson² ¹Statewide Shellfish Extension Agent, Cedar Key, Florida ²City of Cedar Key Commissioner, Cedar Key, Florida

"It's true, it's true, the climate must be perfect all the year. In short, there's simply not a more congenial spot for happily **everlasting** than here in Clamelot."

The wonderfully appropriate lyrics to the musical Camelot, written by Alan Jay Lerner and Frederick Lowe and published in 1960, were the inspiration for this article.

Cedar Key is a modern-day fairytale. The history, character, and economy of this unique community are inextricably tied to its teeming coastal waters. Everything here depends on good water quality. Today the water is clean. In fact, it's some of the cleanest water in the entire country. But that was not always so. Commercial oystermen and fishermen have been forced out of business by closures of productive oyster grounds and a state-imposed net ban. With a renewed sense of purpose and determination, the community worked together to protect the water so vital to the success of these commercial ventures and to develop new sustainable livelihoods.

When inadequate stormwater and sewage treatment systems began posing threats to local water quality, Cedar Key citizens rallied to fix the problem. One of the top priorities was to replace all existing septic tanks and connect them to the town's sewer system. With a grant from the Suwannee River Water Management District to purchase supplies, citizens labored to connect 42 homes within the existing collection area. Next, the city's water and sewage district acquired legislative funding that expanded the sewer system to accommodate more than 100 remaining homes still on septic tanks outside of the collection zone. By 2001 every septic tank in Cedar Key was eliminated.

Another key to clean Gulf water is to protect its source. Nearly 88,000 acres around Cedar Key are held in public trust and managed by federal and state agencies. This fact is significant. Few communities in the entire U.S., and especially Florida, are surrounded by preserved land. The Lower Suwannee National Wildlife Refuge to the north, the Cedar Key State Reserve and Waccasassa Bay State Preserve to the south, and the Cedar Keys National Wildlife Refuge to the west all help build the foundation for Cedar Key's economy. This natural buffer greatly reduces potential environmental impacts from human waste and development. A perfect example was the purchase of Atsena Otie Key, a 60-acre barrier island a stone's throw away from Dock Street. In the early 1990s private developers targeted Atsena Otie for a residential community. Concern over potential impacts on the local shellfish industry prompted the Suwannee River Water Management District to purchase the land in 1997. Today, the U.S. Fish and Wildlife Service manages Atsena Otie as part of the Cedar Keys National Wildlife Refuge.

LEFT: Mitch Roe (foreground) and Chris Bibeau wash clams (aka "tumbling") at a processing plant. Photo by Eric Zamora.



ABOVE: Doug Telgen pulls nursery bags from his lease not to harvest them, but to transfer the clam seed to larger size mesh bags for their final growout stage. Photo by Eric Zamora. RIGHT: Garrett Sims, Jerald Beckham, and Jerald's dad Jerry harvesting clams. The Beckhams have harvested oysters for multiple generations. Now clam farming is part of their family heritage. Photo by Carlton Ward Jr. Molluscan shellfish – oysters and clams – are filter feeders. They get food and oxygen by pumping large quantities of water across their gills. During feeding, shellfish can consume bacteria, viruses, chemicals, and natural toxins in the water that accumulate in their tissue. Because shellfish are often eaten raw or partially cooked, those harvested from polluted areas are a health hazard. Since shellfish resemble the coastal waters in which they grow, harvesting can only take place in the cleanest water. Shellfish harvesting areas (SHAs) must be certified under the National Shellfish Sanitation Program (NSSP), a set of standards operated under the U.S. Food and Drug Administration that determines if the water quality is acceptable for harvesting shellfish. These standards are the most stringent of all water quality classifications. In Florida, the Department of Agriculture and Consumer Services monitors, classifies, and manages water quality to ensure harvested shellfish are safe. SHAs are routinely monitored for fecal coliform bacteria. Annual shoreline surveys are conducted, identifying actual and potential pollution sources, such as septic tanks, wastewater treatment plants, storm water runoff, marinas, wildlife, and industry. Every 12 years, the NSSP requires shellfish harvesting areas to be reviewed and reclassified. For the Cedar Key SHA, this review occurred in 2004. Cedar Key's







ABOVE: Overlooking a commercial dock and clam nursery operation on the edge of Third Street. Photo by Eric Zamora.

hard work and diligence resulted in monumental changes to water classifications within the area. What happened next was unheard of for today's working waterfront. Where most SHAs are fighting a losing battle to keep pollution out and harvesting areas open, Cedar Key managed to get 3,678 acres of previously closed harvesting areas open for production.

