

Observations of natural oyster reef formation and management options with references to the West River, East River, Neck River, Hammonasset River, Pochaug River, Menunketsuck River, Oyster River and Connecticut River in central coastal Connecticut, USA.

A Review of Fisheries Histories For Natural Oyster Populations in Tidal Rivers

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Abstract

One of the first underwater photographic studies of a natural CT oyster bed was conducted by Peter Auster in 1984. A photographic dive survey of the Neck River in Madison, Connecticut, showed that natural oyster beds supported a complex structure of oyster reef dwelling organisms. With current discussions of habitat structure and biological diversity, now termed "environmental services," the value of oyster habitats is being discussed again. A series of ten summarized fisheries histories are reviewed for several natural oyster beds. Natural is described by Connecticut law and local municipal jurisdiction as populations that have been self-sustaining since the commencement of Colonial records.

In this way, information from local fishermen and coastal residents may shed some light on the habitat values, ecology, management and impacts of development upon these natural oyster populations.

Key words: Natural tidal river oyster beds (*Crassostrea virginica*) ecology and environmental services, finfish habitat associations, management programs, local shellfish commissions, potential habitat restoration of areas navigationally dredged, shellfish declines from eutrophication.

Foreword

This paper represents a compilation of meetings, conversations and field studies of river tidal natural oyster populations between 1971 and 1989. It reviews oyster harvesting and some oral fishery histories in the Towns of Guilford, Madison, Clinton, Westbrook and Old Saybrook, all of which are located in central coastal Connecticut

Whenever possible, I have tried to reconstruct conversations, meetings and shellfish surveys to the best degree my memory can sustain. Some of the events have supporting information such as letters, newspaper articles and photography/slides. More recent studies include a slide series made by Peter Auster and underwater videos by Robert DeGoursey and Patricia Meyers, both of the University of Connecticut in the 1980's. All of the interviews and conversations were from residents who lived near oyster populations or had actively fished them. Some occurred during a period I had conducted some commercial oystering, while others before and some while being employed by the University of Massachusetts, University of Rhode Island and finally the University of Connecticut in the early 1980's. I tried to limit my personal experiences from this work and note in the report when observations or previous work was mine or done by others. This is especially true for the section regarding the Oyster River in Old Saybrook.

It is my hope to assist researchers desiring to better understand habitat associations and perhaps restore productivity to areas that have sustained resource loss. I want to acknowledge all of these individuals, some of whom are no longer with us, and others for their time and their willingness to discuss the topic.

They include:

- o Mr. Robert Post, Chairperson, Westbrook Shellfish Committee
- o Mr. Wommack, Neck River resident, recreational boater, Madison
- o Mr. Charles Beebe, East River Marina, Owner, Madison
- o Mr. Joseph Dolan, Oyster grower, restaurant owner, Guilford
- o Mr. Frank Dolan, Oyster grower, restaurant owner, Guilford
- o Mr. Anthony Ronzo, recreational fisherman, Old Saybrook
- o Mr. Howard Clark, Bait and Tackle Store owner, Old Saybrook
- o Mr. Nate Walston, commercial fisherman, Oyster Ground Committee member, Guilford, CT
- o Mr. George McNeil, former oyster grower, Clinton, CT
- o Robert Ketchale, Member, Guilford Shellfish Commission
- o Mr. Scott Wakeman, natural growth oyster harvester, Fairfield, CT

Without their help, I would not have the ability to present this information as part of a continuing discussion of natural oyster bed ecology and management.

-Special Note-

The late 1960's and early 1970's were a difficult time for inshore shell fishermen in Connecticut. Many of the long-standing local fisheries for shellfish, especially oysters had been closed due to water pollution (although many believed the water wasn't as bad as portrayed); it was a loss, nevertheless. Emotions ran high about that, the loss of livelihood, either part time or full time, or that economic "in need" time. Several spoke of the fact that if money was "short," you could always go and tong some oysters – now that opportunity was gone. Others had seen commercial fishing opportunities reduced, the striped bass, for example, and the decline of the winter scallop fisheries in Niantic Bay, sought after by many Old Saybrook small boat fishermen. It all meant fewer opportunities to earn a living from the sea, and some were angry about it. Least of all, they as a group, felt powerless to communicate the impact of these changes that tended to alienate them from a vocal or active part in the management of their resources.

In 1974-75, the winter flounder inshore fishery collapsed in Connecticut from habitat loss, over fishing and eutrophication, taking another small boat fishery from a narrowing list of income producing activities. By 1978, this anger spilled out in the local newspapers which covered pollution and commercial fishing interests that supplied local seafood for local markets. An August 29, 1978 Shoreline Times newspaper article summed up the situation with an headline that read "Clam Diggers, Oysterman Struggle To Battle A Bushel Of Problems." In the early 1980's, some seafood establishments began to advertise, "non-state" or worse, " No Connecticut-bought shellfish" as localities and recreational shell fishermen first began to see "No Shellfishing" signs posted along the waterfront. To the shell fishermen, this was visual salt into an open wound; to recreational fishermen it was a loss of a long time family pastime; for others, it was an end to a part of their summers along the shore.

All these activities tended to polarize the shell fishermen and consumers as they sought to have a role in shell fishing decisions. Connecticut shellfish was a "good" food that they sought to continue to eat. Some of the anger was created by shellfish closures: "we had no warning," or "no one ever told us the water was bad," or "some test was bad so they closed the water." These were the types of comments that were made. In Old Saybrook, shell fishing continued both recreationally and commercially for several years after shellfish closures because of a lack of testing or information. It was commonly accepted by the simple view, how could the water be okay on "Tuesday but closed on Wednesday" – it was too sudden and seemingly indiscriminant. The lack of trust was pervasive.

