

Expanding Florida's Aquaculture Industry: The Geography of Clam and Tropical Fish Production

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Introduction

Florida's aquaculturists satisfy the demands of a variety of interests: food, recreation, environmental remediation, hobby, and niche markets. Their products include shrimp, rice, striped bass, wetlands restoration plants, live rock, koi, water garden plants, and tilapia. Currently, the two areas of aquaculture in Florida with the greatest number of producers are clam production and tropical fish production. In 1995, there were large numbers of active clam producers and tropical fish producers in Florida (167 and 205, respectively) (FASS 1996). The number of tropical fish producers (1988) was stable between 1987 and 1991. But by 1995 their numbers increased to 205. During the same eight year period, the number of clam producers skyrocketed, from 28 to 167 (FASS 1988, 1990, 1992, 1994, 1996). The dramatic increase in the number of clam producers in Florida is in direct response to economic development initiatives intended to offset political and environmental constraints placed upon the wild fisheries harvest industry (colloquially referred to as "commercial fisheries").

This paper examines the geographic factors affecting the location of these two industries (clams and tropical fish) in an effort to predict their potential for expansion in Florida. This paper is divided into four sections. Section One provides brief background information on the events that gave rise to the active state support of aquaculture in general and clam farming in particular. The second and third sections discuss the geographic factors affecting clam production and tropical fish production, respectively. The final section presents the conclusions regarding the expansion potential of these two commodities.

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Background

Two major events led to state-funded expansion of Florida's clam farming. The better known event was the 1994 "net ban" referendum. However, legislative interest in Florida's clam industry began a few years earlier. Large portions of the Suwannee Sound were declared off-limits to oyster harvesting due to environmental damage caused by a tropical storm (Sturmer and Vaughan 1997). At that time, many of the residents of Dixie, Levy, and nearby counties earned their living by harvesting oysters and/or catching fish via small-scale wild harvest operations in season. The closure of the Suwannee Sound jeopardized the stability of these small local economies. Consequently, local and state government officials developed an experimental economic development initiative called Project OCEAN (Oyster & Clam Education Aquaculture Network).

Between 1991 and 1993, Project OCEAN trained 138 participants in aquaculture techniques (Sturmer and Vaughan 1996). Although clams were not previously known to inhabit the waters off of Dixie and Levy Counties, the species *mercenaria mercenaria* (which is found elsewhere in Florida) was introduced in an effort to expand the vocational opportunities for local participants. Clams and oysters grow in open water along coastlines, yet they grow in different aquatic environments with respect to pH, depth, salinity, and nutrient availability. A primary benefit of introducing clam production to this area of the Gulf of Mexico was its ability to utilize large areas of coastal waters that were not otherwise suitable for oyster production.

In 1994, when state voters approved the net ban referendum, it effectively eliminated the livelihood of small-scale wild harvest fishermen. The local governments of Dixie, Levy, Taylor and Gilchrist Counties coordinated their efforts in order to obtain funding and support for a second clam retraining program. Project WAVE (Withlacoochee Aquaculture Vocational Enterprise) operated from 1995-1997, and trained 125 participants in clam nursery and grow-out operations (Sturmer and Vaughan 1997). A similar program was adopted in response to the local impact of the net ban in Oak Hill, in Volusia County. Project Oak Hill operated from 1996-1997, and trained 49 participants in clam production techniques (Strack 1998).

While politics was the impetus behind the substantial growth of the clam sector, the tropical fish sector has grown at a modest yet stable rate during the last ten years. Can continued growth of these

two sectors be expected in the future? Putting aside the regulatory and economic constraints to further growth, and focusing on the geographic factors that affect growth of these sectors, some preliminary conclusions can be drawn about their expansion potential.