Within a decade, seemingly all at once, Cedar Key had virtually hit rock bottom only to climb higher than ever before. Survival requires a willingness to adapt, so while Cedar Keyans cleaned up the water, they also embraced clam farming as the mainstay industry to fill the economic gap left by commercial fishing after the net ban.

A transition to clam aquaculture as an alternative employment opportunity for local fishermen was facilitated through federally funded job retraining programs conducted during the 1990s. During these programs more than 200 participants from a four-county area were introduced to the occupation of culturing clams. Clam aquaculture leases, the first to be located on Florida's Gulf coast, were identified, permitted, surveyed, and marked. Program graduates were soon placed onto farm sites. Today, many of these graduates, along with their sons and daughters, are operating productive clam farms.

Today Cedar Key is a leading producer of farm-raised clams. What's more is the clamming industry creates huge positive impacts on land-use regulations while its footprint on the environment is virtually nonexistent. As long as the region's coastal waters remain clean, and people continue to enjoy high-quality seafood products, the clam industry in Cedar Key and the surrounding region will be able to share its success story into the future.

"Ask any person if he has heard the story and tell it strong and clear if he has not, that once there was a fleeting wisp of glory called Clamelot."

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ABOVE LEFT: Mitch Roe (left) from Crystal River washes a bag of clams pulled from the shallow water near Cedar Key, while Bobby Witt works a motorized pulley to retrieve another bag. At harvest, each clam bag can hold between 500 and 1,000 marketable clams and bring around \$50 to \$100. ABOVE RIGHT: Crab traps stacked alongside the road for drying. Harvesting clams at sunrise. Photos by Eric Zamora.

LEFT: Mike Davis, former mayor of Cedar Key and commercial fisherman, heads back to the dock on Third Street to unload his clam harvest. Photo by Carlton Ward Jr.

ABOVE: The result of one of the most successful job retraining programs in Florida's history, one hundred thousand baby clams await their destiny. There are several hatcheries operating on the island. Looking more like sand, these baby clams will eventually end up in the waters around Cedar Key. Then they will be harvested and shipped to the far corners of the country. At \$18 million (dockside value) annually, clam farming is one of Cedar Key's main economic drivers. Photo by Eric Zamora.

Economic Benefits of the Clamming Industry Cedar Key and the Surrounding Region

By Chuck Adams, Ph.D.

Marine Economics Specialist, University of Florida, Institute of Food and Agricultural Sciences Food and Resource Economics Department, Gainesville, Florida

The cultured hard clam industry centered in Cedar Key generates true economic "impact" to the region. What does that mean? Well, it means that the culture and sale of hard clams brings in new dollars. This is because over 75% of the clams grown in the region are sold outside the region. Thus, new dollars are brought into the area to pay for jobs, provide incomes, support taxes, and pay for supplies. Further, this new money gets spent and re-spent within the local economy, creating what is often referred to as the "multiplier" effect. The process of re-spending creates new types of businesses that support hard clam culture, such as making and repairing clam bags, producing baby clam seed, and others. The bottom line is that these new clam dollars generate "impact" that is just as important as that created by tourism, forestry, and commercial fishing. A University of Florida study conducted in 2008 found that the industry sold \$19.9 million (wholesale value) in clams, which generated an economic impact of \$44.9 million within the region. Along with that, \$28.8 million in value-added, \$22.9 million in labor income, and 556 jobs were created. This means new jobs, and new jobs are a key sign of a growing economy.

To review the complete report, visit the Online Resource Guide for Florida Shellfish Aquaculture website, http://shellfish.ifas.ufl.edu, click on Publications.