Despite what was often reported in several press articles, the local commercial fishermen, led by natural growers in the west, were asking about the right to manage the resource and not merely to use it. Although this cooperative management approach was mentioned as a new initiative, Mr. Joseph Dolan, during one late 1970's conversation, went into his Whitfield Street, Guilford home and showed me a 1949 newspaper article with the almost identical cooperative management proposal from 30 years earlier. Unfortunately, the "resource user" viewpoint was difficult to overcome as the notion of resource "taking" was often outside of the food producing, seafood consumer viewpoint. Commercial fishermen often had to argue for both the consumer who could be many miles away from the coast or in another state, and as the producer the harvester of the resource. After all, a large part of the then coastal shore economy was dependent upon the "summer trade," and seafood was a large part of the vacationing summertime experience. Connecticut also had its factions, and differences between local and non-resident shellfish fisheries' viewpoint of sustainability. Shellfishing was very different than most capture fisheries -- oystering in particular resembled farming; even the language was similar - "seed" and "transplant", "cultivate" and "grow out" were agricultural terms. You could survey the "crop," and in some cases, modify predation, thin out crowded areas and move seed to where there was none. That represented types of aquaculture – extensive, but aquaculture nonetheless. Natural growth was just that, "natural" and that often divided resource manager's opinions.

To be successful, management efforts by shellfishermen, town agencies and state/federal agencies required cooperation. For the first time, fishermen were being asked to participate in these resource management decisions.

Joe Dolan, a Guilford oyster grower, spoke at one meeting when the Madison & Guilford Shellfish Commissions met jointly in response to a suggestion of closing the lower East River to oystering. Responding to the motion, Mr. Dolan said "That's like fencing off the stumps after the forest has been cut; what you really need to do is plant more trees, not protect the stumps." His comment sums up precisely the difference in management philosophies between a sustainable renewable resource and a traditional conservation approach based on bag limits and sizes. Bag limits and sizes historically never really protected the shellfish from over harvesting. He argued that more attention should be placed on ensuring good recruitment (oyster sets), which meant cultivation to clean the bed, re-shelling, if necessary, and thinning/transplanting, none of which he claimed having anything to do with a person had a 3-inch oyster or 4-inch oyster. What the concern should be is enhancing the resource. This regulatory culture of seasons, size limits and catch limits needed to be changed, in his

opinion, to a more sustainable, renewable crop. He concluded, it was easier just to close the river than to do all the shellfish surveys, cultch (shell planting), and to clean the beds, which the fishermen were willing to do. But closing the river to oystering, according to Mr. Dolan, was the easy way; it wasn't the "best way." This feeling is referenced in several communities: it was just easier to shut down the shellfishing than to thoroughly investigate the problem or pollution sources which had caused it to be closed.

I want to acknowledge that shellfish resources were and continue to be vulnerable to upland use and watershed changes. Some of these impacts are mentioned in many interviews, such as increased sedimentation, street water, ice, sand, and water bacterial contamination. Each of these constraints plays a part in the local shellfishery. Despite all of these concerns, I found shellfish harvesters and producers appreciative of just having a chance to discuss the issues and to look at how they caught shellfish in the past. To that, I am especially grateful to all three universities in which my work overlapped. And now, the Sound School for student habitat restoration initiatives and disease resistant experiments that are currently under way.

Introduction

Early Colonial literature frequently mentions the abundance of oysters in tidal creeks and rivers. Before the European's arrival, Native Americans also knew about and harvested these natural oyster beds. They often harvested oysters from bank edges using wooden ash rakes – similar to the modern clam or bull rake. A long-handled rake, termed a push/pull in central coastal Connecticut, dragged these oysters close to the river, creek or marsh edge where they were forked (a wooden spike fork similar to today's pitch fork) on to the marsh surface or into a log canoe. References to this type of fishery can be found in New Haven's records or in a comprehensive book about oystering by John Kochiss (Oystering from New York to Boston 1974).

The only reminders of this indigenous "natural growth oyster fishery" are pictures of 18th century "dug out" canoes and remains of Native American oyster shell heaps called shell middens. Very few, if any, examples of the wooden oyster rakes survived. They were made of ash and had especially long wood teeth. Shell middens have been found adjacent to highlands, next to rivers, as this no doubt cut down on the transportation of oysters across soft marshes during harvests. Contrary to some reports, Native Americans did not tong from canoes but would rake at high tide and fork or scoop oysters into canoes at low tide. Tonging required a stable platform and the ability to remain "onsite." More modern oyster tongers would "pole down" or drive two stakes along side for site positioning while tonging. It is safe to

assume that natural oyster beds in rivers were protected from the higher salinity predators such as the oyster drill Urosalpinx cinera and starfish Asteria forbesi and flourished in these natural reef formations. It is important to remember that oysters are probably one of the most fecund organisms (someone once calculated that 20 generations of oysters, if no mortality, would cover most of the world's agricultural lands) and that oyster reef formation was governed by the ecology habitat in which they live. Oysters can freeze to death and can succumb to long periods of fresh water (low threshold salinity) and excess heat (low dissolved oxygen levels). But, within its life history parameters, Native American and later European settlers could expect to find oysters in every creek and tidal river.

Oyster Reefs in Tidal Rivers

We have many accounts of these natural bed oysters and descriptions of early oyster fisheries. Paul Galtsoff (1964) pictures huge Stony Creek oysters in his famous bulletin published by The Bureau of Commercial Fisheries, U.S. Fish & Wildlife Service. Other US Fish Commission accounts also help describe these oyster fisheries. What we lack is detailed information on how these oyster populations existed in a natural state – i.e. absent of harvesting or how they impacted the other habitat(s) of the river itself. We do have information about their ecology and relative abundance from historic shellfisheries. Landing statistics often were grouped by geographic regions or termed “river oysters” by commercial oyster (aquaculture) growers of the last century. Paul Galtsoff, in his 1964 technical bulletin, said the American oyster or the Eastern oyster gives the most ecological view of these natural river beds, but he was limited by what he could examine: what came up in the dredge or tongs, or what was cast up on the shore. The limiting factor was the absence of longitudinal studies and of course, under water photography restricted the amount of information on day-to-day or year-to-year habitat associations. How did these early oyster reefs function in the absence of nutrient pollution, storm water runoff and sewage outfalls? What types of estuarine fishes used oyster bed reefs as habitat and when continues to be critical questions around essential fish habitat and today's discussion of environmental services. The role and function of natural oyster beds in estuaries is now the topic of several national research initiatives. More and more shellfish ecology is being looked upon as the key estuarine quality environmental indicator.

One of the things that I learned from local commercial fishermen, some of who used to tong oysters from these natural river beds, is that the oysters respond to environmental changes and that response can be observed by looking at the oyster shell itself, an annual “state of the bed,” so to speak, that could be combined in an historical review of a particular bed or region.