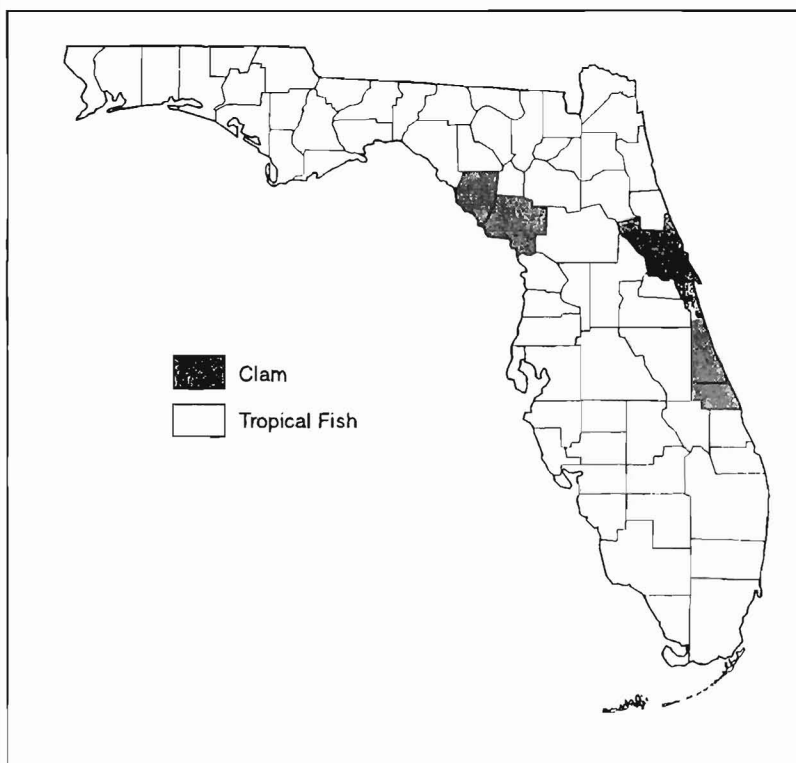
Generally speaking, the production techniques used in clam and tropical fish production are the biggest determinant of site location. For instance, clam production occurs on parcels of submerged coastal land. This is necessary to lower production costs by taking advantage of the existing food sources in the water. Conversely, tropical fish production occurs in earthen ponds or recirculating tanks above ground. This allows the tropical fish farmer to create and monitor an artificial habitat appropriate to the species being raised. These two production techniques result in an important difference in determining site locations for clam and tropical fish producers. Clam production occurs in open water: the Atlantic, the Gulf of Mexico, and coastal lagoons, rivers, and other ecologically compatible areas. Tropical fish production occurs inland, often in active or former agricultural areas. This permits somewhat greater flexibility in location decisions. But there are other geographic factors that come into consideration. The next section will describe the five geographic factors affecting clam production in Florida.

Clam Production

There are five geographic factors affecting the site locations of clam producers within Florida: ecological factors, climate, access to site, permitting, and agglomerations of production. Because clams are grown in open water, it is essential to locate an area of suitable stable ecology with respect to food availability, salinity, pH, soil type, and numbers of predators. For Florida clam growers, climate is both an asset and a detriment. Although *mercenaria mercenaria* is raised from Maine to southernmost Florida, the warmer climate in Florida allows for a faster grow-out time. This means that Florida clams are ready for market sooner than northern-raised clams. However, the warmer waters of Florida make it very difficult to cool Florida clams to 45 degrees Fahrenheit in order to meet federal standards for shipping live clams across state lines. This prevents many Florida producers from competing in the lucrative northern clam markets. Climate affects Florida clam production in another important way as well. Southern Florida's coastal waters are quite warm, and are more susceptible to red tides than elsewhere in Florida. Mollusks harvested from waters affected by red tides can

transmit the red tide pathogens to humans, resulting in illness, or even death in some cases. Consequently, clams may not be harvested from areas affected by red tides.

Figure 1
Production Areas, 1996



Site access is another concern of producers. Ideal sites are close to shore, and to a boat ramp, since the time spent shuttling between the leased production site and the home base is time that could be spent in other business activities, such as marketing, distribution, or administrative duties. The siting issue is directly linked to the constraints associated with permitting. Since clam farming occurs in state waters a submerged land lease is necessary. Approval from up to 21 state and federal agencies must be obtained before the lease

is granted. This permitting process can take two or more years. During this time the site is evaluated for its suitability for clam farming, in addition to its potential negative impacts on conservation or preservation activities, and the land values of waterfront property owners. Other potential conflicts associated with siting clam farming operations include conflicts with other water users, such as recreational or commercial fishermen.