Cedar Key Shellfish Harvesting Area and Aquaculture Lease Sites

ABOVE: Aquaculture leases, grouped into five sites named after adjacent landmarks, are located in conditionally approved waters within the Cedar Key Shellfish Harvesting Area (Zone A). Encompassing 191,000 acres, this area is managed on rainfall, which is measured at a forestry tower located 10 miles inland. When rainfall over a four-day period exceeds five inches, the area will temporarily close to harvesting and will not reopen until levels of bacteria in water samples meet national standards. The management plan results in an annual average of five closure days, allowing clams to reach markets almost year-round. Shellfish harvesting in conditionally restricted and prohibited classified areas is not allowed due to actual or potential pollution. Classifications are based on sanitary, hydrological, meteorological, and bacteriological surveys.

ABOVE: Doug Telgen holds up a petri dish of several thousand seed clams that he hatched in his backyard operation. RIGHT: A clam makes its way down two spinning cylinders of a grading machine. The gap between the cylinders helps to size the clam before it is placed into a bag and prepared for market. ABOVE RIGHT: A processing facility where the clams are graded, counted, weighed, bagged, and placed on pallets for shipment to markets across the country. Photos by Eric Zamora.

Clam Farming: From Seed to Plate

By Leslie N. Sturmer University of Florida, Institute of Food and Agricultural Sciences, Shellfish Aquaculture Extension Program, Cedar Key, Florida

Clam farming can be viewed as occurring in three consecutive stages – production of small seed in a hatchery, growing of larger seed for final planting in either or both a land-based and field nursery, and growout to a marketable size.

Hatchery: Clam culture begins in the hatchery with the production of seed. While hatchery techniques are well defined, they are fairly complex. Most growers opt to purchase seed from a hatchery. There are several hatcheries in Cedar Key and many more around the state, ranging from backyard operations to commercial-sized facilities. In the hatchery, adult clams are induced to spawn by manipulation of water temperatures. Broodstock are selected for reddish striated markings on the shells, referred to as "notata," to distinguish the clams as farm-raised versus product harvested from wild stocks. Once spawned, fertilized eggs and resulting free-swimming larvae are reared under controlled conditions in large tanks filled with filtered, sterilized seawater. Cultured phytoplankton, or microalgae, are fed at increasing densities during the 10- to 14-day larval culture phase, after which, the larvae begin to settle out of the water column, or metamorphose. Even though a true shell is formed at this time, post-set seed are still microscopic and vulnerable to fluctuating environmental conditions. They are maintained in the hatchery for another 30 to 60 days until they reach about 1 mm in size.

Nursery: The nursery serves as an intermediate stage, which provides the small clam seed produced in a hatchery with an adequate food supply and protection from predators until they are ready to be planted on the lease for growout. Nurseries built on the land usually consist of wellers

and raceways. A weller system consists of open-ended cylinders suspended in a water reservoir. Seawater circulates through the seed mass, which is supported on a screen at the bottom of the cylinder. Raceways are shallow tanks or trays with salt water pumped from an adjacent source providing a horizontal flow as opposed to a vertical flow in the wellers. Over 40 land-based nursery facilities operating in the Cedar Key area provide growers with less expensive, locally acclimated seed. Most growers incorporate the field nursery option which places juvenile clams within the natural environment using a smaller-mesh variety of the growout culture gear.

Growout to Market: Clams are primarily grown on coastal submerged lands leased from the State of Florida. A shellfish aquaculture lease has a term of 10 years and is renewable and transferable. The lessee pays an initial application fee and a nominal annual rental fee thereafter. There are currently about 170 growout businesses located off the coast of Levy and Dixie counties on over 1,300 acres of state-owned submerged lands dedicated to shellfish leases. Growers, their crops, and farms are certified through the Department of Agriculture and Consumer Services. Certified growers must comply with best management practices developed for their farms, which result in minimal environmental impacts.

Since clams are bottom-dwelling animals, culture gear is designed to place the larger seed in the soil substrate and provide protection from predators. The gear must allow substantial water flow to provide both oxygen and natural food, or phytoplankton, for growth. The soft bag, which is made of a polyester mesh material, is used by most growers in Florida. Bags, staked to the bottom using a variety of materials, are planted in rows, similar to terrestrial crops. The naturally occurring sediments from tidal and wind actions allow the clams to bury into the bottom. When harvested, only the product and mesh bag are removed. A winch operated from the boat assists in the harvesting process. A crop of market-size clams can be grown within 12 to 15 months, depending on the season planted, using seed clams about a half inch in size and stocked at 1,000 to 1,400 per bag. Phenomenal production of clams in Florida is attributed to subtropical waters and high natural productivity, allowing for almost year-round growing conditions. Survival rates are specific not only to planting methods, season planted, and grower's level of experience, but also predator abundance. Crabs, snails, rays, fish, and humans are among the many predators that attribute to mortalities. Once the crop is harvested, clams are prepared for market by certified shellfish wholesalers, who wash, sort, grade by size, count, tag, and package. Clams are generally sold live, or as shellstock, and refrigerated trucks are used in transporting product to markets throughout the state and nation. There are about 20 wholesalers in the area who process from 150 to 200 million clams annually.

