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Kristen M. Cammarata

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Introduction

State of the World’s Fisheries and the Potential for Aquaculture

The unthinkable has come to pass: the wealth of oceans, once inexhaustible, has proven finite and fish, once dubbed "the poor man's protein" have become a resource coveted - and - fought over by nations. Michael Parfit[1]

Fishing is a centuries-old occupation, one of the few remaining pre-industrial livelihoods. Rhode Island has a history of a strong fishing tradition. This history includes not only the capture fisheries but also a managed fishery in the early to mid 1900s when men and women seeded and farmed Narragansett Bay, continuing what is a 4,000 year old practice originating in Asia – aquaculture. Many regions of the world have turned to aquaculture for economic development and supplementing their fish supplies. Many US states have developed successful sectors which coexist with the capture fisheries. Rhode Island has had a difficult time reviving the practice of farming the sea. In some cases, people are vehemently opposed to it. In this thesis, I will explore the marine-based aquaculture debate and the existence of socio-cultural barriers to marine based aquaculture in Rhode Island.

As a result of overfishing, habitat destruction, pollution, and inefficient management, the ability of the capture fisheries to meet the increasing world demand for fish is declining. Many marine fisheries have been overcapitalized as a result of the open access[2] nature of the resource. Although aggregate landings are increasing, catch per unit effort is decreasing (Figure 1). Essentially, the situation can be reduced to too many boats chasing too few fish.

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[1] Parfit, Michael, "Diminishing Returns: Exploring the Ocean's Bounty," *National Geographic*. November, 1995.

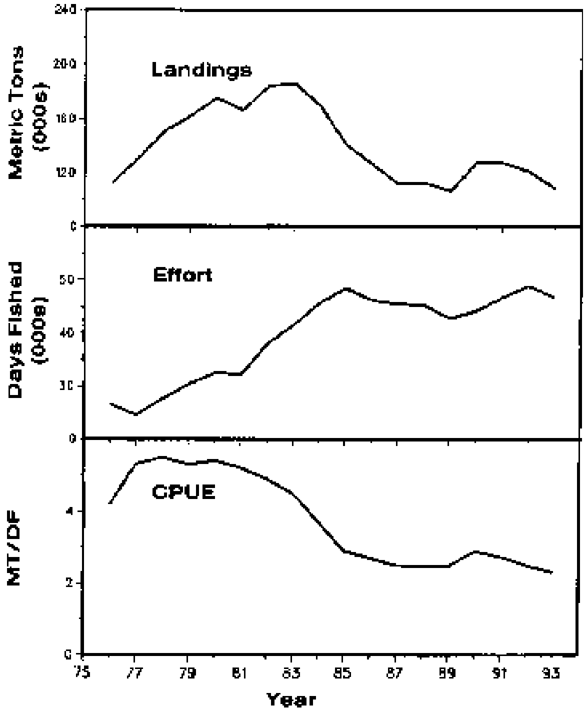

Figure 5. Total multispecies trawl landings (metric tons, all ages) standardized trawl fishing effort (DF, days fished) and landings divided by effort (CPUE, mt / df) since 1976, reflecting major changes in trawl fishing activity and aggregate resource abundance.

According to the Food and Agricultural Organization (FAO) of the United Nations, all but two of the world's fifteen fisheries – almost 70% of the world's fish stocks – are "heavily exploited, overexploited, depleted or slowly recovering."[3]

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[2] 'Open access' is defined by Crutchfield and Pontecorvo (1969): When there is any profit at all to be made, new entrants are likely to be attracted despite the evidence of decline in productivity of the resource. Cited in: McCay, Bonnie and James M. Acheson, The Question of the Commons. Tucson: The University of Arizona Press, 1987. *Tragedy of the Commons*, as the open access problem has come to be known as was a theory popularized by Garrett Hardin in his 1967 *Tragedy of the Commons* essay.

[3] Russell, Dick "Vacuuming the Seas", *The Environmental Magazine*, July-August 1996 Volume VII, No. 4, p. 30.

The FAO maintains that by the year 2000, the demand for fish will have surpassed marine catches by twenty to thirty million tons per year.[4] The trend toward declining productivity is problematic since fish represents a daily source of protein for millions of people worldwide, accounting for sixteen per cent of total animal protein consumption.[5] With the increased cost of fish in local markets, populations that traditionally have relied on seafood are increasingly unable to afford it. The fishing industry also provides employment for over 150 million people globally.[6] In the last few years, declining catches have resulted in the loss of more than 100,000 jobs among the world's 15 to 21 million fishers.[7]

In 1995, the total US capture fishery production was 5.6 million metric tons (MT), a slight increase from the previous year's 5.5 million MT.[8] However, despite the increase in weight, fishermen are earning lower values for many of the products. Much of the harvested fish represents formerly underutilized species such as squid, butterfish and dogfish. The National Marine Fisheries Service (NMFS) has declared that 86 commercially harvested species are currently overexploited. In the case of New England groundfish, 80% of the stocks are in the low abundance category. Mid-Atlantic and New England groundfish stocks have the highest fractions of overexploitation (100% and 76%, respectively). As for shellfish stocks, Rhode Island Sea Grant reports that shellfish landings in Rhode Island have declined more than 40% in the last decade and the earnings of individual shellfishermen have been "reduced dramatically".

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[4] "World's Natural Fish Stocks Depleted Says New Study" http:worldbank.org

[5] FAO, Marine Fisheries, op. cit., note 5 Fish and Fishery Products: World Apparent Consumption Statistics Based on Food Balance Sheets (1961-1990) (Rome: FAO, November, 1992) cited in Weber, p.7.

[6] The World Bank database. http://www.worldbank.org

[7] Weber

[8] National Marine Fisheries Service http://www.remora

Many scientists and research institutions view aquaculture as a potential solution to the decline of the world's fisheries, contributing to stock enhancement and addressing problems of food security. NMFS defines aquaculture[9] as the following:

> Aquaculture is the propagation and rearing of aquatic organisms in controlled or selected aquatic environments for any commercial, recreational or public purpose. Potential purposes of aquaculture include bait production, wild stock enhancement, fish culture for zoos and aquaria, rebuilding of populations of threatened and endangered species, and food production for human consumption.[10]

A study by the International Food Policy Research Institute (IFPRI) predicts that a growing human population and diminishing stocks of wild fisheries will need to rely more on aquaculture (or fish farms) and managed natural fisheries to meet the needs of the future and to conserve the world's aquatic resources. While the capture fisheries are stable, in terms of landings, catch per unit effort is increasing (See Figure 1). Aquaculture is also one of the fastest growing food production industries and offers potential to compensate for some of the unmet demand for fish protein.

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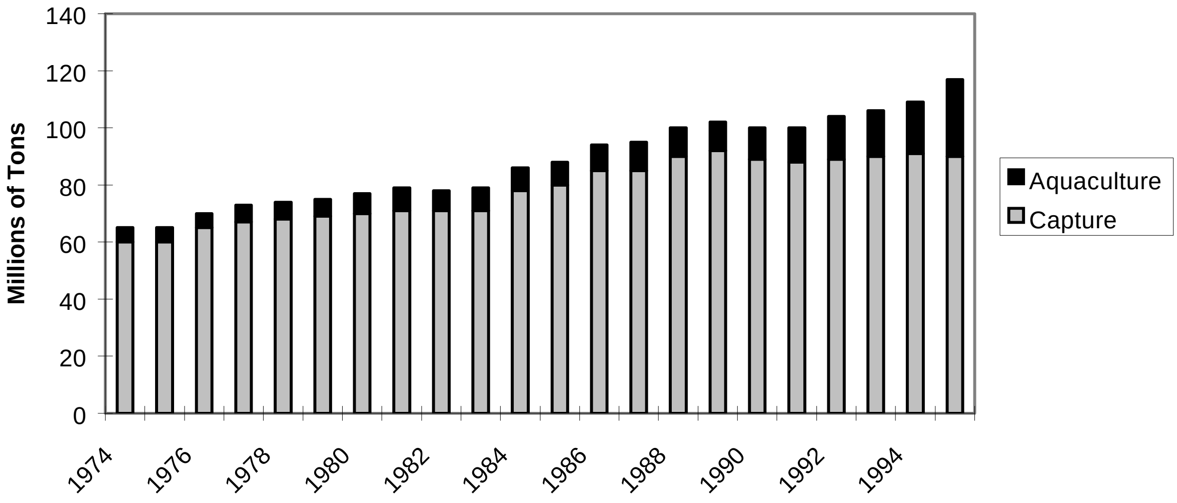
[9] There are two kinds of aquaculture: land based and in-situ or marine based, commonly referred to as "mariculture."

[10] National Marine Fisheries Service Strategic Plan, Objective 4
http://www.remora.ssp.nmfs.gov/fus/fus96/index.html.

Contributions from Aquaculture and Capture Fisheries



Source: FAO -SOFIA Summary, 1996

Figure 2

The international community, particularly aid organizations, has demonstrated overwhelming support for the continued research and development of aquaculture as a priority for world food security. A report released by the World Bank in June 1995 reports that aquaculture could provide up to 40% of the seafood for human consumption over the next fifteen years and comprise more than half of the total catch.

If it is implemented properly, aquaculture can have many benefits. However, it can also be the source of many negative impacts - social, economic and environmental. Habitat degradation from marine-based aquaculture is well documented in several regions around the world, and in some areas, large quantities of wild fish are caught to provide food for the cultured fish. For example, approximately 5.3 tons of fish are required to produce one ton of cage-reared salmon.[11] There is also mounting evidence that aquaculture is responsible for the displacement of many local fishers. Rather than run small-scale farms, countries have chosen to develop large expanses of land for intensive projects requiring large quantities of food, water and chemicals.[12]

In 1994, US consumers spent approximately $39.4 billion on fishery products.[13] The *Seafood Market Analyst 1996 Year in Review* reports that in 1996, the US imported $2.5 billion worth of seafood, primarily cultured shrimp, from Thailand, Ecuador and Mexico. Conversely, the US exported $620 million in value, mostly salmon, with 47% being sold to Japan.[14] Importing fish products contributes to a $3.7 billion trade deficit which increased aquaculture production could balance.

The Federal Government has attempted to address the issue of the decline of marine resources by promoting the expansion of the aquaculture sector (both land-based and in situ marine based or mariculture) and the preservation of marine resources.[15] Section 1001 of the National Aquaculture Policy, Planning and Development Act of 1980 authorizes the Secretary of Agriculture to "offer loans, conduct surveys, explore methodology and disseminate information."[16] The support for aquaculture has made a significant impact; the fish harvest (from aquaculture) has shown a steady increase from 6.6 million MT in 1984 to 12.68 million MT in 1991.[17] However, despite this move, the US still lags far behind and is currently responsible for

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[11] Mulvaney, Kiernan. A Sea of Troubles: In the International Year of the Ocean: Are We Reaching Our Limit? The Environmental Magazine, January-February, 1997 p. 30.

[12] . Producing one ton of shrimp requires 50-60 million liters of water. Mulvaney, Kiernan. "A Sea of Troubles In the International Year of the Ocean. Are We Reaching Our Limit? The Environmental Magazine, January-February, 1997, p. 30)

[13] NMFS Fisheries Statistics, 1995.

[14] The Seafood Market Analyst 1996 Year in Review

[15] National Aquaculture Policy, Planning and Development Act of 1980, 16 U.S.C. 2801-2810 (1988 & Supp. III 1991).

[16] Fernandez, Jose L. "Public Trust, Riparian Rights and Aquaculture: A Storm Brewing in the Ocean State." *William and Mary Environmental Law and Policy Review*, September, 1996. p. 193.