The final geographic factor affecting clam production in Florida is agglomeration of production. By establishing operations near an agglomeration of producers, the newcomer takes advantage of the existing availability of suppliers, buyers, distributors, and other related businesses. This significantly decreases the time and effort needed for business start-up. At present there are two main areas of agglomerated clam production. The Indian River Lagoon area has been the dominant clam production area since the 1950s. Only in the last few years has the coastal area near the Gulf coast port of Cedar Key begun to out-pace its east coast counterpart in the number of active producers in the region (FASS 1996) (See Figure 1).

Tropical Fish

Tropical fish production is constrained by five geographic factors very similar to those of clam production. However, due to the nature of tropical fish, these five factors take on a different slant when applied to tropical fish production. The five factors are: ecological, climate, access to the water table and the airport, permitting, and agglomerations of production. Because the natural habitats of tropical fish farmed in Florida are in South America, Africa, or Asia, the different species require different habitats. Pond and tank production allows for the careful recreation of the various environmental conditions appropriate for the species being raised. As the name implies, tropical fish originate in warm climates. Consequently, the warmer south Florida climate is preferred for operations, as it lowers production costs; tropical fish production in more northern locales does occur, but it requires special strategies to compensate for the colder winters.

The third geographic factor affecting tropical fish production in Florida is that of access to the water table and to airports. The two most important inputs for tropical fish farming are water and brood stock. Although tropical fish farming does not use nearly as much water as more traditional agricultural activities, it is still a

necessity.¹ Airport access is important to tropical fish production as almost all imports arrive in the U.S. by air freight. So proximity to an airport impacts a producer's ability to obtain brood stock. And for those producers that have generated their own distribution networks, airport access expedites their shipping activities.

While there are essentially as many permitting hurdles to overcome in tropical fish production as there are in clam production, in some respects there may be fewer siting conflicts. Because tropical fish production occurs away from open water sources (primarily to reduce the risk of an accidental release of exotic species) it does not have to compete with the variety of other users for that land. The large-scale commercial tropical fish production activities occur in agricultural areas. There are small-scale "backyard" operations that have permits to occur in some residential areas, but the trend seems to be away from this. In fact, as residential areas move into former agricultural areas, there seem to be some conflicts between producers and their new neighbors (Hagy 1988, Strack 1998).

There is a definite trend towards agglomerations of production in the tropical fish industry. The majority of tropical fish producers are located in two areas: the Hillsborough-St. Petersburg Metropolitan Statistical Area, and in Dade County (see Figure 1). Within both areas there are numerous importers, exporters, distributors, suppliers, buyers, and other related businesses. In addition, the state has located an extension office with a diagnostic laboratory in Hillsborough County, in order to provide assistance to the many producers in that area.

Conclusions

Given the finite amount of coastal land in Florida, and its ever increasing desirability for development or preservation, there is most likely a limit to the amount of future growth possible for the clam industry in Florida. On the other hand, because tropical fish production does not require highly prized coastal land, it can be located in areas somewhat distant from human population centers. However, as production is shifted away from the agglomerated areas in South Florida, the costs, effort, and technical complexity of the

¹The water usage among tropical fish producers is carefully monitored by the appropriate Water Management District.

operation will increase. Nonetheless, based on the geographic factors affecting production, there is significant room for expansion of Florida's tropical fish industry. When this is coupled with evidence that Florida's tropical fish producers do not begin to meet market demand for tropical fish (Chapman et al 1997)², there is reason to believe that Florida's tropical fish farmers have not yet reached their fullest production potential.

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²Although Florida is the largest producer of tropical fish in the entire USA, the state's output meets approximately 5% of consumer demand for tropical fish (Watson 1997).

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