FAR LEFT: Counting a sample of field-nursed clams to estimate how much seed is needed to stock bags for growout. BELOW: Chef Peter Stefani of The Island Room, also a clam farmer, serves steamed clams to restaurant patrons. Clams are nutritious and delicious; enjoy Cedar Key's farm-raised clams in a variety of ways – steamed, roasted, grilled, or raw. A baby clam extends its foot to explore the world; clams inside a bag, tagged and ready for market. Photos by Eric Zamora.

Shellfish Aquaculture: Everybody Wins!

By Sandra E. Shumway, Ph.D.

Editor, The Journal of Shellfish Research; Research Professor, Department of Marine Sciences, University of Connecticut, Groton, Connecticut.

In addition to being good for the environment, culturing shellfish is also good for the economy and the consumer – claims few other farming efforts can justify. Shellfish aquaculture provides food, jobs, and ecosystem services. It's a winning proposition for all. In a climate of declining stocks of wild fish, shellfish aquaculture can not only be used as means of stock enhancement to boost depleted wild shellfish stocks, it can also provide jobs in sometimes depressed regions of the country and allow fishing communities to thrive in spite of declining wild fisheries. From an ecological standpoint, shellfish aquaculture is a source of habitat enhancement and improved water quality. Not only does shellfish aquaculture demand the highest quality of water, it is environmentally friendly and sustainable marine farming at its best.

The animals are suspension feeders and get their food entirely by filtering particles from seawater – think vegetarians! In doing so, they improve water quality by reducing sediment loads and turbidity of estuarine and coastal waters and remove excess nutrients from the water column. It has been calculated that a 2 1/2 acre oyster farm would be sufficient to eliminate the nitrogenous wastes generated by 40-50 coastal inhabitants. As an added bonus, cultured shellfish are a tasty source of protein and vitamins, and are low in cholesterol and fat.

The demand for fresh seafood will continue to grow and so will opportunities for development of shellfish aquaculture facilities. Shellfish aquaculture offers an important opportunity for economic and social cohesion in coastal areas that preserves the ambience of these seaside communities. Don't let social pressures, uninformed naysayers, and multi-user conflicts thwart those efforts. A productive shellfish farm means a healthy and equally productive surrounding environment and should be a great source of pride for any coastal community. Spread the word!

> RIGHT: In Cedar Key's past, natural resources have been decimated through overharvesting. Shellfish harvests are sustainable and aquaculture provides optimism for the future. Our actions will benefit the next generation. In turn, every citizen, every visitor, and every child will win. Photo by Eric Zamora.

Shellfish Aquaculture is Good for the Environment

Clams clean the water by filter feeding.

- A single clam can clear over 10 gallons per day.
- A typical land-based clam nursery in Cedar Key filters over 25,000 gallons a day.
- A small 2-acre clam farm in Cedar Key filters over 9 million gallons each day.

Clams remove excess nutrients.

- Shellfish remove microscopic plants as they feed.
- Nitrogen contained in shellfish tissues is removed when animals are harvested.
- Shellfish feeding stimulates denitrification.
- Improved light penetration and reduced nitrogen help seagrasses recover and flourish.

Clam aquaculture stimulates diversity.

- Recent studies reveal that shellfish aquaculture can improve species abundance and diversity.
- Shells and aquaculture structures provide habitat for juvenile fish, crabs, and other organisms.

Clam farming is sustainable.

- Harvests are made possible by planting hatchery-reared seed.
- Shellfish feed low on the food chain.
- No fertilizers, feeds, herbicides, drugs, chemicals, or antibiotics are used.