[17] James Anderson and Mark Spatz. Rhode Island Department of Administration, White Paper- "Aquaculture: An Assessment of Opportunities and Constraints in Rhode Island" (1994).

only four per cent of the global aquaculture market. Within the US, the Northeast Atlantic states are responsible for only 15% of the domestic output. In the context of this region, Rhode Island, despite having a 420 mile coastline and being home to Narragansett Bay, one of the most biologically productive estuaries in the world, has a share of a mere five per cent of total cultivated fish and shellfish.[18]

Although there is a supportive climate in the federal government, aquaculture is regulated differently from state to state. Therefore, the industry is easy to enter in some states and exceedingly difficult in others, such as Rhode Island. Currently Rhode Island has leased only 11.5 acres in the coastal ponds to nine mariculturists.[19] The recently released report of the *Rhode Island Legislative Commission on Aquaculture* identifies what the group perceives to be the most significant constraints to developing the aquaculture sector in Rhode Island:

- Regulatory Constraints
- Use Conflicts
- Predation and Disease
- Access to Financial Capital
- Water Quality

In order to address declining stocks and food security issues, the world seems to be shifting from traditional harvesting methods to aquaculture. Rhode Island is not following this trend. I intend to explicate the user conflict category, exploring what if any socio-cultural barriers exist to the development of marine-based aquaculture in Rhode Island. In this thesis, I have conducted an ethnographic inquiry to assess the existence and impact of public perceptions and attitudes regarding this industry. Over the course of one and a half years, I used an in-depth applied social research methodology focusing my inquiry on policy makers, scientists, stakeholders and commercial fishers in Rhode Island. In the following chapters, I present the history of mariculture in Rhode Island, the methodology used to conduct this inquiry and finally, an analysis and interpretation of my findings.

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[18] Anderson, James. Lecture Second Annual Rhode Island Aquaculture Conference, October 1997.

[19] One of the leases was finally approved in December, 1997 after a long arduous process; therefore, no production information is available.

Chapter 1

Statement of the Problem and Brief History

Looking at Rhode Island: A case study for potential socio-cultural barriers to marine based aquaculture

In June 1995, the Rhode Island General Assembly convened a 13 member Aquaculture Commission[20] to ascertain how the State can develop its aquaculture sector. The Commissioners' goals, as stated in the resolution, were to: "to promote, protect and stimulate aquacultural commerce in Rhode Island." On February 6, 1996, the Commission submitted a 75 page bill, HR 8276, to the Legislature, intended to make the regulatory climate here more favorable towards aquaculture. This bill called for streamlining the bureaucracy by eliminating the Department of Environmental Management (DEM) from the permitting process. All power to grant aquaculture leases would have gone exclusively to the Coastal Resources Management Council (CRMC), the legislatively appointed body which currently grants permits for the use of the state's submerged lands.

Recreational fishing, boating, swimming, commercial fishing and commercial shipping constitute the major interests that now compete for Rhode Island's marine resource. As there is only a limited amount of space in the State's coastal waters, conflicts among the different user groups often emerge. HR 8276 was met with fiercest opposition from fishers' trade organizations which have developed into visible lobbying groups playing a significant role in legislative processes and aggressively protecting their industry. The revised HR 8276, a document one eighth of the original's length was passed in August 1996. In the second draft, most of the original controversial legislation, such as the elimination of DEM from the process, had been omitted. Some of the more contentious issues included the designation of CRMC as the lead permitting agency, exemptions from size restrictions for aquaculturists and the elimination of DEM- the only agency which has the authority to carry out the provisions of the Clean Water Act- from the process.

Many other user groups also agreed that the original version of HR 8276 was problematic. Several individuals, including James Boyd, a former member of the Aquaculture Commission and coordinator of aquaculture activities at the Coastal Resources Management Council, and Dr. Robert Rheault, the president of both Ocean State Aquaculture Association and SPATCO, Rhode Island's largest mariculture company, agreed with the commercial fishing industry that the bill was unfair and essentially a "big mistake".[21]

Both proponents and opponents of aquaculture concur that Rhode Island does not have a marine resource management plan that reflects or takes into account each of the user groups' interests. The current regulatory structure and opposition from different user groups, - fishers, coastal property owners, and local town planning agencies - makes entry into the aquaculture sector exceedingly difficult. Most notable of these opposition groups has been the Rhode Island Shellfishermen's Organization, the only one of ten commercial fishers' organizations that did not support the abridged version of HR 8276. The revised bill made no changes to the law governing mariculture and made only minor provisions for land based aquaculture.

Fisheries Management

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[20] House Resolution 95-H 5615 Substitute A

[21] Interview with Robert Rheault 5/20/97. Interview with Jim Boyd 5/97

As stated in my introduction, Rhode Island, home to some of the most productive fisheries in the US, has not escaped the worldwide decline of fish stocks. As early as 1921, the Annual Report of the Rhode Island Commissioners of Inland Fisheries revealed concern for this resource base. In the first section of their report, the Commission identified the need for a stocking program:

> It is universally recognized that modern conditions of excessive fishing demand that the natural supply of fish in the streams and ponds be supplemented by liberal stocking, a proper amount of stocking would result in good fishing.[22]

In 1957, Rhode Island had a record harvest of 142,080 pounds. Since the early 1980s, Rhode Island fishers in Pt. Judith, one of the largest fishing ports on the eastern seaboard, responded to overexploitation of groundfish populations by targeting what were then underutilized species. However, with changing federal regulations, other states have been forced to make these adaptations as well and now even formerly underutilized species are under extreme pressure.

In the past decade, the federal government has advocated a preservationist approach towards the wild fisheries. As a result of these efforts to mitigate the disastrous economic and biological effects of overfishing, moratoria have become a way of life for many fishing communities, particularly in New England. Shorter fishing seasons coupled with complete closure of some areas or even entire fisheries have left many communities socially and economically devastated.

On the national scale, traditional management practices have not proven effective in reversing the trends of declining wild harvest landings. Since the early 1980's, the federal government has instituted buy back programs which essentially buy fishing boats and gear to reduce the number of participants in the fishery. However, the US government has seen that

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fewer fishing vessels does not subsequently decrease the total fishing effort on the part of existing vessels and, conversely, the fish harvest has shown a steady increase from 6.6 million metric tons in 1984 to 12.68 million metric tons in 1991.[23]

In most fisheries, catch limits have been imposed, limiting the amount of product a fisher can harvest. While this method is theoretically effective, the regulatory structures in many regions do not provide adequate funding for enforcement of these measures. In Rhode Island, the State Department of Environmental Management (RIDEM), Division of Enforcement is entirely understaffed. There are thirty-two conservation officers to work seven days a week for three shifts. These State employees are faced with the responsibility of enforcing marine, freshwater, wildlife and boating safety for the entire state of Rhode Island. A 1994 survey of shellfishermen by a University of Rhode Island professor revealed that few shellfishers have had their craft boarded by an official inspector.[24] This lack of enforcement further signals to certain individuals that even flagrant breaches of the law escape penalty. As one biologist at DEM said in frustration, “There are ways to get around every law we have.”

Resource Management in Rhode Island

With a decline in shellfish stocks and Rhode Island’s economic dependence on the fishing sector, the State certainly needs to better manage its fishery. Over 40% of Rhode Island’s shellfish beds currently are closed for harvesting due to pollution. Shellfish, however, have the ability to depurate that is, as they take in polluted water, they can filter it and essentially rid themselves of most bacterial pathogens, toxins and heavy metals which make them unsuitable for

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[22] Commissioners of Inland Fisheries, Fifty-first annual report, January 1921, Providence: The Oxford Press, 1921, p. 6. According to DEM records, Rhode Island had a lobster hatchery in the early 1900’s for stock enhancement purposes.

[23] James Anderson and Mark Spatz, Rhode Island Dept. of Administration, White Paper- Aquaculture: An Assessment of Opportunities and Constraints in Rhode Island (1994)

[24] University of Rhode Island, Dept. of Sociology. Professor William Gordon. 1994 Survey of Commercial Fishermen.

human consumption. In states such as Connecticut, an individual may obtain a permit to remove stock from polluted waters and transplant it to clean waters, harvesting it after it has had sufficient time to purify itself. Rhode Island's DEM also frequently performs such transplants. Volunteer shellfishers harvest the shellfish from polluted waters and DEM transports it to a clean site where it is dumped for purification. Sometimes these shellfishers are paid by the bushel for the amount they harvest. Most recent funds for transplants have come from three sources. The first is settlement monies from the World Prodigy Oil Spill, which includes $40,000 for shellfish stock transfer and $35,000 for enforcement, predator control and monitoring. NMFS has stipulated that polluted stock be transplanted to spawner sanctuaries. The second source is federal funding procured by Senator Jack Reed, a total of $150,000. Of these funds, $100,000 has been allocated for stock transplanting and $50,000 is to sponsor research on the Providence River shellfish stocks.[25] The third source is legislative funding.

The following table (Table 1) identifies the most recent shellfish transplants. Those diggers participating in the May transplants were paid from the funds remaining from the World Prodigy Oil Spill settlement. In 1996 shellfishers participated in volunteer transplants of Greenwich Bay in order to stock the Bay for the winter.

Date Of Transplant	**Location**	**Pounds**	**Number of Diggers**
May 15, 1997	Potowamet Spawner Sanctuary	97,450 pounds	89 diggers
		201,975 pounds since 1995	
	Sakonnet Spawner Sanctuary	25,800 pounds	
		19,700 pounds	
May 22, 1997	Goddard Park	80,000 pounds	66 diggers

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[25] These monies allotted are for research on population density and possible effects of those transplants. These funds would be used for research on the burden of pathogens and chemicals only as needed to comply with National Shellfish Sanitation Program (NSSP) requirements.

These transplants are highly controversial. On one hand, shellfishers refer to them as "public benefit aquaculture". These individuals believe that they are removing an otherwise inaccessible product and harvesting it for the benefit of society. Others, including scientists, policy makers and even some shellfishers criticize the transplants as "welfare for diggers". Other problems with this process include the potential for illegal harvesting. Indeed, some of the volunteers who accompany DEM to the newly created beds reputedly carry along hand-held Global Positioning System (GPS) devices, which help them to ascertain the exact location of the transplanted product. In the most recent project at Warwick Cove, the yacht club flag provided an excellent marker pointing to where the transplanted shellfish lies. For instance, during the Warwick Cove transplant, a conservation officer boarded one of the volunteer boats to find the digger had several bags of suspect quahaugs hanging over the side of his boat. This is an industry where a few violators create a negative image of the entire group. Still, while such incidents are more often the exception rather than the rule, they fuel the assertion that this form of management is not efficient and contrary to public policy.

Moreover, subsequent returns to the transplant sites by DEM researchers have revealed that transplanting may not be the best method biologically for managing the shellfishery. Preliminary follow-up did not provide encouraging results. For two consecutive years divers have found broken shells and dead animals. The failure of transplanting is documented in a 1975 report by R. Sisson, Deputy Chief, Division of Fish and Wildlife, DEM, that reveals a 50% mortality rate in these cases.

Protective measures against certain predator species - such as placing nets over young sets - have yet to be explored in this decade. Primarily because of the lack of funds and staff, the Division of Fish and Wildlife has been unable to adopt a holistic approach to data collection and fisheries management. Furthermore, despite the evidence of declining stocks, State agencies are still not given adequate facilities and funds to deal with effective management of the fishery.

Without the means to stabilize stocks and promote alternative strategies, the future of a sustainable capture fishery does not look promising.

History of the Mariculture Industry

Rhode Island has had a long and colorful history of mariculture in Narragansett Bay. In 1799, the Rhode Island General Assembly granted a two-acre lease off of Sabin's Point (now East Providence) to Samuel Thurber in response to a petition from citizens concerned about oyster shortages. [26] Then in 1822, the General Assembly passed an act whereby the State leased two acres each to two men in the Providence River.[27] When the industry first began to develop in Rhode Island, seed oysters were collected from Virginia, New York and Connecticut. The seed oysters subsequently were transplanted into leased areas of Rhode Island's waters, where the salinity conditions were more favorable than further south. In 1848, sixteen acres were leased to four men who planted oyster seed purchased from Virginia and Fire Island. The organisms from Virginia never set properly, most likely due to differences in temperature. From that time forward, product for cultivation was purchased from northern states, including New York, which possessed climate and habitat conditions similar to Rhode Island's.