Oysters with thin elongated shells (called "dogs") put their energy into height to avoid being buried; curved oysters lacked space to grow properly; (saucers) shorts or stunted oysters from upriver with lower salinities while box oysters or "cups" grew on firmer bottom, closer to Long Island Sound. Thin shells were also an indicator of lower salinity, reflecting tidal/times of these upriver oyster beds that did not get the length/duration of higher salinity than those at the mouth. The presence of mud blisters on the shell inside were also indicators of a "fresh water oyster" and thick white shells were indicators of a "salt water oyster." Tongers who fished these natural oyster beds were acutely aware of these differences, and could tell, if the oyster reef was spreading, collapsing or being buried. They could determine this by the amounts of live oysters in comparison to dead ones and what the oysters looked like. This was sometimes called the run. Oyster reefs came and went within a river over a period of years; some oyster areas would improve while others "died out." It was not as much so the tongers over-harvested or that the river oyster ecology could not recover that quickly. There were always plenty of spawner oysters left to repopulate the river. The harvesting methods were inefficient and contained their own conservation measures.

The dynamics of oyster reef formation was subject to so many variables, winter ices, storms and floods which could carry vast quantities of silt and mud suffocating the oysters, trees and stumps that altered currents, and the normal temperature extremes of New England. Several warmer winters meant less ice damage but that could be negated by a spring flood or freshset that blanketed oyster beds with dead leaves or silt. A hot, rainy summer could cause warm temperature mortalities; a long cold winter could ice over some of the upper portions of river oyster beds. Despite these factors, oysters of harvestable or usable commercial size could be found nearly every year. Occasionally, all the above conditions favored these river oyster beds and periodically, great oyster abundance was recorded.

Joe Dolan, East River, Guilford Oyster Grower and Scott Wakeman, Natural Growth Harvester, Fairfield, CT

In the Guilford/Madison area, that oyster abundance seemed to occur about every three decades (Joe Dolan, personal communication, 1978). He had seen great sets and survival in the late teens, the late 1940's and again in the late 1970's. At that last time, Mr. Dolan estimated the amount of oysters in the East River, Guilford, CT to be somewhere between 100,000 to 150,000 bushels, and he said it would be nearly impossible to harvest them all before they would be buried by leaves and were killed. I accepted his invitation to see what he meant and set off in his oyster boat, Teal, to show me. Nate Walston and Joe Dolan took me to the first bend of the Neck River with his

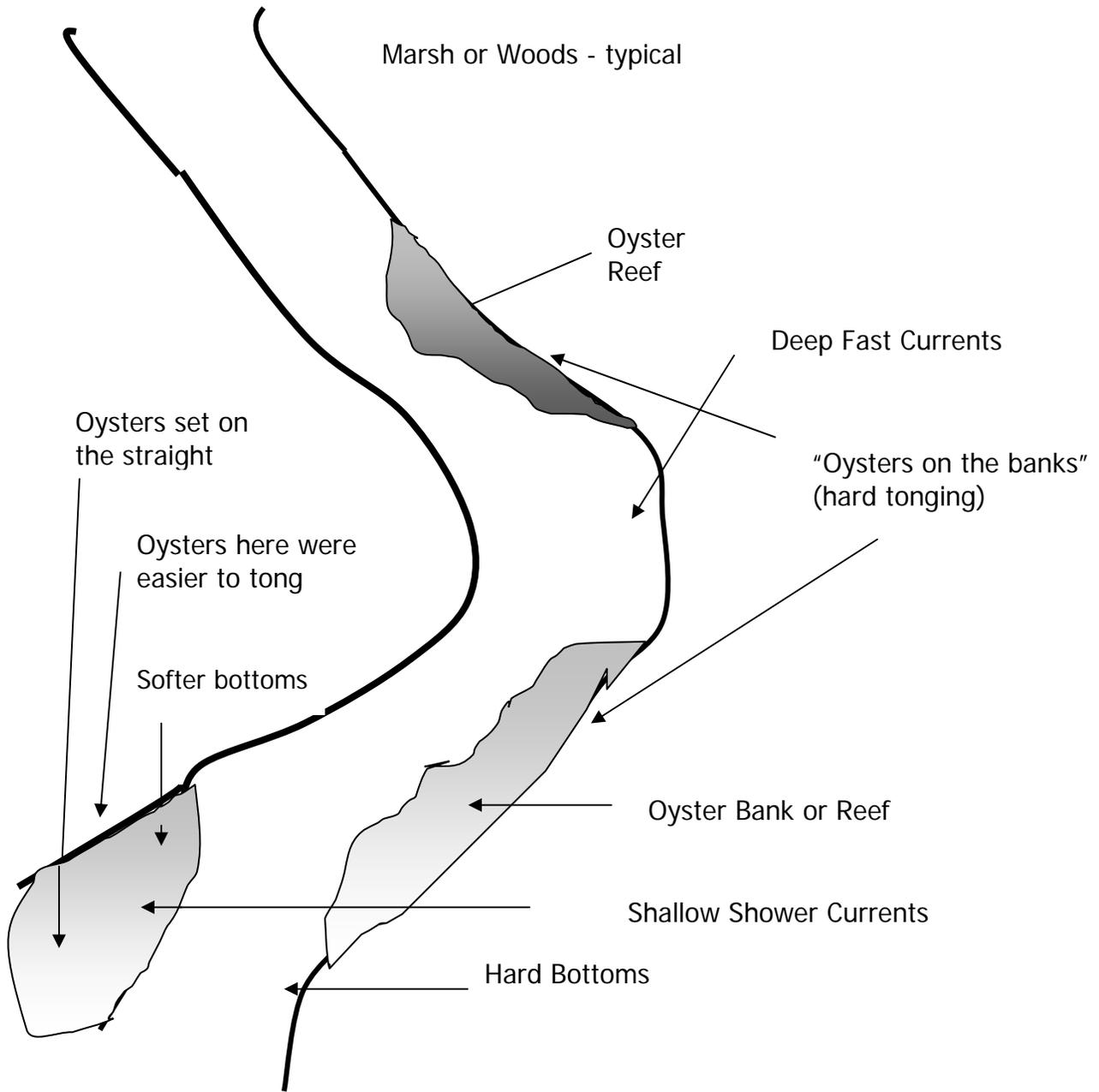
mechanical dredge boat, and we deck loaded his vessel with oysters (100 bushels), but nearly all were dead, just the surface shells had small oysters on them. "All dead, nothing but stools," Mr. Dolan shouted. I took pictures for the Madison Shellfish Commission of these dead oysters, mostly long and thin with both shell halves (valves) attached. Back at the Guilford Sluice dock, Mr. Dolan explained that often the River was closed to shellfishing. (He didn't feel the water was that bad in winter.) In 1968, the oysters had "reefed up;" he likened it to mowing your grass once in ten years.