Information provided by East Coast Shellfish Growers Association, Tom's River, New Jersey. For more information, visit the Association's website: www.ecsga.org

Clam filtration rates provided by Dr. Shirley Baker, Associate Professor, University of Florida, Fisheries and Aquatic Sciences Program

How Can You Keep Our Coastal Environment and Waters Clean?

By David Heil, Ph.D.¹

Former Assistant Division Director, Division of Aquaculture, Department of Agriculture and Consumer Services, Tallahassee, Florida

- Become involved in local, regional, and state planning, zoning, permitting, and preservation processes.
- Require strict enforcement of existing local, regional, state, and federal laws.
- Demand planned, responsible, limited, low density, and Low Impact Development in coastal areas.
- Install bacterial performance-based, on-site disposal systems (advanced septic tanks) in coastal areas where wastewater treatment facilities are not feasible.
- Demand zero discharge of human wastes from all boats, and educate all boaters about the public health risks of discharge of human waste.
- Promote purchase or construction of Green Areas (parks, preserves, etc.) along coastal shorelines to serve as natural buffers to shellfish harvesting waters.
- Call for pet waste removal and provide "pooper scooper baggies" at public access beaches, parks, and shorelines adjacent to shellfish harvesting waters.
- Promote landscaping and gardening with native plants that reduce or eliminate the need for irrigation and use of fertilizers.
- Encourage agricultural activities that follow strict Best Management Practices that limit the use of fertilizers and pesticides.
- Encourage the use of living shorelines instead of seawalls, and minimize dredging activities.
- Require garbage to be covered and frequently collected. Participate in coastal cleanups and recycle.
- Educate residents and visitors about the importance of all of these activities.
- Spread the word!

¹Currently with the Division of Marine Resources Management, Fish and Wildlife Conservation Commission, Tallahassee, Florida

ABOVE LEFT: Molluscan shellfish aquaculture is, by definition, a "green" industry. Clams are highly efficient water purifiers. Their ciliated siphons pump large amounts of water, providing oxygen and food to the animal. **ABOVE RIGHT:** Egrets, terns, roseate spoonbill, and ibis share space along a dock in Cedar Key. Photos by Eric Zamora.

Historical Perspective

By Dr. John W. Andrews

Founding President, Cedar Key Historical Society, Cedar Key, Florida

Cedar Key was an important industrial port on Florida's Gulf coast in the mid and late 1800s. Large shipments of lumber, cotton, sponges, fish, oysters, and crabs left Cedar Key's docks on trains bound for markets along the eastern seaboard and in Europe. In 1910 the

Standard Manufacturing Company began producing fiber and brushes from the cabbage palm. The lumber and commercial seafood industries supported a thriving community by providing work for hundreds of residents. Large families fared better than most during the Great Depression. They lived off the water, trading seafood with inland farmers for fresh vegetables and meat. Cedar Key's seafood industry flourished long after timber declined. Today the railroad is no more, and boatloads of fish are a memory. The 1994 statewide net ban crippled commercial fishing efforts in Cedar Key, ending a way of life. Every single person in Cedar Key was affected by the net ban. In the face of change, fortitude and creativity gave rise to a new industry – clam farming. Amidst rich history, a new chapter began for Cedar Key's working waterfront.

The Cedar Key Historical Society and Museum were established in 1977 and 1979, respectively. The latter consists of two historical buildings (Lutterloh building and the Andrews house), containing exhibits, extensive archives, and photographs on Cedar Key's remarkable history. The City's Historical and Architectural Review Board tries to preserve the town's historical character.

Special Thanks

Thanks to the dedicated men and women of Cedar Key's aquaculture industry for their hard work and contributions to our economy, our environment, and our dinner plates.

Thanks also to YOU, the reader, for giving us the opportunity to inspire a new appreciation for Cedar Key's aquaculture industry and what it will take to sustain it.

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Florida

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CEDAR KEY Evenlasting

The Story and Significance of Shellfish Aquaculture in Cedar Key

The livelihood of Cedar Key depends on the continued growth and success of its fishing and aquaculture industries. Whether you're here for the day, the weekend, or for good, we hope you'll help us sustain it.

ON THE COVER: As the sun rises on the Keys there will almost always be clammers at work. Rick Cooke and his worker harvest clams on the early morning tide. Photos by Eric Zamora.