In 1844, the Rhode Island legislature established the Commission of Shellfisheries[28] and in 1864, it legalized the leasing of Narragansett Bay for private shellfish cultivation.[29] In 1870,

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[26] James Langevin, Secretary of State, "Farming the Waters: A History of Fisheries and Aquaculture" October, 1997.

[27] John Kochiss, Oystering from New York to Boston (New York: Columbia University Press, 1974)

[28] Langevin

[29] Kochiss

Public Law 848 was passed, establishing the Commission of Inland Fisheries to: “introduce, protect and cultivate fish in the inland waters of the State, […] make all needful regulations for the protection of such fish, and […] prosecute for the State concerning all inland fisheries.”[30] This Commission was responsible for all aspects of fisheries management, the maintenance of hatcheries and the operation of a marine experiment station.[31]

Rhode Island’s major role relating to the aquaculture industry was propelled by people clever enough to see the windows of opportunity there for boat building, shipping and processing seafood product. By 1908, there were more than one hundred powered oyster boats in Rhode Island and it was estimated that these increased the gross harvest twelve-fold.[32] Companies hired people to harvest oysters both by traditional methods such as bullrakes or tongs and on newly introduced dredge boats. The harvest was then brought back to large shucking houses where people would shuck the oysters before the meat was sold.

At the industry’s peak in 1912, approximately twenty-two companies owned leases for oyster farming in Rhode Island. During that time 21,000 acres or one third of Narragansett Bay was reportedly devoted to mariculture. The average fee for such plots was$10.00 per acre. Moreover, the industry employed 1,500 workers and produced more than 15 million pounds of oysters each year.[33] The most prominent companies were predominantly Connecticut entrepreneurs who took the risk of leasing the deeper regions of Narragansett Bay traditionally passed over by Rhode Islanders.[34] These entrepreneurs would lease their contracts in the name of a Rhode Island resident, harvest their product and then bring it back to Connecticut, where the shells were placed for the spawning of next year's crop.

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[30] Langevin

[31] ibid.

[32] Kochiss

[33] Michael Rice, 1994

[34] Kochiss

In the early 1800s, shortages of oysters were first observed and attempts at transplanting were initiated. The transplanting process involved moving the seed stock to grow-out areas with optimal conditions, harvesting the product and returning the shells to the seeding area during this process. Once this technique had been mastered, cultivators continued planting with natural sets. The chief failing of this method was that it was purely a transplant operation with no measures being taken to re-introduce or ensure propagation of the wild stocks.

Rhode Island's shift towards privatization of the commons has not been exempt from social conflict. There has always been some form of user conflict between those who make their living from the free and common fishery – the "free fishers"- and those who harvest leased lands. In the past, oyster farmers were often beset by illegal fishers. In the early 1900's, a Californian inventor turned Rhode Island oyster farmer -Nels Lybeck- was constantly plagued by such poachers. In 1907, Lybeck decided to rent Hog Island and formed the Hog Island Watch to guard his beds from trespassers.[35] Around this same time one Captain Bowman rented Starve Goat Island from the Field sisters and built a small house to protect his beds from "oyster pirates".[36]

One of the most notorious cases of poaching involved a pair called the Coggeshall Brothers, two "free and common fishers" arrested for poaching from oyster leases in the early 1930s. In court the brothers plead guilty to fishing on leased lands, but they used their trial to publicly oppose privatization of the fishery as well as the State's practice of allocating leases to a few well connected individuals, - specifically leaseholder and legislator, George Lewis. The Coggeshalls argued that practices then employed were for the profit of a few individuals and thereby contrary to the Charter of Charles II, which granted the citizens the right to a free and common fishery. Again, this is also a precursor of what is happening now.

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[35] Almeida Fairchild, Joyce. The Knights of Hog Island. (1994)p. 23-24.

[36] Newspaper article on Starve Goat Island Providence Journal, 8/20/96. Source DEM archives.

Demise of the Industry

The oyster industry in Rhode Island failed, but not because of poachers. By 1914, pollution had become a serious problem in the Providence River. In combination with overfishing, habitat destruction from filling, dredging and silting, had all but destroyed the natural oyster beds, making the industry entirely dependent on the transplanting process. In the late 1930s, urbanization in Bridgeport and New Haven produced further habitat-destroying pollution. This continued to degrade the spawning grounds. The final blow was delivered by the Great Hurricane of 1938, which damaged equipment and shifted silt and sediment over the oyster beds. Additionally, the depletion of manpower during World War II also attributed to the inability of the industry to rebuild after the hurricane. The boom period of one of Rhode Island’s most lucrative industries had come to a premature end.

Due to an overburdened post war job market, many soldiers returning home began to harvest quahaugs, a shellfish that had been traditionally overlooked as a food source. In 1952, the last large-scale enterprise, the Warren Oyster Company, went out of business. However, despite their closing, these and other entrepreneurs still held the lease rights to land in Narragansett Bay. The historical user conflict between the free fishers and the oyster farmers thus continued for several years after the demise of the industry, because lease owners tried to charge people for harvesting quahaugs on these contracted areas. This attempt at controlling the leases was not accepted and eventually the leases expired.

Present State of Mariculture in Rhode Island

Culturing oysters was essentially non-existent in Narragansett Bay from 1952 until the late 1970s when Luther Blount of Blount Marine received a permit for oyster farming, and began the Prudence Island Oyster Project. Although the low mortality rate of his venture was considered successful, the oysters were never sold since the meat was not large enough to be of market quality and his stock suffered from a ringworm infection.[37] There is some speculation that Blount's project is connected with the resurgent oyster sets that have sporadically occurred in the last two decades but no scientific evidence exists to back this assertion. Also in the late 1970s, the Blue Gold Mussel Farm leased almost 60 acres of Narragansett Bay and grew mussels using a long line technology. After a few years, Blue Gold declared bankruptcy and left behind a large quantity of equipment (cages, barrels and such).[38] Since the company had not been required to post a bond on their contract, the State was left to pay for the clean up. From time to time, gear from the operation still washes ashore. Until the 1980's when Moonstone Oysters, Inc. first began operating in Pt. Judith Pond, the Blue Gold incident was one of the few examples of mariculture that state officials and local fishers point to as reasons for opposing mariculture.[39]

In the preceding chapters, I have described the general state of the fishery and how current practices within the government are inadequate for resource management. I have also presented an overview of the history and the present state of aquaculture in Rhode Island. In the next chapter I will present my rationale for exploring socio-cultural barriers to mariculture in Rhode Island and begin my analysis of the perceptions that are critical to these barriers.

Chapter 2

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[37] DEM Archives. Blount Oyster Project

[38] Information about Blue Gold was hard to come by but one participant said that one of the reasons he believed they were not successful was that they left a lot of pea crabs in their product. This made the shellfish unacceptable for consumers.

[39] In interviews during the summer of 1997, several state workers and fishers complained about gear from Blue Gold that washes ashore or becomes entangled with fishing nets, traps and lines.

Research Rationale

To understand user conflict it is necessary to understand the key players- fishers -and other stakeholders. I will now discuss how I approached the problem of getting to know the players. In the 1970s, researchers at the University of Rhode Island published several studies on this state's fishing population. In *Fishermen of Galilee,* Marine Bulletin Series No.17 (1974), sociologists John Poggie Jr. and Carl Gersuny developed a human ecology model of fishers in that southern Rhode Island port. They interviewed thirty fishers and compared them with thirty mill workers. In their interviews, one of the questions that they asked was, *"What do you get from fishing in comparison with other types of work you could do?"* Among the more intriguing responses was: "It's more of a challenge, like a game of chance. No humdrum existence like shop or office. Like a good poker game-you're always looking for that big trip." Poggie and Gersuny identified the fishing community of Galilee as an independent social structure with a specific set of beliefs regarding the physical environment, the social environment, technology, ideology and ritual and social organization. "Independence, challenge, disdain for regimentation and love of the outdoors are highly valued and often mentioned by fishermen."[40],. they concluded, "The idea of a strong commitment to work as a central life interest among the fishermen in our population is part of the complex of their individual characteristics."[41]

It is difficult to assess how accurate the Poggie were then or if the character of the fishing population in Galilee has changed since 1974, but the nature of the fishery has certainly changed. In the 1980s, when the nearby fishing communities of Gloucester and New Bedford first began experiencing difficulties, the Galilee fishers reacted to the changing times and diversified their operations as I discussed earlier. Uncharacteristically, the fishers in this port are generally considered to be better educated than their counterparts in other areas, perhaps as a result of Galilee's proximity to the University of Rhode Island and the various associate programs and marine focused programs offered there over the years through the University.

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[40] Poggie, John J. and Carl Gersuny. (1974) Fishermen of Galilee. University of Rhode Island Sea Grant Marine Bulletin Series, No. 17 p.105.

[41] Poggie and Gersuny, p.106

Although Narragansett Bay is a well-studied fishery and Galilee is a well-studied port, there is a notable absence of sociological information to contribute to our predictions on the future of Rhode Island fishers in the coming years. Other fisheries such as Maine and New Bedford are well documented in terms of the characteristics of the fishery, the nature of kinship and the inter-industry management of the resource. Extensive long-term research of these other fisheries has contributed several in-depth portraits of the communities in these regions.[42]

Aquaculturist/capture fisher conflicts have been studied all over the world[43] and these data demonstrate that displacement can result in serious conflict if there is no opportunity for the fishers to become involved in aquaculture.[44] In recent years the worst case scenarios in Latin America and Mexico have secured the world's attention and propelled many negative images and examples of aquaculture into the public eye. This has contributed to the negative public perception of aquaculture in places such as Rhode Island.

For my study I chose Southern Rhode Island because it is home to the uniquely successful fishing port of Galilee. However, since Galilee has a very large offshore[45] fleet, I included other locations that have a large portion of in-shore fishers. Taking into account potential discrepancies in attitude based on whether people fish inshore or off shore, I chose to interview only people who fished inshore or both in shore and offshore. The first reason for this is that in-shore fishers face competition or perceived competition from mariculture in terms of space. Although the prospects are currently being researched, offshore mariculture operations are not very popular yet and thus pose no immediate threat to the space or navigation of offshore fishers. Another reason why I chose to target in-shore fishers is that the product being grown by all of the on-going and proposed mariculture projects in Rhode Island is shellfish. Most of the offshore boats target finfish, crustaceans and squid, with only a few boats harvesting ocean quahogs.

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[42] McCay and Acheson, Bettencourt, and Chesapeake Bay study

[43] Pollnac, R.B. Sociocultural Aspects of Use Conflict in Aquaculture Plenary Review presented at World Aquaculture 90: 21st Meeting of the World Aquaculture Society and the 7th Meeting of the Aquaculture Association of Canada, June 10-17, 1990. Owen, 1981, Kamara et al, 1976; Stevenson, 1990.

[44] Kapetsky, (1981) as cited in Pollnac, 1990.

[45] Offshore is generally considered to be outside of the three mile zone and in-shore is classified as within the three mile zone.

Traditional fishing communities historically have been characterized by a strong degree of kinship.[46] Fishing grounds are very territorial and the members of the community respect each other's area. Traditionally fishers have tended to live in the same communities or neighborhoods. However, there are not many places in Rhode Island where this sort of traditional fishers-only neighborhood or community still exists. There have been no recent demographic studies or analyses conducted regarding community relationships but several of the fishers in my study described their neighborhoods as made up of mixed professions. It is not even clear how many fishers are second or third generation or if there are multiple fishers within families. This was another question to be pursued.[47]

Interviewing Stakeholders

In order to determine whom the relevant stakeholders and policy makers in the State of Rhode Island are, I began with a search of the *Providence Journal* from January 1995 through January 1997 that produced more than 300 articles on aquaculture. Many of the articles were authored by stakeholders or presented partisan views contributing to the confusion that continues to surround the aquaculture debate. Several identified the commercial fishing industry as one of the primary barriers to developing this industry in Rhode Island waters. From this initial research it became clear that there are many problematic issues (political, legal, environmental and social) concerning this question.