This was my first introduction to the concept of reefs of oysters in these tidal rivers. Mr. Dolan said some areas the oysters had reefed up four to five feet higher than the late 1960's, and said that was how we lost the lower East River. "The oysters got so high, boaters couldn't get in, so they dredged." (Mr. Post of the Westbrook Shellfish Commission would echo these comments some ten years later.) Mr. Dolan also felt the oysters were reefing up faster than in the past; he blamed leaves, silt and too much "street storm water." More silt meant less hard bottom for oysters around the bends and a greater tendency for oysters to grow thin and long, "dogs" as he called them. He remembered when tongers harvested six to 10 thousand bushels each year from the East River and nearly all of them cups or box oysters. "We kept the saucers and dogs for us and shucked them out, but twisted, overgrown oysters, we just threw back; it wasn't worth the time to cull them out or shuck; we figured it was good to have them as "spawners."

Mr. Dolan continued: "The bottom back then was harder and firmer from pieces of shells, gravel and sand. There was always mud on the "straights" (straight sections after the bends), but nothing like what happened after Route 95 was completed. We started getting trees, over the beds (Trees cut during the project were dumped into the river Mr. Dolan claimed), and they collected limbs and sticks with the leaves and storm water silt. We used to have oyster beds way above Interstate 95, but it's all dead now, covered with sticks and leaves. The beds below Route 1, some of the best in the river, were full of leaves and silt. They had reefed up. So high they grew out of this debris, we would hit them at low tide." He also felt the railroad bridge had restricted tidal flow up the river, so between not enough salt water and too much silt, the oyster beds above Route 1 "were now gone." In 1978, ninety percent of the East River oysters were of the long and thin variety, and he claimed the river was a mess. The trees and logs needed to be cleared (Two abandoned cars were towed out from the River below the railroad bridge), and the stools dug up and broadcast for a set. The beds had to be "cleaned," and Mr. Dolan was willing to do it. Mr. Dolan was able to accomplish much of what he wanted to do and did so after giving me a 1949 newspaper article describing a very similar situation (Appendix 1).

Later that day, Mr. Joe Dolan discussed his observations about the river in the 1930's and 1940's. Tongers knew the hard bottoms as the ebb flowed out creating them seaside of every bend. Here, oyster shells, pebbles, and often sandy bottom produced the nicest oysters round or "cup" like; as you approached the bend, you hit the reef or "bank." Bank oysters is a term to describe the reef, occasionally called edge oysters as these were on edge of the reef or bank. According to Mr. Dolan, you could tell where a tonger was working by the type and size of oyster he culled. (Culling was a process used to break about pairs of oysters into singles for easy handling and marketing). He drew a diagram of a river bend in the sand, showing me how it looked at the wide side the river - be deep and fast, no oysters - but as the bend straightened, the bottom - firmed oysters would "bank" or reef out from the bank. This also followed observations of the Hammonasset and Oyster Rivers.

Joe Dolan Diagram (1979)



The difference between tonging the banks or straights was the height/profiles of the beds. You could be off the oysters quickly on the banks, and tides made it difficult to tong them except during "slacks" at low waters. Years ago, Mr. Dolan remembered you could see the oyster banks (reefs) early in the morning at slack water especially in the fall. River visibility at times could be several feet, something that fishermen in town say had lessened in recent years (these observations also were noted by Charles Beebe and George McNeil who lived by the East and Hammonasset Rivers). Mr. Dolan recalled that in early winter, just before skim ice, oysters could be seen by the old trolley line crossing. (South of the present day Route 1 bridge) south of then Cutlers Seafood, now just a vacant lot by the Route 1 bridge (see appendix).

After Interstate 95 was built, the trolley crossing piles acted as a comb and collected several large trees which had to be "spiked" and moved by barrels. It was difficult to clear them but if they did not, they would catch more limbs and leaves, making a mess of the bottom (Reference Interstate I-95 construction). They also had noticed greater amounts of soil in the River and on the oyster beds than during the 1950's, and they were concerned about dirt and debris washed off the streets. Leaves were becoming more of a problem. In addition, after heavy rains, the River also would appear muddy brown, something they had not seen some two decades before. Mr. Beebe and Joe Dolan both felt the water visibility had declined in the East River and had reasons for it. Before the paving of the street, rainwater had time to "soak" and did not carry mud directly into the streams. After paving, storm drains were installed under the streets and one particular drain on the East River carried water off the hill (the Guilford side of Route 1) under the street (Route 1) by the Fowler Nursing Home. This drain at times carried "mud" directly into the River and this in turn blanketed the oysters. They had seen the river "silt up" after heavy rains, something that to them was getting worse. Mr. Dolan also was concerned about water quality problems and these "drains." The woods, he felt, were nature's filters and that by piping the water, the filtering/cleansing process was being bypassed by them. He had proposed that these drains be removed and water run threw "river gravel" before entering the East River. He tried to get Guilford (the town) behind these ideas, but said not too many people oystered, but everyone owned a car, so if it came down to the oysters or roads, the roads "won the day."