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[46] McCay, Bonnie and James M. Acheson, eds. (1987) The Question of the Commons. Arizona: The University of Tucson

[47] I had hoped that this kind of data could be achieved by a survey. In 1993 University of Rhode Island Professor Bill Gordon had conducted a survey to determine inshore fishing effort in Narragansett Bay. Because of the nature of this survey, the DEM was reluctant to give out the names and addresses of license

After identifying individuals who are involved in aquaculture, I created a priority list of stakeholders. Ultimately my research included interviews with forty policy makers, stakeholders and scientists to determine what those individuals involved perceived as the barriers to developing an aquaculture sector.

When I began interviewing in March of 1996, there were eight private marine-based aquaculture projects and one private land based one.[48] Because of the particularly sensitive nature of marine based aquaculture in terms of environmental and social impacts, I chose to focus my study on marine based as opposed to land based ventures. The foundation of my questioning became, *What are the barriers to marine-based aquaculture in Rhode Island as perceived by my respondents?* This proved to be an interesting inquiry for a number of reasons. As I will discuss in the Findings section, participants' responses were strongly linked to their professional affiliation. Regulators were loathe to identify one barrier over another, whereas industry members and scientists, two groups whose livelihoods are directly related to aquaculture and fisheries management, were more candid with their own perceptions of what the barriers were. One constant was that, with the exception of one person, all 24 interviewees in the first group said that they believed user conflict is a significant factor. Thus, I was supported in my overarching question's real-world centrality

Analysis of these interviews combined with my literature review identified the relevant user groups as the following:

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holders. The survey was 7 pages, far too long, and the return rate was very small. Based on the limitation of the Gordon survey data and other practical constraints I decided against any large-scale survey.

[48] Naturally, this figure does not include the four State owned hatcheries.

- coastal property owners
- recreational fishers
- commercial fishers
- recreational boaters
- environmentalists
- conservation commissions

As will be discussed in my Findings section, these user groups all take issue with different facets of aquaculture. I chose to focus on commercial fishers as I believed that this group could be the most heavily impacted, socially and economically, since aquaculture could have direct and indirect impacts on their livelihood, culture or way of life. As explained in Chapter One, aquaculture is lauded as a potential means for food production and relieving stress from the wild stocks. However, some people maintain that if an active sector is developed in Rhode Island, both land based and marine based systems could pose potential competition to the capture fishers. While the local newspapers identified commercial fishers as a source of opposition to aquaculture, there were still many questions left unanswered. Was there really this strong opposition on the part of fishers and, if so, what were its origins? Are *all* fishers opposed to aquaculture? Are there any fishers who were interested or had taken steps to pursue aquaculture? Thus I decided to narrow the scope of my question and ask: Is there any socio-cultural opposition to mariculture on the part of commercial fishers in Rhode Island?

In-shore fishers tend to be small-scale operators, usually individuals working alone.[49] It is the small-scale fisher that is in danger of being eliminated, not necessarily by aquaculture but by potential cutbacks and loss of subsidies in the capture fishery. As Peter Weber of the Worldwatch Institute reports on the global picture, "Reducing the large-scale fishing industry by half would eliminate some 100,000 jobs. Reducing the medium scale fishing industry would eliminate 500,000 jobs. Reducing the small-scale fishing industry by half would eliminate 7 to

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[49] This observation was made from participant observations and general knowledge of the Rhode Island industry.

10 million jobs."[50] This forecast further indicates that it is also the small-scale individual fisher who is most threatened with the decline of fish stocks and therefore someone who could benefit significantly from making a transition to aquaculture. With the development of small-scale aquaculture leases, fishers could make a partial transition to aquaculture.

DEM licensing records reveal that the majority of current license holders reside in Southern Rhode Island. I chose my participant observation and interview sites in order to have access to individual in-shore fishers. This plan was based on information gained through informal interviews with DEM Fish and Wildlife employees, local residents and local fishers. Many fishers, particularly shellfishers keep their boats at their homes and use a boat trailer to bring the boat to the launching ramp. Colt State Park and Barrington have public launching ramps and were chosen to access this kind of fisher. The other sites were all selected for their size and location. With the exception of two interviews in Barrington and participant observation in Mt. Hope Bay all sites were selected for their location in the West Bay.

In 1996, the State of Rhode Island issued 4,167 commercial fishing licenses. However, since there is no requirement for an individual to state whether they are a full-time, part-time or recreational participant in the fishery, accurate figures are difficult to estimate. In August 1997, DEM mailed a survey to all commercial license holders to try to access this information. The purpose of the survey was to provide the DEM with a better characterization of the participants in the fishery in order to have some statistically significant demographic information to assist them in making their decision about whether to lift or to extend the current moratorium. Some questions on the survey provided DEM with accurate data. However, the responses to the question of "full-time" versus "part time" turned out to be highly problematic since many people in the industry have differing opinions of what such terms mean. Some individuals who do not own their own vessels, fish when there is the opportunity and pursue land-based occupations at other times, and for this sector of the population, their occupation depends more or less on chance.

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[50] Weber, Peter Worldwatch Paper No. 20. Net Loss: Fish, Jobs and the Marine Environment.

User Conflict

There is a body of literature that identifies the socio-cultural barriers to aquaculture worldwide based on a variety of case studies. This conflict is an emerging issue in the US and although university researchers are beginning to tackle the problem, research on other countries tends to make up the body of published papers on user conflict between aquaculture and capture fisheries. An economics study at Chittagong University in Bangladesh maintains that shrimp farming often displaces more jobs than it creates.[51] Research indicates that cultivating a 100-acre parcel of land with rice requires 50 workers, while the same area calls only for five workers on a shrimp farm.[52] In Satkhira, a coastal region of Bangladesh, more than 40% of the 300,000 local inhabitants moved to the already overcrowded cities to find work due to jobs and land lost to shrimp farming.[53]

Indian environmental activist, Vandana Shiva, argues that India's experience only proves that shrimp farming does not make economic sense in India.[54] Estimates of the total export revenue generated by shrimp in Tamil Nadu were calculated at $868 million, but this figure was dwarfed by the $1.38 billion annual loss accrued in traditional livelihoods, fishing and farming.[55] Furthermore, the $868 million dollar revenue went to only a small group of investors, none of them local people. "To barter away precious ecological resources for the benefit of a few unscrupulous, anti-national and heavily subsidized prawn farmers" says Ms. Shiva, "is suicidal."[56]

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[51] ibid.

[52] ibid.

[53] ibid.

[54] ibid.

The literature provides numerous examples which identify the negative socio-economic impacts of aquaculture and fisheries management on fishers in developing countries. Rhode Island does not have the option of shrimp farming so some would argue that these disasters are not of concern here. I contend that Rhode Island can still learn from the mistakes of mariculture operations in other countries. Furthermore, in the interest of protecting the viability of Narragansett Bay, measures should be taken to ensure a sustainable and equitable mariculture sector.

Aquaculture is one means by which the US National Marine Fisheries Service attempts to address the biological and socio-cultural problems of declining fish stocks. NMFS also maintains that they are committed to conservation and to the development of sustainable fish populations. While on the surface advocating both measures sounds fair to the capture fishery and to aquaculture alike, how to simultaneously promote the two remains a looming question.

Can Private Property Save the Fishery?

Fisheries have been traditionally unregulated, unlimited entry entities. Most fisheries suffer from what is referred to as "common property resource exploitation". In 1954, Scott

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[55] ibid.

[56] ibid.

Gordon wrote an article called, "The Economic Theory of a Common Property Resource: The Fishery". In it he stated:

> Fishery resources are unusual in the fact of their common property nature where natural resources are owned in common and exploited under conditions of individualistic competition.[57]

The situation of a fishery is a classic example of the prisoner's dilemma[58]. That is, if an individual limits her harvesting based on a concern for the limited resource, there is nothing to ensure that another fisher will not harvest the extra product not harvested by the first fisher. The present fisheries management system in the US does not encourage conservation. Furthermore, consumer demand for seafood exacerbates the situation. Fishers need to spend more days at sea in order to satisfy their personal quotas. Small fishers have essentially been forced both by regulations from the government and by pressure from big factory trawler competition to overfish the resource. Regulation, and individual behavior can not be relied on top protect the resource. Given the downward trends do we want to turn to aquaculture for preventative measures or do we want to look to aquaculture to keep pace with the increasing consumer demand? In either case understanding user conflict is important.

Chapter 3
Methodology

To a person uninstructed in natural history, his country or sea-side stroll is a walk through a gallery filled with wonderful works of art, nine-tenths of which have their faces turned to the wall. Thomas Huxley

Through a combination of qualitative research methods including participant observation, in-depth interviews, intercept interviews and surveys, I explored my central question: Are there socio-cultural barriers to the development of the marine-based aquaculture sector in Rhode Island? I concentrated my efforts on exploring the perceptions of commercial fishers as well as public perceptions of the role of fishers in the mariculture debate.

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[57] H. Scott Gordon (1954). "The Economic Theory of Common Property Resource: The Fishery", *Journal of Political Economy,* Vol. 62, p. 124.

[58] This is a model in economic game theory. This game produces a "non-cooperative" solution, namely, that two rationally motivated individuals will act in their own self-interest but to their own ultimate disadvantage." McCay, Bonnie and James M. Acheson, eds. (1987) The Question of the Commons. Arizona: the University of Tucson. Peters, Pauline E. The Grazing Lands of Botswana and the Commons

The participants in this study were chosen based on their expertise with aquaculture and involvement with the debate in Rhode Island. Some scientists and policy makers from states other than Rhode Island were also interviewed. All of the permitted aquaculturists in Rhode Island were contacted and six consented to interviews. Thirty-five fishers were also interviewed. The following table (Table 2) gives the numbers and professions of the participants.

Occupation	**Number**
Scientists	12
Private Citizens (URI class)	15
Policy makers	8
Fishers	30
Aquaculturists	6

In his ethnography on Japan, Brian McVeigh articulates the focus of social research: the qualitative rather than the quantitative, the meaningful rather than the simply measurable, and the local rather than the national.[59] As cognitive theory dictates, the only way we can truly understand the social dynamics of a situation is by talking to the participants in the dynamic and by becoming participants at some level in this dynamic. Qualitative researchers Lofland and Lofland support this assertion.

> Qualitative field study differs from other research methods in that it features researchers themselves as observers and participants in the lives of the people being studied. The researcher strives to be a participant in and a witness to the lives of others.[60]

Debate.

[59] Brian McVeigh (1997) Learning to be Ladylike. New York: Routledge Press, p. ix.

Prior to designing any comprehensive methodology or even choosing a question to pursue, I engaged in the three steps for preparation of fieldwork as directed by Werner and Schoepfle:

1. readings from ethnographic literature
2. developing familiarity with the field language
3. extensive literature search

The importance of this in-depth preparation is to alter the ethnographer's ethnocentric mindset and thus allow for greater objectivity.

In attempting to identify socio-cultural barriers to the development of mariculture in Rhode Island, I interviewed or surveyed close to 100 people, primarily in Southern Rhode Island. Aquaculture is a very salient political issue in the state and several clearly defined user groups emerged from the debate. All of the respondents are familiar with the concept of aquaculture and most of them had some level of involvement in the support or opposition of developing this sector in Rhode Island.

Gaining Access to Fishers

Anyone who has ever attempted to do any qualitative or quantitative research in a fishery knows that fishers are a very difficult population to access and interact with. Designing a methodology was challenging because of the diversity of the Rhode Island fishery. Accessing fishers turned out to be even more problematic than I had originally anticipated. Research interviews were often conducted opportunistically and only after long periods of time spent in the field. From May 1997 through November 1997 I was employed as a research assistant at DEM, Division of Fish and Wildlife, Coastal Fisheries Lab in Jerusalem. As a result of exposure to both

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[60] John Lofland and Lyn Lofland. (1995) Analyzing Social Settings: A Guide to Qualitative Observation and Analysis, Wadsworth Publishing Company, p. 3.

administrative and research functions of the office, I was able to develop a better understanding of the culture and management structure of the fishing industry.

Site Selection

As stated in my Rationale section, Southern Rhode Island is the base for many of commercial fishers in the State. In addition it is the home of Pt. Judith, one of the largest fishing ports on the East Coast. Partly based on proximity to the DEM coastal lab, my research was conducted in Jerusalem, Pt. Judith, Wickford and Colt State Park. Participant observation was also conducted in other areas such as Barrington and Mt. Hope Bay, places further north and close to fieldwork sites to which my job responsibilities brought me.

Researchers often forget when they leave the field that their presence has had an impact on the population that they studied. Ethnographers must always adhere to a professional code of ethics and take care not to exploit an individual's confidence and instead wait for an opportunity to elicit data. Throughout this project, I was always concerned with the fact that I was interviewing people about their livelihoods and that given the precarious state of the fishery, the topic was sensitive. Many times I heard from fishers how they felt misrepresented by academics and reporters and that they had grown hesitant to talk to people. I could argue that perhaps my strict interpretation of an ethnography code of conduct prevented me from aggressively collecting more data. However, I felt then as I do now that in this traditional, male dominated arena, I had to proceed carefully and anticipate reactions to my presence in order to be able be accepted and allowed access.

Participant Observation

Participant observation, the process of systematically attempting to understand individuals based on direct observation while trying to fit into a daily role in the culture under study,[61] is an integral part of ethnography. Lofland and Lofland describe the aim of this technique:

> The process in which an investigator establishes and sustains a many sided and relatively long-term relationship with a human association in its natural setting for the purpose of developing a scientific understanding of that association.[62]

I was a participant observer mostly in the early mornings (6AM) and sometimes in the late afternoons (5 PM), when the fishers were bringing in their catch. The following table is a summary of my participant observation log.

Table 3

Location	Period	Dates	Time
Colt State Park	3 days	July 1997	5:30-14:00
Bissel Cove	2 days	July 1997	9:30-15:00
Barrington River	6 days	May-June 1997	9:00-15:00
Providence River	4 days	May-June 1997	9:00-15:00
Mt. Hope Bay	1 day	July 1997	10:00-14:00
Narragansett	3 evenings	May, July, November 1997	19:00-22:00
East Greenwich	5 days	June, August 1997	9:00-15:00
Wickford	2 days	August 1997	6:00-12:00
Pt Judith	3 days	July, August 1997	17:00-19:00 7:00-10:00
Jerusalem	100 days	May - November 1997	8:30-16:00

For the first two months of my research assistantship at DEM, I conducted fieldwork in a variety of locations in Rhode Island. I would usually arrive at the site one to two hours earlier than my research group so that I could conduct participant observation of fishers at work. My intent was to determine how open people were to being approached in order to conduct intercept interviews during future visits. I would usually bring a thermos of coffee and sit and read or take notes and observe people who were getting ready to go out on the water. If I was conducting fieldwork for my job, I would be in a boat on the water or on shore working and tried to observe what I could. I was always more comfortable in my role of participant observer when I was working.

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[61] Oswald Werner and G. Mark Schoepfle (1987) Systematic Fieldwork Vol. 1. Foundations of Ethnography and Interviewing. California: Sage publications.

[62] Lofland and Lofland, p.18.

During participant observation of shellfishers, I would look for visible characteristics of the fisher: his[63] age, the time he began or ended, the number of hours he worked and the condition of his boat and car[64] (the latter being potential proxies for financial status). When observing shellfishers near shore, I looked for the number of boats, the space between them and whether they had any kind of verbal or non-verbal contact with each other while on the water. When I went to the docks, I tried to discern from conversation what kind of relationships these individuals might have with each other. This was done by attending to the level of familiarity, tone of voice, demeanor and topical references in these conversations.

Participant observation was also conducted at a series of public hearings. Attendance at these meetings gave me the opportunity to hear public officials, scientists, commercial and recreational fishers and other stakeholders. Table 4 lists the meetings I attended. These would run from two hours to all day, as in the case of the Aquaculture Conference.

Table 4

Meetings I Attended from May through November 1997.

Meetings Attended	*Date*
Rhode Island Marine Fisheries Council	May, 1997 July, 1997 September, 1997
Quahaug Sub-Committee Meeting	June, 1997
CRMC/Fishers Dredging Meeting	June, 1997
CRMC Public Hearing	November, 1997
Rhode Island Aquaculture Conference	June, 1996 October, 1997

Focus Groups with Fishers

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[63] All shellfishers interviewed and observed were male.

[64] At the Second Annual Rhode Island Aquaculture Conference (October 1997) two of the out of state participants used the number of new pick-up trucks purchased in a year as an indicator of economic success of fishers and fishers turned aquaculturists.

When I first began designing the methodology, I had hoped to conduct age specific focus groups to determine if there was any correlation between age and perceptions of mariculture. I had also intended to conduct a focus group of family relation fishers to determine if there could be any intergenerational basis for opposition to mariculture. The Fishermen's Resource Center in Galilee offered me their facilities and help with recruiting members. However, after one month of attempts I came up with only four willing participants. Two of these volunteers were recent entries into the fishery and what some would classify as "opportunists". One young man told me that he thought being a fisher was a good way to make a lot of money. He also did not possess any knowledge about the state of the fishery or any relevant information about the industry, which all of the other respondents in my research seem to consider common knowledge. A third volunteer was the head of one of the fishermen's organizations, a very vocal constituent and eventually a participant in my in-depth interviews. I did not have a representative group of fishers and the focus group idea was abandoned.

In Depth Interviews

During May and June (1997) the first two of six months of participant observation, I began conducting in-depth interviews with fishers and aquaculturists. These in-depth interviews were all with people whom I had met once or had been referred to by one of the participants in my preliminary interviews. All but two of ten respondents were male, full-time participants in the fishery and owned their own boats. In addition, they were each very actively involved in the industry and belonged to fishermen's organizations.[65] These interviews were conducted early on in the fieldwork process and I was able to document some of these individuals' changes in attitude and perceptions over time after I met many of them again at industry committee meetings or public hearings.

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[65] One fisher was a part-timer and another individual does not belong to a fishers' organization.

Of the eight permitted aquaculturists, I was able to obtain six separate interviews. I sent each individual a letter informing them of my research and asking them to contact me if they would be willing to participate. This method of contact was uniformly appreciated. Three of the seven people offered me the chance to visit their operation to see the site, the gear and the process they had developed. These interviews will be discussed in the next section, but it is important to note that all of these people were extremely generous with their time in the way of explaining their operations as well as the history of their experience with aquaculture and the permitting process.

Intercept Interviews- Fishers

The intercept approach was my most successful method of data collection. The interview survey used semi-formal, short and concise. I approached fishers after they came in from the day's work, had sold their catch and were cleaning their boats or socializing on the dock. I conducted 30 intercept interviews which lasted between 4-30 minutes each.

Classroom Survey

The East Bay Campus of the University of Rhode Island offers a short course every summer for people who are considering applying for an aquaculture permit or who want to know more about aquaculture. The course instructor granted me time to conduct a brief written survey with the June 1997 class (15 students). The document was a two-page survey on the public perceptions of aquaculture and barriers to aquaculture (land based and mariculture). Fourteen of the fifteen administered surveys were usable.

The methodology for this study utilized a variety of social research techniques. All of the in-depth interviews with policymakers, scientists, fishers and aquaculturists were taped and analyzed from a verbatim transcription. I took notes during and immediately after the intercept interviews. Interviews with two aquaculturists and one fisher were conducted over the telephone. The data from each has been coded using a combination of thematic coding and iterative review to determined the veracity of the themes. The results of the coding were then compared across subgroups and additionally triangulated with the data from the literature review conducted at the onset of this study. In the following chapter I will present my findings from the research methods described above.

Chapter 4
Findings

Findings based on my qualitative research and assembled stakeholder comments are summarized in this section. This study supported the hypothesis that there *are* socio-cultural barriers to the development of marine based aquaculture in Rhode Island. This is perhaps, not a surprise to most people who have some knowledge or experience with the debate. What is striking and new is the nature of these socio-cultural barriers. The barriers transcend traditional variables of age, ethnicity and education, in that they are more complex and can be traced back to ideological differences in what was once considered to be a very homogeneous group - fishers. In this chapter, I present my findings and detail the salient themes that emerged from this study. Where there was remarkable consistency in stakeholder comments and when findings corresponded to the literature review, conclusions and recommendations have been made. My data revealed the following themes.

- How Salient is the Issue of Aquaculture?
- Disparate views within the fishing community
- Privatization of the commons
- The semantic difference
- The cultural “myth” of common property
- Availability of space - Fear of displacement
- Strong connection between opinion and position
- Economic Impact
- Environmental Impacts
- Problems with the Regulatory Process
- Perceptions of the effects of marine based aquaculture on the environment
- Conditional development and Mistrust of the Legislature
- Is there room for compromise?

(1) How Salient is the Issue of Aquaculture?

"Aquaculture" is still not a term used in mainstream America. However, all of the respondents in this study, who are involved directly or indirectly in the fishing industry, recognized the term "aquaculture", as demonstrated by their immediate responses to my first question, *What do you think about aquaculture in Rhode Island*? Most people appeared to feel confident that they knew enough about the subject to have formulated an opinion. Some people were more passionate about the subject than others, sometimes because they are more direct stakeholders in the issue. There was almost no ambivalence with regard to the subject, although there were people who applied conditions to their support of the sector. When asked where they received their information, most people (non-scientists) responded: newspapers, magazines, public meetings, colleagues, and friends.

(2) Disparate Views within the Fishing Community

Contrary to earlier assumptions that fishers are a homogeneous population, I found that there is not a singular mindset among the participants in the fishery regarding aquaculture. In 1988, marine anthropologist R. Pollnac wrote, "There are numerous characteristics intrinsic to the occupation that influence socio-cultural characteristics of both the workers and their communities."[66] I would argue that this statement is too global and perhaps does not hold up as well today. The Rhode Island fishery is changed and is also seeing a shift in the traditional profile of a fisher and that some of these assumptions based on historical accounts of fishers are simply, no longer true.[67]

As discussed earlier, the Rhode Island fisher community is considered to be well-educated as far as fishing communities are concerned and includes several members who see the potential for making a transition to aquaculture, whether it be a small-scale partial transition or a larger shift. More than half of my respondents had completed college or taken some college courses and all of the respondents are high school graduates. We can safely assume then that the education level for the average fisher has increased.[68] Nationwide many fishing families are now encouraging their children to continue their education after high school and then enter the fishery if they still want to. Fishing also offers the opportunity of a part time occupation that many teachers, firemen and other professionals pursue when weather permits.

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[66] Pollnac, RR. (1988) *Social and Cultural Characteristics of Fishing Peoples*. Marine Behavioral Psychology, Vol. 14, pp.23-29.

Standard demographic characteristics were not revealing in my analysis of socio-cultural variables. I would argue that, based on the limited but varied population in my study, there is no direct correlation between level of education and opposition to aquaculture. Fishers who have completed college and oppose aquaculture feel just as strongly as those who have not completed college. Conversely, the same is true for those who support aquaculture. Three of the six aquaculturists who were interviewed for this study are fishers who have not completed college but were positive about the opportunity to supplement their income through aquaculture.

In this study, age was not a significant variable in attitudes and perceptions towards aquaculture. I hypothesized that men approaching middle age might be the most firmly opposed group since mid life career changes are often the most difficult. However, my interviews revealed that there were many men of this mid-life category who were considering shifting into mariculture.