In 1968, the East River was closed to shellfishing because of "high bacteria" counts. Mr. Dolan had predicted this as more development and increased street water was "dumped" into the River. He had asked the local health department to test the waters in the winter to see if the oysters could meet the health codes at that time, but it did not happen. Oysters continued to grow up towards the surface, killing the bottom ones, producing stools. (Stools are dead, still paired oyster

shells-reference George Goode). The process would scour the banks that had oysters sending shells downstream (Mr. Dolan noted that the mouth of every creek and river had shell wash outs, the rounder shells if could "roll" with the currents. The flat shells, called "chips," would stay in the River, the ebb tide was stronger than the flood but shells did roll back and forth, and it was not unusual to catch a clump or bottle and then find it again several hundred feet down river a few days later. He said the setting ability of many of the returned shells were lost, as some ended up in deep bends or landed in soft bottoms where currents were less. Thus, these shells were buried and were unable to "catch a set." The stronger the ebb currents, the "harder" the bottom, and the deeper, slower currents had softer bottoms and much of the shell base was buried. A straight section provided the steadiest oystering and a better-shaped oyster. Mr. Dolan felt the oyster population in a river should not be considered a single reef but a series of independent reefs which when they combined represented "the river." At any given time, some reefs were building and others forming and at times could redirect currents, and if left unharvested, they could "break surface." In other words, left to the unharvested, condition, reefs would build up and lessen river depths, putting pressure on the bends (marsh surface) to under cut the bank (marsh) until it broke off. This would tend to widen the entire river. He had seen this happen in the teens, 1940's and again today (1978). The difference today is that there is more leaves and silt which killed many oysters, much more than could be harvested because he considered tonging to be one of the most inefficient ways to oyster – "breaking your back" and that even for seed oyster prices (1978/\$4 per bushel), it was not worth it in the polluted (closed waters) to tong. It was however, worthwhile when the East River was open. A good day could produce one to two bushels of box oysters (good shape) and six to eight bushels of shucking stock, oysters to opened for stew and stuffing. This was a four to five hour day. The best market for the oysters was fall, and tongers of whom Guilford had about six to eight, would harvest to December or until the river "iced in." The East River provided a 3 to 4 hour "window" to tong around the slack, low water, but less during the moon tides.

Mechanical and Hand Dredging of Natural Beds

In 1968, the State of Connecticut changed the laws around tonging seed oysters to include hand hauled seed oyster dredges. Any oyster harvested in closed or uncertified waters in 1978 was considered "seed oyster." Although, Mr. Dolan had mixed feelings about using hand hauled (30 lbs of less) seed oyster dredges, at least the oysters were "used for something." His concern was a tremendous amount of seed oystering would occur and when the beds needed cultivating to remove silt and leaves (the natural growers would not be here), no one would do it. He had seen this before (1949).

He also felt that hand dredges could clean and cultivate oysters (which was needed), but people not knowledgeable about the reefs could bill or chop the oysters in half. This in fact did happen as the oysters in these banks were often "tightly packed" and if the blade hit these "square on," it could cut them. In addition, these reefs were often so packed, it could take hours to loosen the outer surface or "crust," so to speak, so dredges started to catch oysters. In 1981, just after the East River was opened between the railroad and Route 1 bridge, several thousand bushels of "seed oysters" were removed by "natural growers," one of whom was Mr. Scott Wakeman. He recalled how it took several hours to remove sticks and leaves off the beds and only then was the extent of the oyster population underneath revealed. Mr. Wakeman was amazed at the depth of bed; he estimated that the top two to three feet of the bed was still alive although many of the oysters appeared stunted.

A series of photographs was made into a slide show of Mr. Wakeman oystering during this period. The oyster bed had a definite "hump" about halfway between the railroad bridge and old trolley crossing. He was working this "hump" (reef) as he described it and on some occasions, broke past the live reef and into the old; here oysters were small and all dead. It was possible by observing glass and occasional bottles to estimate the age. Mr. Wakeman, while oystering in western Connecticut, had dredged up many old bottles while shellfishing in similar circumstances. He likened it to a time clock on the bed history and confirmed what other area oystermen had told me. You could tell a lot by looking at the shells. This bed had set well, about 6 to 8 years ago, (in 1972 or 1973) and lacked space to grow. This area had been productive 30 or more years ago. He estimated, based on other experiences that the shell base below the living oysters could be many feet deep, perhaps 10 to 20 feet or more.

At one low tide, he had actually hit bottom with his outboard engine. He described the beds as really "needing to be worked." While oystering with Mr. Wakeman, we worked the edge and broke into a section of older oysters. While they were all dead, the shells were long and thin and tightly clustered. This bed, he felt, was buried by a significant event that produced a tremendous amount of silt, perhaps a storm or flood. He said it was common to find such areas and seemed to confirm Mr. Dolan's account of some areas forming and some getting covered within the river system. Seed oystermen worked this section for several months and about 6 thousand bushels of seed oysters were harvested from the area. Mr. Dolan purchased some of the seed oysters; others took the seed oysters to western Connecticut oyster growers.

Mr. Dolan resubmitted a 1976 plan that he had made to the Guilford and Madison Shellfish Commissions which was to cooperatively work the lower sections of the East River, where the beds were flatter and not banked. In return, he would relay a set number of bushels to each Shellfish Commission (to a site of their choice) and replace bushel for bushel his share with dock dried shell so the chances of getting a sustainable oyster "crop" were enhanced. He had made almost the same proposal in 1949, almost 30 years before. The upper sections would still be open to tongers, the large dredge boats could not work up there anyway, and he would purchase overgrown oysters (seed) from them for cleansing elsewhere since direct harvests were prevented. Oysters now had to be cleansed in the remaining open or certified waters.

Mr. Dolan's 1976 plan was finally accepted in 1978-79, but by then, tens of thousands of bushels had died—he termed it overgrowth. Frank Dolan, Joe's brother, also reported that the same thing was happening in the West River, and he was suspicious that the Neck River also was now overgrown. Since 1970, the rivers had been getting good oyster sets and were starting to increase bed heights, a natural occurrence in these rivers. What the Dolans claimed was not natural was the amount of leaves and silt being washed into the River and that no one was taking the oysters out. By 1979, it was too late for much of the East River oyster's population. He claimed shellfish surveys in the 1980's recorded that he was correct: massive mortalities of oysters were documented.

Nathan Walston, Oyster Tonger, Guilford, CT

"Nate" Walston lived in Guilford, CT and his father, John, Jr. was a former fish trawler owner and trap net operator who fished out of the Guilford "sluice" dock as it was formally called. I can remember purchasing lobster bait from the Walston's trawler who supplied bushels of blue crabs and flounder from Kimberly Reef. The Walstons also set the last fish trap net off Madison/Guilford shores, just to the east of Guilford Harbor in the late 1960's to early 1970's.