Ethnicity was not a predictor or distinguishing characteristic in that the Rhode Island fishery is overwhelmingly comprised of white males. The following table, which is the most recent information generated from the 1990 US Census identifies the ethnicity of those Rhode

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[67] My study is not a profile of Rhode Island fishers. However, I have compared the data collected for my research and the current literature with studies from the 1970s. This comparison provides validity to my hypotheses.

[68] This assumption is based on a qualitative comparison with the Poggie and Gersuny study in 1974.

Islanders who classified themselves as full-time participants in the fishery.[69] In my study, all of the respondents except one female were white males.

Table 5

County	Total	White males	Non-white males	White females	Non-white females
Washington	612	559	7	46	0
Newport	333	302	31	0	0
Bristol	125	125	0	0	0
Providence	92	78	7	7	0
Kent	281	257	8	16	0

To highlight the non-homogeneity of the fishers regarding aquaculture I present the following encounter with two fishers. In August of 1997, I went to a small fishing port in Wickford, Rhode Island and conducted intercept interviews. One of these interviews was with a man in his mid- forties who approached me. He had at first looked to me more like a weekend sailor than a Rhode Island fisher. This man, in fact, turned out to be a Rhode Island native and a diver who harvests quahaugs. When I asked him if he had ever considered applying for an aquaculture permit, he replied that he is thinking about it but to him it represents a “varied, complex issue.” He said that he has mixed feelings about mariculture since he supports the right to the free and common fishery. He also suggested that he had thought about a rotating lease system that would be run similar to a cooperative where one whole group of people work a plot of land for certain period of time. Under this arrangement, they would all benefit from the venture under a principle of equal ownership, equal work and equal profit sharing. He also feels that those people with more seniority in the fishery should be given priority

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[69] 1990 US Census http:sasquatch.kerr.orst.edu/cgi-bin/eeo-list?filenam=07-009

Soon after this interview I interviewed a very reticent older man who said he has been fishing for over forty years. He appeared more suspicious than the rest of the respondents when I approached him. This individual said he has never considered applying for his own aquaculture lease but he had watched a documentary about land based aquaculture in England where they pumped ocean water into the system. He said this sounded like an innovative approach. When I asked him about mariculture he replied with a vehement "No!" and explained: "because it would take up a vast track of space." Upon further probing, he added that perhaps if mariculture were done someplace where it would not interfere with fishing grounds, then it would be acceptable. This man echoed the sentiments of several other participants who find mariculture objectionable because of the potential for reduction in available fishing grounds.

These two individuals demonstrate a central finding: that this is a population which holds disparate and varied *ideological* views on the management of the fishery and the presence of mariculture in Rhode Island.

(3) Privatization of the Commons

Improvement of any area originally exploited as an open access or common property resource results in conflict when it is perceived as interfering with fishermen and others who normally exploit the region. *R. Pollnac*[70]

Privatizing the commons is a theme that emerged on both sides of the aquaculture issue in my study. Almost all of the participants in this investigation agreed that the development of this sector needs to be both controlled and limited. The intense debate is not new for Rhode Island. As discussed in Chapter Two, the State had this form of managed fishery as far back as the turn of the century. None of the respondents in any of my interview subgroups stated that they favored extensive development of mariculture, although some had been quoted in the Providence Journal as supporting a shift in current fisheries management.

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[70] Pollnac, 1982, 1990.

It is difficult for people to understand how fishing grounds that have been always accessible and available as a source of livelihood to them and to their families are now threatened by privatization. There are others who see the potential for positive benefits of aquaculture as well as the opportunity it provides. Yet these people still do not believe that Rhode Island has the capacity for large-scale mariculture. One of the current aquaculturists emphasized to me many times in our interview that aquaculture is "site specific." "There are only so many places it can work in Rhode Island. You cannot do this just anywhere," he said. While some fishers objected to mariculture on the basis of losing fishing grounds and while proponents of mariculture have not sought to define the spatial goals of the sector, this aquaculturist's point was very poignant. Of the six aquaculturists interviewed, two make their living as fishers; one is a former full-timer, now part-time; and the others come from various other backgrounds. These individuals have experience in the industry and have made significant efforts to educate the public about aquaculture.

Many fishers were extremely wary of a perceived decrease in available fishing grounds. As one fisher firmly opposed to mariculture stated:

> The biggest barrier to me is that it's privatization of public land. Control of the resources - shift of harvest, shift of benefit away from the public to the private.

Feelings of connection to the water and theories of ownership of the resource were more likely to be felt by people who actively utilize the Bay, fishers and non-fishers alike. These factors often underlie feelings of opposition to mariculture.

A large group of people also suggested making the opportunity available to experienced fishers who already have made the investment in both gear and experience. Fears of privatization mirror the widespread concern among members of the fishing and coastal communities over the development of extensive aquaculture and gradual elimination of the capture fisheries.

(4) The semantic difference: perceptions of the definition of aquaculture

While people recognize the term “aquaculture,” there are conflicting opinions as to what aquaculture actually means. In one interview a state regulator explained about a grant that would fund “public resource enhancement.” In an interview with an active member of one of the fishers’ organizations, the respondent told me that his group was in favor of “public benefit aquaculture.” For a lot of people, particularly shellfishers, aquaculture is equated with the transplant process, and as several others - both fishers and non-fishers - have asked, “Why should the State be funding transplant operations to subsidize shellfishers - particularly when the areas that the polluted product comes from are spawner sanctuaries?”

While some people equate aquaculture with ‘transplanting,’ still others equate it with growing.’ Aquaculturists generally have the view that they are planting seed and raising it to market size, as in farming. Then there are the varying definitions of "public benefit aquaculture,” wherein some view aquaculture again as transplanting polluted product and others view it as seeding areas to encourage natural setting.

(5) The Cultural "Myth" of Common Property: Understanding the Law

One of the most intriguing findings in my study was with people who are opposed to mariculture; they have the perception that while land may be privately owned, water is a common property resource. Many fishers and other participants stated that the Rhode Island Constitution protects their rights to a free and common fishery. Article I, Section 17 states:

Section 17. Fishery rights -- Shore privileges -- Preservation of natural resources. -- The people shall continue to enjoy and freely exercise all the rights of fishery, and the privileges of the shore, to which they have been heretofore entitled under the charter and usage’s of this state, including but not limited to fishing from the shore, the gathering of seaweed, leaving the shore to swim in the sea and passage along the shore; and they shall be secure in their rights to the use and enjoyment of the natural resources of the state with due regard for the preservation of their values; and it shall be the duty of the general assembly to provide for the conservation of the air, land, water, plant, animal, mineral and other natural resources of the state, and to adopt all means necessary and proper by law to protect the natural environment of the people of the state by providing adequate resource planning for the control and regulation of the use of the natural resources of the state and for the preservation, regeneration and restoration of the natural environment of the state.[71]

As one participant, a non-fisher, remarked,

> "The government of Rhode Island has underlying problems besides its political mentality and that is- we still validate in our Constitution the Charter of Charles II. The charter granted all the power to the General Assembly."

While the Charter of Charles II guaranteed the people the right to the free and common fishery, it also left interpretation of the laws to the General Assembly. Fishers' knowledge of the State Constitution and the fact that they were citing the legal origins of their rights were important findings. The debate over aquaculture has become a very powerful and ubiquitous issue in Rhode Island and it is possible that in attempts to be more educated on the subject, interest groups are promoting and disseminating this information. Currently the General Assembly's interest in promoting aquaculture is the guiding force behind its momentum and as I will discuss later, this concentration of power is problematic for many people.

However, the very same individuals who cited the Constitution did not know or did not choose to identify the rights of the State under the Public Trust Doctrine. This law gives states the power to lease out public lands to private individuals, provided that such is in the interest if the common good - i.e. it develops the employment sector. This "interest" is a penumbra. Fishers who oppose mariculture maintain that they are the ones doing society a service by harvesting seafood that is otherwise inaccessible to the general public. Moreover, these individuals object to the idea of one individual or a group of individuals benefiting from the public resource. As one person said, “I have the right to fish wherever I want. The fish that is there doesn’t belong to any one person.”

(6) Availability of space for marine based aquaculture

I found that there are differing perceptions regarding the amount of space that is available for mariculture in Rhode Island. When respondents were asked about mariculture in Rhode Island waters, or in some cases after they had said they were not in favor of mariculture, many respondents qualified their responses by saying that Rhode Island “does not have the space for mariculture”. Proponents always preface their argument with the fact that Rhode Island has 417 miles of coastline. When I asked one respondent what he thought about mariculture in Narragansett Bay, he looked at me incredulously and asked, *“Have you ever seen Narragansett Bay around the Fourth of July?”* When I asked him what he meant by that question, he explained to me that there are already too many users and that the ocean floor is literally “paved and cluttered with lobster gear.”

An interview with a legislator revealed similar feelings. This respondent explained that she has seen all of the presentations about the perceived benefits of mariculture but “Rhode Island does not have the vast undeveloped coastline like Maine does.” Furthermore, she felt it was not fair for the coastal property owners who paid high property taxes to be subjected to the noise and the visual obstruction that an aquaculture operations brings.

A former policy maker, who has since left the state, identified his view on the future of aquaculture:

> There are a certainly areas, particularly in the upper east passage that are generally very well used by the shellfishing industry; there’s no question about it. We would not want to see aquaculture posed in those areas unless it was public benefit aquaculture. Then for purposes of restoration or resource enhancement,

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[71] Rhode Island State Constitution: Article 1, Section 17.

> there's a lot of interesting concepts out there and probably one of the most interesting has been to look at it from a technological bend and trying to see how to best mass produce shellfish, particularly quahaugs, as a business.

(7) Strong connection between opinion and position

Where people fish and what they fish for are tied to their attitudes about aquaculture. Not surprisingly, I found that those who are directly competing with mariculture for space and product market are more likely to oppose it.

In identifying commercial fishers' perceptions about mariculture, the semantic difference between "land based aquaculture" and "marine based aquaculture" is very important. For example, the first question I asked in intercept interviews was: *What do you think about aquaculture in Rhode Island? Do you support or oppose it?*

Some participants responded that they were opposed to aquaculture. Then, when I probed to see if they specifically objected to land based or to marine based, the issue changed. The differences in my populations' perceptions of land based and marine based are very salient. Respondents, particularly fishers, had identified their views and, although simply stated, these were clearly premeditated opinions, as evidenced by the immediate responses to my questions. However, whether these were individually thought-out positions or stances encouraged by the fishing association to which they belong, I was unable to ascertain. One participant explained to me that he and his organization are opposed to marine-based, but support land-based aquaculture. Several inshore shellfishers stated that they oppose marine based while several offshore finfish/lobster harvesters said that they do not oppose either kind of aquaculture.

(8) Economic Impact

Support for aquaculture generally is not characteristic of all offshore fishers. I spoke with several apparently successful individuals,[72] and they all stated that they think if the sector

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develops, it threatened to have a negative economic impact on their livelihood. One offshore fisher replied: "I'm against it because it drives down the price of the fish I harvest and bring to market." He did not attempt to offer any other argument about why he opposed alternative production/harvesting strategies should not be allowed or why he thought aquaculture would impact capture fisheries. In this study, opposition to aquaculture was based on several logical arguments; however, the argument of protecting the income of one user group while actually preventing another user group to earn an income was one articulated by many.

One aquaculturist sees the economics quite differently. He explained that aquaculture targets a different market. The aquaculturist is selling a "brand-name, packaged product" directly to restaurants rather than to a shellfish dealer like the fishermen do. When I asked this aquaculturist about the possibility of market saturation in the sector he replied:

> We are so far from market saturation in the oyster market. You have only to look at the fact that the Connecticut industry basically started in 1972 and they were producing 100,000 bushels. They are now producing maybe 50 million dollars a year in just fifteen years, and what has the price done? It's gone up and up and up each year. There is an increasing demand for aquacultured oysters and a reduction in demand or softening in demand for wild harvest product, which has perceptions of night digging and such.

Then when I asked one of the regulators known among aquaculturists and shellfishers for being objective about the debate, he explained that to mitigate any potential economic impacts, the shellfishing industry needs to organize itself to ensure a higher price for their product. They also need to step up public relations campaigns to combat negative images. He stated:

> The shellfish industry needs to invest money. To sustain...thus far they haven't been willing to do that until very recently with this bag tax. At the same time, they also make the argument we spend now $200 a shellfish license and the state is not giving us a return. To a degree they're right and some of that money should go into the fund.

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[72] This is a subjective interpretation based on the appearance of vehicles, boat and any personal information or knowledge I had about this person. See Methods Section for discussion of the rationale for these proxies.

(9) What environmental impacts do participants believe aquaculture will have?

In this study, the environment was not a very salient issue with respect to people's perceptions and attitudes towards the mariculture sector. By 'salient' I mean, the environment was not mentioned early or with much intensity in discussions or surveys. In fact, the possibility of degrading the resource was spontaneously raised in only a single interview, one with a scientist from the University of Rhode Island. This individual is firmly opposed to the idea of marine based aquaculture in Rhode Island waters, arguing that the waters of Narragansett Bay could not support massive inputs into its system. Furthermore, he cited his experience with aquaculture projects abroad in his examples of areas around the world where mariculture has contributed to habitat degradation, nutrient pollution, and serious social impacts.

When the environment was discussed, several participants argued that mariculture actually provides an indicator of water quality as well as a means to contributing to the increased improvement of that water quality. These perceptions came both from participants with scientific as well as nonscientific background. One participant stated that aquaculture offers "ways to conserve and protect the resource." In my interviews with aquaculturists, five of the six respondents spontaneously described the positive contributions their operations now offer and potentially could make to the marine environment, particularly in terms of spawning periods. On several visits to one site, I observed divers and bullrakers working very close to the boundary of the lease, suggesting that over the years the site may have contributed to the natural propagation of the wild harvest in its vicinity.

As I discussed in Chapter Two, both the decline of the fishery and the development of the aquaculture sector have had serious social impacts both locally and globally. To quote Raymond A. Rogers, a former full time fisher who now researches the sustainability and management of fisheries, "Environmental problems are becoming increasingly complex not just because they interact in biophysical terms, but also because they create instability in the larger social context."[73] Respondents overwhelmingly focused on the use of the public resource and the social impacts of aquaculture rather than the ecological impacts. It remains unclear whether this was because people were not aware of the environmental effects or whether they felt that the social impacts were more pressing. Another possibility is that the questions were more directed at the social impacts because of the background questions elicited. Yet, I specifically avoided asking people about their perceptions of aquaculture on the environment, intending instead to see if this issue would be salient enough for the participants to bring up on their own. The audience that I had targeted as my respondents are mostly dependent on fisheries for their livelihoods whether they are fishers, scientists or policymakers. For them, social impacts clearly take precedence over environmental consequences. Ironically, it is the latter which define the sustainability crisis.

(10) Problems with the regulatory process

The most commonly perceived obstacle across the two subgroups of aquaculturists and those interested in aquaculture is the permitting process. The six permitted aquaculturists interviewed in this study stated that they did not view commercial fishers as a barrier to developing the mariculture industry. Indeed, three of the permitted aquaculturists are fishers themselves who have taken up aquaculture to supplement their income. Another one of the two individuals in the process of applying for a permit is also a commercial fisher. In addition, of the fifteen survey participants in the aquaculture class asked to identify three obstacles to commercial fishing from a list of eight choices, only three people checked commercial fishers.

Almost all of the permitted aquaculturists described in detail their frustrations with various agencies in Rhode Island that are responsible for the regulating process. Local government entities and the lack of public knowledge of aquaculture were also cited as obstacles to the development of the sector. One of the aquaculturists described his situation in which the town officials making the decision have no direct first hand knowledge of the field- "although the town itself has been cooperative." This individual continued to explain that despite his having extended many invitations, none of the people responsible for granting his permit had ever actually visited his site.

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[73] Raymond A. Rogers (1995). The Oceans are Emptying: Fish Wars and Sustainability. Montreal: Black Rose Books, p. 2.

Knowledge of the inefficiency of the regulatory process is not confined to present aquaculturists but seems to be a general public perception. As one of the class survey respondents described, "I can understand the need to regulate fish products and leases, but it seems that the state is going out of its way to hinder progress. There are compromise solutions which can benefit all."

While working as a research assistant at DEM, Division of Fish and Wildlife, I questioned the lack of a protocol or methodology for conducting a site assessment. Furthermore, this issue also came up when reviewing an aquaculture proposal at the July 1997 Rhode Island Marine Fisheries Council meeting. One of the board members stated that it was problematic that they, the board members, did not understand what the protocol was - if there even was any - and what they should be looking for.

DEM was not the only agency that I found to have a problematic decision making structure. One aquaculturist described the uncooperative nature of the CRMC. As part of its permit application, CRMC requests drawings of the gear used in the operation. When this person photographed his gear on a white background because he felt he could not convey the necessary information with his own self-described inadequate drawing skills, the photos were returned as unacceptable. While the individual felt that his sketches did not represent his gear nearly as well as the photographs originally submitted, It was these less revealing sketches that were eventually accepted. When he repeated this story to me he was still incredulous about the inanity of this process.

(11) Conditional Development and Mistrust of the Legislature

Among those who oppose privatization of the public resource, there is the distinct concern - almost fear - that control of the fishery will inevitably come to rest in the hands of a few - as so many things do in Rhode Island. In essence, respondents in this study clearly do not trust state officials and decision-makers. Some support mariculture and would even like to get involved, only if it is developed around a system of small conditional leases, less than five acres and made available to the general public. One full- time fisher who is considering applying for a permit articulated the following:

> I think there is room for both (fishing and mariculture). If done right I don't think it should have any impact. The permitting process is too daunting. Leave out the politics at the State house. Funding such as what was done in Florida and Connecticut would get the ball rolling.

Another suggestion was articulated by a participant and echoed by others:

> If you put together a piece of legislation which would not permit people to assemble large blocks of leases, which would not permit them to raise capital by borrowing against the leases, you would end up with individual farmers, literally, who would be utilizing small areas because that's all it takes.

One full-time, in-shore fisher -a man in his early thirties who has been fishing for fourteen years and who is not opposed to aquaculture but supports a conditional development of the sector, said that the state lacks grounds that are not being utilized. He also said that, “We need a Bay-wide management plan and all fisheries need to be consulted. There is no need to bump out the old to bring in the new.”

However, as discussed before, there are people who object to the privatization of the common property resource because they feel that, quite simply, it belongs to everyone. This also is linked to mistrust of government and there is some historical precedent for such a concern. In chapter one, I mentioned the Coggeshall Brothers were arrested in the late 1930s for poaching from the oyster farms and in court they argued that they were not opposed to mariculture but rather that the resource was allotted to benefit only a few individuals - most notably then General Assembly member George Lewis, who owned a significant amount of acreage.

Present-day suspicion concerning the motives of the legislature were voiced by one fisher who said that the formation of the Aquaculture Commission was created only as a last minute rider on a June 1995 Motor Vehicle Bill. For people who have lived in this state for a long period of time, familiarity with its politics seems to preclude any hope for an equitable distribution of leases:

> My problem is that I've been around the state for a long time and when I start seeing certain names being associated with a certain piece of legislation or a certain push...the red flags go up. The end result is creating a class of privileged folk who make an enormous amount of money.

The number of participants who articulated feelings of mistrust for the legislature was overwhelming. A number of people asked me what I had “heard” and did I have any idea what was “going on.” Recently an unconfirmed report has begun circulating that Talmadge Brothers, the company that owns 90% of the leases in Connecticut, has hired representative counsel in Rhode Island. Upon hearing this, many people are worried and wondering who in the decision-making realm has another agenda. The lack of clear parameters for this industry will be discussed later. However, there exists the belief that this push towards privatization of the commons does not appear to have the intent of conservation or preservation of the resource, rather it appears to be an attempt to capitalize on the “untapped potential.”

There are certain entities in the State that seem to support the present power structure. The backing of transplants, despite scientific evidence that suggests that they are not the best method for resource management, and the lack of specific aquaculture expertise in the two state agencies (DEM and CRMC) exacerbates the crisis in the fishery. This last factor reflects back on the General Assembly, which controls the purse strings in this state and whose inquiries into DEM (1996-present) have been counterproductive, lowering morale and still failing to allocate adequate funds for projects. I will pursue this further in the final chapter.

The problems with the power structure are also present in the provincial attitude which governs this state. Coastal property owners and conservationists who oppose aquaculture on the basis of interference with aesthetics rather than engaging in serious dialogue on how to make this a sustainable farming sector are also counterproductive. “Shellfish for U” in Westerly, which uses the simplest gear possible, is a successful enterprise that represents the quaint, rustic image of a small farm in the water. Restrictions on the equipment and inputs such as feed and antibiotics involve areas where citizens concerned about the natural environment could channel their efforts. If mariculture is planned properly then it can actually enhance the environment. The goal should be development without growth. Small-scale aquaculture farms, with minimal gear and smaller boats could potentially place a lot less stress on the environment than the large boats and the lost traps and nets that clutter the bottom of Narragansett Bay.

One fisher who has been fishing in-shore waters for almost thirty years responded furiously to questions about his perception of mariculture. “No one owns the water or the fish in there...I have every right to dig them.” Another individual who said he has been fishing for fifty years told me he remembered the days after the collapse of the industry when fishers could not quahaug on the areas leased for oyster farming, even though these areas were no longer being used for oysters. He stated that he had the “right to the free and common fishery”.

This data raises some interesting questions about what the idea of the commons means and how the notion of common property represents different things to different individuals. This issue will be revisited in my Implications section.

U(12) Is There Room for Compromise?

Several fishers, policy makers and aquaculturists have articulated that there is room to accommodate all user groups, provided that mariculture is conducted in a “sustainable manner.” The emphasis on the buzzword “sustainable manner” is problematic considering the global debate regarding the definitions of sustainability. However, my interviews reveal that no one is sure about the parameters or goals for this industry in Rhode Island and what kinds of guarantees would be provided for sustainability and equity. If these questions could be addressed, some very important issues could be resolved.

In the following section I will discuss some additional interpretations of this study and implications that my research has revealed. Moreover, I will offer some suggestions based on my study activities for conflict resolution of this issue.

Chapter 5
Implications and Recommendations

The time I have spent researching aquaculture in the State of Rhode Island has convinced me that there are tremendous possibilities for this industry here. Aquaculture indeed has the potential to be part of a holistic goal of achieving food security and sustainable fisheries. However, background research, ethnography and interviews with decision-makers and stakeholders has also convinced me that the present trajectory of the industry in Rhode Island is problematic. In Chapter Four, I identified key opinions and perceptions which can be useful for conflict resolution in the mariculture debate in Rhode Island. Moreover, my work has provided a strong foundation upon which to conduct a larger quantitative public perception study. In this chapter I will offer my recommendations for developing a more successful aquaculture industry in the state.

The suggestions I will make grow from the premise that the two largest constraints to aquaculture here in Rhode Island are the socio-cultural barriers for which I have provided extensive evidence of in this paper, and the present regulatory system. My findings revealed twelve themes which can be distilled into three socio-cultural barriers. The majority of these socio-cultural barriers are based on:

(1) fear of displacement,
(2) mistrust of the legislature
(3) a lack of public understanding about mariculture.

Furthermore, in this study I conducted an in-depth exploration of commercial fishers' attitudes towards mariculture and I conclude that socio-cultural barriers cannot be attributed entirely to this group alone. My research has shown that the fishing community is not a homogenous group holding the same ideological beliefs. There are many members who see the opportunities in mariculture both for themselves and for the future of sustainable fisheries. Right now, these individuals are constrained by a regulatory process that is generally perceived as cumbersome, inefficient and confusing. Yet, moves to amend regulations have encountered obstacles because the different user groups feel threatened by the proposed changes and suspicious of those proposing the changes. Perceived threats are also caused by the fact that there has been no discussion on selecting parameters for the industry.