When the topic of shellfishing came up, Nate Walston talked about his tonging experience from the East River and clamming offshore. Guilford, he recalled, had two excellent oyster producing rivers, the West River and East River. He wanted to discuss the West River, a river that had oysters in it all the way to the road. (The road he mentioned is today called Water Street.) When the rivers were opened, they produced oysters for local restaurants and fish markets. He was concerned that the oyster beds were overgrown and might become a problem for boaters. He did not want to see the West River dredged like the lower East River. It was Mr. Walston who one day showed me the mooring markers, concrete ones that were placed in

the East River. When they were pulled to prevent ice loss, he showed me that they contained new oyster sets. According to Mr. Walston, oysters still wanted to grow there, but the dredging removed the entire "shell base," so all that was left was mud and sticks that washed off the Neck and East Rivers from above. He likened the dredged area to a sink trap, catching all the silt and organic debris coming down the rivers. He was not surprised that the area needed dredging again. They (the oyster growers) wanted to maintain the depths themselves. (Mr. Walston worked for Mr. Dolan who offered to scoop out oysters and any trees, eliminating the need to dredge.) The area is full of leaves, and they get hung up there and rot, especially at the confluence of the East and Neck Rivers. It is a very sticky bottom now; at the mouth, the bottom was firmer. The East River area tended to "wash out" at low tides.

Mr. Walston had watched at least two dredging projects and saw thousands of bushels of oysters, pumped or dragged up. He did not want that to happen to the West River and asked the town to consider cooperative agreements with Mr. Dolan, a local oysterman. He was concerned about proposals to open the rivers to natural growers, people who would harvest the oysters (they leave nothing but the roots,) but who did not return dock dried shell to the river each June (for a set).

Mr. Walston and Mr. Dolan had tried to work an agreement with Madison about the Neck River, but Madison said "no." He had heard reports that boaters in the Neck River were complaining there also. In general, Mr. Walston felt Madison did not care or know much about oystering, especially since they only had a few commercial fishermen left in town. Johnny Blakeman had passed away, and Cutler's Seafood had closed. Every time fishermen approached Madison, they had no luck; at one point, they had to claim they tonged oysters from the Guilford side only. He felt it was a tremendous waste of shellfish; the River was closed to shellfishing, so no one was getting them now. He felt that was okay with Madison. His father had tried to get them (The Town of Madison) to open for clams, but they said "no" and the clams died. No one cared about the fishermen, but every one however, wanted seafood in the local restaurants. It was ironic to see that, he mused. People coming to Guilford to the restaurants (located at the Guilford Sluice) to get fresh oysters, but they had to buy them from out of state! He got angry every time he thought about it. They had even approached the Town of Madison about using the "Blakeman Bed" to relay (transplant) oysters to the Blakeman grant (formerly Kelsey Bed off Overshores Road, Madison). Here a series of rocks protected oysters from storms and was a particularly successful spot to transplant oysters, but the town (Madison) had told the Walston's that title to the ground was not clear. (The fact that I was from Madison at times did not help the conversation!) They had offered to

lease clean ground from Madison, but that offer also was declined. So Guilford literally awash with oysters had no local product to offer former seafood customers. Mr. Walston was concerned about the oyster fishery. People, he felt, will forget how productive the areas(s) were and that oyster beds would die out from neglect (no harvesting) and then be dredged for navigation. That is what happened in Westbrook and Clinton; just when the oysters started coming back again, they would dredge the River and with no one oystering who would speak up for the oysters they don't vote, he would tell me. He thought Guilford had a chance because people there were more interested in the environment. He remembered a proposal to dredge out most of the East River marshes for a marina, and people came from everywhere to prevent it. People who had never lived in town even wrote letters. "Guilford didn't allow it," Mr. Walston said.

Years later, when I was appointed to the Madison Shellfish Commission, I did locate a handwritten letter written by Nate's father, John Walston, Jr., dated March 7, 1966, asking to clam in Madison's waters. At the time, according to Nate, Madison had about 800 acres of hard shell clams that set in the 1940's, a bed that extended from "the Convent," Our Lady of Mercy, to Tuxis Island and south to Madison Reef, a large bed by anyone's estimation. Madison said "no" again, even though they (Board of Selectmen) knew it was deep water and no one else could get them. Although he was very grateful to obtain the letter, it raised old memories not too pleasant ones for him about the loss of shellfishing income it raised old memories, not pleasant ones for him, about the loss to his family, and for him.

As for his comments about oystering, he also felt the lower East River produced a better oyster. He could recall when a heavy set between the Route 1 bridge and railroad bridge was moved to the lower river to grow by local tongers. He felt the upper oysters would stunt, some growing no larger than a man's finger because of overcrowding. Others felt that these oysters would have little value if moved, once the shell shape was set, there was little chance that it would ever round out and become complete or marketable. But others felt they would grow into something suitable for the restaurant half shell trade. Still others felt they would grow to good size only if moved "early." Sometimes, the oysters upriver grew so thick that it was not possible to tong; people carried a special rake with curved teeth, but thicker so as to not pierce the oyster. They would rake first, to gather living oysters "off the top" and concentrate them for tonging for a test. The rake was designed to not bring oysters to the surface, but to bring oysters to the boat. They also were used to "clean up" what was scattered by tonging at the end of the tide. That is why the lower river was so valuable. In this section, oysters were looser, not clumped, better-shaped and easier to tong. If given a chance, according to Mr. Walston, the area would again produce a quality oyster.

Knowing that the river(s) in town were closed, he also was concerned that they would now be dredged for navigation. A proposal was made to maintain certain depths by oystering in town but at the time, Guilford had accepted, what he termed, practically "free dredging" for the East River from the Army Corps, so the offer was not considered. It was a discouraging situation because they had watched the oyster bed heal itself only to be dredged again.