This study showed that the designation of CRMC as lead permitting agency was met with opposition for a variety of reasons. First and foremost, many participants feel that the agency is a legislatively appointed body, and with the fervor of the current legislature promoting aquaculture, conflicts of interest are a serious concern. Furthermore, CRMC does not have the scientific background required, particularly with the departure of a director who held a degree in benthic ecology. The leadership of the agency is now in the hands of an individual with an accounting background. The regulatory authority and experience is not present in the agency either, particularly the absence of authority to carry out the provisions of the Clean Water Act. Internal strife within the office and fear of decisions guided by personal interest already has led to delays in permitting and questions about the competency of the agency.

The recent CRMC hearing (September 1997) demonstrates both the internal strife among decision-makers and the lack of a clear plan. A final draft of aquaculture regulations was released on the day of the meeting and twenty-seven legislators, conservation commissions, public citizens and fishers testified in opposition. Many fishers attended this meeting and articulated one of their main concerns, one of the most important findings in this research; that is, fishers feel that this bill opens up the area for private exploitation:

> We felt that the new language had a detrimental effect: it once again made the public resource available for private exploitation.[74]

While their fears are well-founded, the irony of this situation is that the public resource has been overfished and therefore there is a moratorium on the number of entrants allowed into the fishery thus making the public resource available only to those with the licenses to fish. Ironically the very people who oppose privatizing the sea for fishing are the ones who have exclusive rights to use the resource now. The poor management stems from lack of funding from the state and the constant attack on DEM by the General Assembly. It is my observation and the opinions of many participants in this study that under these conditions, it is difficult for the agency to do the job it has been entrusted to do. In addition, the lack of qualified and experienced people to work on aquaculture in the state bifurcates the process, splitting it among two agencies without the experience or the communication between them to accomplish the task.

Lack of Parameters for the Developing the Aquaculture Sector

In 1996 the FAO released its Code of Conduct for Sustainable Fisheries. The Code was adopted by the Twenty-eighth Session of the FAO on October 31, 1995 and its purpose is identified in the following statement:

> Fisheries, including aquaculture, provide a vital source of food, employment, recreation, trade and economic well being for people throughout the world, both for present and future generations and should therefore be conducted in a responsible manner. This Code sets out principles and international standards of behavior for responsible practices with a view to ensuring the effective conservation, management and development of living aquatic resources, with due respect for the ecosystem and biodiversity.

In Article 9, the Code recommends that aquaculture should be developed and promoted as it is a possible answer to the problems of the decline of the fishery and world food security. It maintains that development should not be encouraged at the expense of local and traditional fishers. Based on my findings, I would argue that, in spite of its size, Rhode Island should abide by the restrictions and suggestions of the international community as put forth by the Code. Part of the pre-condition for mariculture in other states is that it not be permitted on shellfish beds or other productive habitats.

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[74] Providence Journal, September, 1997

Although mariculture and land based systems offer tremendous possibilities to Rhode Island, they should not be developed at the expense of people who currently make their living fishing. Bringing commercial fishing representatives to the table to map out an equitable distribution of resources is a partial solution to determining available grounds but these interest groups should not be allowed to dominate the process. Rhode Island is a provincial state and the commitment to Narragansett Bay and to inshore waters is strong.

Recommendation : In order to develop the holistic approach which I have begun to outline, the present moratorium on commercial fishing licenses should remain in place because as demonstrated in the introduction, there are currently too many boats chasing too few fish. This view was supported by many of the participants in this study. Allowing new entrants into the fishery would only result in increased competition for those already in the fishery. Moreover the biological assessments have demonstrated that there is no species that can support additional pressure.

The fact remains that overfishing, pollution and misuse of technology have created a serious crisis in the fishery. It is important to involve stakeholders and it is essential that the debate be moderated by an independent entity with experience in user conflicts. My research demonstrates the saliency of the issue among stakeholders and points to the need for more dialogue. As evidenced in my findings many participants in the industry and other stakeholders feel excluded from the decision making process. While the state has the power under the Public Trust Doctrine to determine the best use of resources it has been suggested that those with the decision making power are guided by other interests. Among many of the participants in this study, there was a distinct lack of confidence in the General Assembly's ability to manage this issue.

Equitable Distribution in Mariculture

Several people interviewed for this study believe that if the purpose of an expanded mariculture sector in Rhode Island is purely economic development the reality is that extensive development would benefit only a few individuals who are wealthy or well connected enough to secure a lease. At the Second Annual Aquaculture Conference in October 1997, Professor James

Anderson of URI, the chief author of the Strategic Plan, suggested that the lease fees be contingent on the value of Narragansett Bay. Although the value of Narragansett Bay can not be determined, the lease price ideally should reflect its worth, and the system should not exclude individuals who have demonstrated the experience working on the water or the knowledge to conduct mariculture from securing a lease. Interviews triangulated with background research reveal that extensive mariculture would potentially eliminate a large portion of commercial fishers and charter boat/recreational fishers, industries whose direct and indirect links are vital to the economy of Rhode Island.

Recommendation: At this point in time, Rhode Island should continue to develop the mariculture sector by granting leases of less than five acres to fishers who want to diversify, or to individuals who have demonstrated the needed capital and research, as the current aquaculturists in Rhode Island have. This would also speak to fishers concerns about space. The existing small-scale operations have demonstrated no adverse impacts socially, environmentally or economically and should continue to be promoted and developed Shellfish are filter feeders removing nitrogen, phosphate and particulate matter from the water. They are indicators of ecosystem health. Cultivating shellfish requires minimal energy and no inputs into the system since they feed on what is present in the water column. Shellfish mariculture requires very simple gear that in many cases looks like the fishing traps and gear already used by lobster fishers.

I would encourage Rhode Island to develop its land based aquaculture sector for the following reasons. First there are several abandoned shoreline warehouses and buildings around the state that could be converted into land based aquaculture facilities. Funding will come from private industry but the State and the Economic Development Corporation need to cultivate a stable regulatory climate and offer incentives for companies to develop their enterprises in Rhode Island. As with any business, the State needs to step up its planning priorities and assess the growth and employment potential that peripheral aquaculture industries could generate. Currently most of the gear, supplies and machinery are manufactured in Canada. There are openings in several markets and the Economic Development Corporation could encourage firms to re-locate Rhode Island or provide the start up capital to generate this kind of company in-state.

Social and Ecological Concerns

One of the most critical problem areas with regard to these issues is the lack of clearly stated goals for addressing or mitigating potential social and environmental impacts. Furthermore, in the Strategic Plan for Rhode Island Aquaculture (June 1997), the economic potential for the sector is described but how to ensure the ecological and social integrity of Narragansett Bay and its coastal ponds remains unclear. Finally, there is also an absence of dialogue geared towards conflict resolution over the parameters of the industry. One of the findings that I identified was that, for various reasons, almost all my respondents - regulators, aquaculturists, and fishers- expressed a preference for limiting this sector's expansion. This is not to argue that aquaculture is not a viable industry for Rhode Island. However, from what I have seen and heard, I conclude that the state government regulatory bodies at this time do not have the staff nor the expertise to expand the sector in the way that its strategic plan directs.

While overfishing has contributed to a decline in the fishery, making clear the reason why Rhode Island needs to develop the aquaculture sector is important.. Aquaculture should not be implemented solely for direct economic profit but rather as *part of a holistic management plan contributing to restocking certain marine species in situ, expanding the employment sector and relieving some of the urban blight from the abandoned mills and warehouses located around the state which have been suggested as viable areas for land based operations.* The strategic plan suggests zoning Rhode Island waters for aquaculture and the development of a statewide management plan for Rhode Island waters has been advocated by fishers organizations. While the zoning suggestions outlined in the report sound logical and relatively easy to accomplish the level of mistrust that exists among all interested parties in the state is a barrier to the development of the sector.

Recommendation: According to many of my respondents in this project, the industry has not been developed because the State has never allotted the funds for its promotion. One of the most important recommendations that I therefore make is the creation of an *independent aquaculture office*. This aquaculture office should be a small office, staffed with experienced scientists, consultants and policy analysts who consult DEM, CRMC and URI when necessary, but who primarily work on their own authority and thus will not fall victim to interagency squabbles. As proponents claim, aquaculture offers tremendous revenue potential for the state and so qualified individuals should be hired. Their salaries can come from state funds as well as revenue generated by the industry itself. Part of the problem currently is that given the relatively low salaries the State offers, many qualified individuals will not seek the position or if they do, they may become quickly disillusioned. The agency needs to be granted a reasonable budget and significant decision making power. With the creation of this office, the role of the legislature in the development of the aquaculture industry should be eliminated. While members of the General Assembly attack DEM for the lack of aquaculture expertise, it is fair to say that the General Assembly has neither the expertise nor the mandate with respect to the promotion of any industry. The General Assembly members should develop their skills for ensuring the environmental protection necessary for sustaining Narragansett Bay and a fair regulatory climate in the state that encourages new businesses.

Conclusion: Deciding the Future of the Resource

Raymond Rogers, a former fisher and current fisheries management professor at York University in Canada, identifies problems with conservation approaches and uses the Canadian fishery, in some ways already in a greater state of decline than most of those in the US, as an example. “Conservation in the fishery, as well as sustainable initiatives generally, require a prescribed level of exploitation by their very definition. It is therefore the role of those biologists involved in conservation or sustainability initiatives to supply that number,” furthermore, he writes, “It is a focus on conservation which is dominated by a production model view of the natural world, and like management frameworks, is comprised by too readily accepting the edicts of development-based approaches to the exploitation of natural processes."[75] From this theory develops an important question: Do we want to harness the natural resources of Narragansett Bay for development and production? And what is the most economical and environmental sound manner to utilize the Bay?

Perhaps, if the trajectory of the fishery continues at its present rate, it will be determined by all parties involved that privatizing the "common" - the inshore waters of Rhode Island - is the wisest management option. New Zealand and Japan offer two exceptional models on how the transition from fishing to farming can be accomplished and how it is beneficial to both the resource and to the participants involved. In both countries the success is attributed to the fact that the fishers run the privatized land themselves and that the state has supported a *transition* rather than a *transfer*. In the case of Rhode Island it would appear that the state is advocating a transfer of rights rather than a transition of rights.

In a final response to my original question, "Are there socio-cultural barriers to the development of the mariculture sector in Rhode Island?" The answer is yes. However, I do not see them as insurmountable to the development of the mariculture industry. In fact, I hope I have demonstrated that understanding these socio-cultural factors will enlighten the process of designing an economically, environmentally and socially appropriate model. Provided that there are benchmarks and checks established to ensure the development of a sustainable mariculture system, one that ensures the conservation of Narragansett Bay and the coastal ponds a very successful industry can be developed. In this investigation, both proponents and opponents of aquaculture identified their fears of extensive development and monopolization of the resource by a few individuals. This fear is genuine and if one looks at the trends in the history of the State, a legitimate concern.

Finally, returning to another of the questions I posed earlier: Do we want to preserve the integrity of the culture of the traditional fisher? I cannot provide an answer to this question, first, because my individual opinion is subjective and second, the philosophical debate behind this

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question goes beyond the scope of this study. However, I can posit the following. As man has encroached on nature and manipulated nature to serve his own purposes so has he exploited the very foundation upon which he depends for survival. Overfishing is a product of fishers but also part of the repercussions of consumer demand of peoples of primarily prosperous nations. It is my assertion that the development of a sustainable aquaculture sector, with specific parameters and a responsible agency to carry out its provisions would benefit Rhode Island socially, ecologically and economically.

Are there Socio-cultural Barriers to the Development of the Mariculture Industry in Rhode Island? An Ethnographic Inquiry

by

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[75] Raymond Rogers, *The Oceans Are Emptying.* Montreal: Black Rose Publications, 1995.

Thesis

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