He also supported the concept of reshelling the dredged area, which he claimed was used only for about 12 boats. The largest problem for the channel was leaves and logs and for them, the dredge boat was a better option. People just did not know how much one big tree could mess everything up on the bottom; trapping leaves, he claimed, were becoming a bigger problem every year. The dredge boat could help keep the bottom clear and clean of sticks and leaves as they made their way out of the River. In 1979, Mr. Walston became head of the Guilford Oyster Ground Committee and started activities to mechanically dredge overgrown dead oysters from the East and West Rivers. Mr. Walston was mate on the oyster trip that Mr. Dolan arranged for me, and I took pictures of thousands of oysters that had died with shell halves still connected. He also felt that small winter flounder spent a large part of time on or near oyster beds as he had often caught them in tongs and in dredges. The first job he set out to do was to change a law that forbade mechanical dredging on natural oyster beds. Written in the late 1800's, the law now was seen as a legal obstacle to forming a cooperative agreement to manage the lower river. He was extremely frustrated (angry) about this situation and kept asking about the Army Corps of Engineers dredging oysters. They could do it and destroy the oyster bed when all he wanted to do was prevent oyster loss, yet everyone was okay with the navigation dredging. We were using oyster dredges to catch oysters. They killed them (the dredging activity for navigation), and no one said anything about that.

Apparently Guilford had supported the concept, and Madison had raised the issue of legality as the state general statute stated oysters to be taken by "tongs only."

In the Dolans view, (Joe and Frank Dolan both operated their oyster business) and Mr. Walston's could keep the channel clear of logs and trees, leaves and muck, as part of their oyster activity. By cleaning the oysters by oyster dredging, trees, logs and leaves would be removed gradually. It is a lot easier to move one inch of snow than 30 inches was the example they used. Instead, people wait until the bottom is a mess, full of muck, silt and logs, then the Army Corps comes and takes out everything – trees, muck, oysters, shells and even sand and gravel. In the process, the "spoils" would be dumped

on the salt marsh, which they did not think was a good idea. It was their hope that the boating community and the oyster industry would work together and save everyone money while saving natural resources.

With oyster mortalities increasing in the East River, Guilford was prepared to move oysters out of the River on its own without Madison's approval since the statute written for tonging was developed in a time when the water quality was open to direct shellfishing. With the waters now closed by the State Department of Health, the only way you could use these "seed" oysters was by moving them to clean water outside of the River. A new law gave the right to natural growers to be allowed into uncertified waters to harvest the seed oysters. At the time, a boat load consisted of 150 to 250 bushels and that some 50 boatloads, some 8 to 12 thousand bushels needed to be moved as soon as possible. In addition, this was just a fraction of what had been lost according to Mr. Walston. Guilford was already getting pressure about the oysters impacting the West River boating community in that area. Nate thought that was a double standard, letting the Army Corp of Engineers take the oysters from a "natural bed" but the local oystermen could not. I will never forget one of his comments during an Oyster Ground Committee meeting that the Army Corps, "should get out of the oyster business." They take more than the oyster companies. I was invited to go out on one of the oyster boats after the meeting and document the loss. On March 22, 1979, in a legal notice in the Guilford Shoreline Times, ran this announcement: "Invitation to Bid Towns of Guilford and Madison. Bids are being considered by the towns of Guilford and Madison for the transplanting of oysters from the East River on a no-cost basis to the towns. Maximum number of bushels to be transplanted approximately 20,000." Mr. Walston had finally been able to do something.

Charles Beebe, Marina Owner, The East River, Madison CT

Mr. Beebe owned and operated a small marina/outboard repair facility on the Madison side of the East River. For many years, he was across from a popular seafood restaurant called "Cutlers." He was concerned about the oyster population for two reasons. First was food and people stopping in Madison to buy Madison seafood. The second was navigation to his small marina, which depended upon sufficient depths to the marina. He claimed, in 1971, that since oystering had stopped, the number of logs had increased, especially between Route 1 and the railroad bridge, and on occasion, limbs and branches could be seen above the surface and were a hazard to small boats. As part of the oyster fishery, oystermen once removed these logs and limbs with a metal spike fitted into a metal pipe, so they could be dragged to the side or pulled out.

Without the fishery, he was concerned that the oyster beds would grow to the "top of the river." He had moved some trees himself north of the Old Trolley Crossing, where several piles remained and trapped logs being washed down river. The oysters needed to be harvested or they would continue to grow on one another until reaching the surface (low tide). He had approached the Madison Shellfish Committee to authorize transplants to the Blakeman beds. A local oysterman, John Blakeman tonged oysters from the East River and planted them behind some rocks off Overshores. Here they would grow and fatten, so by the fall, "Madison oysters" were in all the local seafood restaurants. They were considered some of the best, and according to Mr. Beebe, Mr. Blakeman never had "a shortage of orders, just a shortage of oysters." But he heard no response from the Madison Shellfish Committee. Mr. Beebe wanted to do something similar, especially between the bridges – the area that concerned him most.

His thoughts were confirmed by the use of a "scallop looker," a view box created for bay scalloping in Niantic Bay. Here you could see oysters in October 1971 as well as many small limbs and branches on the bottom north of the railroad bridge. His proposal to the Madison Shellfish Commission was rejected twice. On the final attempt, he scheduled a meeting with the First Selectwoman, Vera Dallas, and the Board of Selectwomen that listened to the plan remove oysters to clean water off Madison, where a natural cleansing process could remove bacteria for a fall harvest. Mr. Beebe told me that this plan was not approved as the Board felt the East River oysters were all poisoned and therefore, couldn't be harvested or safe to consume by the general public. He was very discouraged by the decision and made no further contacts.

As someone who owned a small marina and who was dependent upon income from the boating community, he felt the oystermen and boaters both wanted a good, "clean river" and deep water in which to navigate. He worried that with no one on the River, the logs and trees would become more of a problem. He was especially concerned about the oyster population between the Route 1 bridge and railroad bridge. He had made an oyster dredge from an old bay scallop drag that he had for many years scalloped there. (Clinton Harbor had bay scallops, he would tell me.) He had attached a bar with short teeth and repaired the chain ring bag. In 1971, he made short tows with a Brockway scow boat he had for the marina and lobstering. Short tows of 1 to 2 minutes had yielded 100 to 200 small live oysters in each dredge. He was worried that these oysters would grow so high as to be exposed at low tide and interfere with boaters returning to his marina. With no starfish and oyster drills up this far in the river, he was concerned that the bed would grow up towards the surface as he had seen happen before. The tongers had kept this area "trimmed" by

taking oysters down river, but with the river closed by the sanitation (health) department, he wondered what would happen.

One related story he told was about striper and winter flounder fishing. Although such stories are often bound by oral oaths, it seems of little purpose to continue the pledge, and Mr. Beebe has unfortunately been gone for many years. He spoke of the fish over the oyster beds, each year, particularly striped bass and winter flounder. In the spring and fall, he would see schoolies, small striped bass, enter the River and catch large winter flounder with little effort just above the railroad bridge.

When he fished for flounder, which was always early spring or November, December, he would tie up just above the railroad bridge. After raking some oysters to the bank, he would "crack them" and throw them out near his clam necks on hooks. After awhile, he would have several "very large flounder." The trick according to Charles was to use a hand line with blackfish hooks; in that way, he didn't spend time taking off the runts (small immature fish). From time to time, he would catch a striped bass, and the gut cavity was "packed" with crabs. He called them mud crabs that lived on the oyster beds. He thought they were what the stripers were eating because he felt their jaws were not strong enough to break open the oyster itself. Just below the railroad bridge, which, because of the tidal restriction was very deep, he would catch two to three "cow" striped bass with the same method that, according to Mr. Beebe, they overwintered in the deep hole caused by the bridge. Only at this spot did he use a boat pole with a heavy line and a chunk of mackerel or bunker as bait. He had not tried to go fishing in several years, and people were not catching flounder like they used to.

S. Jackson Wommack, Neck River Recreational Boater, Madison, CT

Mr. Wommack was a summer resident along the Neck River in Madison, CT. His family owned a seasonal cottage on the Neck River side of what is called Circle Beach. He was an avid recreational boater and owned a large sailboat that he kept on his dock on the Neck River. By 1983, the Town of Madison had opened all its areas under its control to natural growers, seed oystermen from primarily western Connecticut. Overgrown conditions had led to large oyster mortalities in the East, Neck and Hammonasset Rivers, so the Town of Madison issued several seed oyster permits with no catch limits except \$1 per bushel fee to ensure returned shell for oyster setting. Mr. Wommack witnessed some of the oystering activity and mistakenly thought they (natural growers) were dumping rocks in the water in front of his dock, which he didn't want. As a member of the Madison Shellfish Commission, I was contacted and arranged to meet Mr. Wommack in

his house, and we talked for nearly two hours. The activity he had seen first hand was the process of taking oysters to be cleansed out of the River. This was something he had seen done regularly in the 1970's, but he had not seen dredges. Natural growers were using hand dredges, which was a new activity on the river. After awhile, Mr. Wommack confided why he was so upset he had been able to keep his sailboat at his dock until a few years earlier. At lower tides, he would hit "rocks," as he described, first at low tide and then at half tide, so it became necessary to keep the boat elsewhere. Other boaters had noticed this also, but he said he owned the largest sailboat (power boaters just used tilts on their vessels) and had the greatest difficulty. As the conversation continued, I explained about the recent surge in shell fishing activity and that the oysters were still "polluted," but had grown up and needed to be moved to clean water for a natural cleansing process. He asked if I could estimate how deep and responded two to four feet maybe higher in some places. He quickly concluded that the rocks he was grinding on weren't rocks at all, but perhaps oysters. I stated that it was quite likely. Walking out I noticed a natural growther who I knew and asked if he could make a few tows in front of Mr. Wommack's dock, which he did with us aboard. A 30 second tow yielded an overflowing bushel of oysters, most long and thin, from in front of his dock. Becoming excited, he stated, "take them all take them all; I know what the problem is now." He became so enthusiastic that he brought down 2 six-packs of soda and offered the use of his driveway or anything else he could do to help. After about two weeks, he noticed that oystering had ceased. It was the end of June and oystering and stopped until fall. Spawning season started June 20th.

Mr. Wommack wanted oystering to continue with the hope that the water depth would be what it was before. Several of the seed oystermen reported that the live/dead ratio had dropped to a point of 50 percent live, 50 percent shell so it was not worthwhile to oyster at that spot anymore. He was very disappointed and arranged for a second meeting. At this meeting, he produced a white line depth paper recording of the East River and Neck River. It clearly showed the East River dredged area by the Army Corps of Engineers, (last done in 1978-1980) and entering the Neck River the decrease in depth was quite noticeable. But what he wanted to discuss was the fact that, at various points in the Neck River, there were very noticeable bumps, some two to three feet higher than at other places. He asked if these bumps were the oyster "reefs" I had mentioned during the first visit. I responded that it was they were; report had come in that areas were high, but most of the living oysters had been scraped off the tops one to two feet, but several feet of dead shells remained. He had spoken to several of his neighbors, and they all wanted the oysters out.

I arranged for a seed oysterman to meet with Mr. Wommack about the shells in front of his dock. Estimates 600 to 1,000 bushels in front of his property. During the second boat trip, we concentrated several tows in front of Mr. Wommack's dock. Here larger dead shells, often still-paired, came up, but nearly all the dredges has very few live oysters. Back at the house, I showed Mr. Wommack a copy of Paul Galtsoff's *The American Oyster* (1964). In it, the author had included a picture of how oysters would grow naturally on top of one another until they met the ice line or winter freezing depth. It was the upward vertical representation he had shown with the white line recording earlier that summer. In early July, the shells in front of Mr. Wommack's house obtained a heavy oyster set on the shell fragments, which caused him concern rather than continue his petition with local residents to have the Neck River dredged by the Army Corps (similar to the East River), he wrote a letter to the Madison Shellfish Commission asking that the set and dead shells be removed from his dock area. A hand written letter dated August 8, 1983 was received, and a plan created to assist Mr. Wommack. Madison Shellfish Commission waived the dollar per bushel fee to the natural growther; Mr. Wommack hired him to take the oysters and shells, which were given to the Old Saybrook Shellfish Commission. The Town of Old Saybrook sent municipal dump trucks to the East River boat ramp for transplanting in Old Saybrook. Over a 5-day period, some 1,100 bushels of mostly dead oyster shells were harvested from in front of Mr. Wommack's dock alone. With the water depth restored, his sailboat was observed back at his dock later that August. That fall, he called to tell me that he was very pleased with the comprehensive shellfish program.

George McNeil, The Hammonasset River Natural Beds, Oyster Grower, Clinton CT

George McNeil, whose oyster business started at City Point (Oyster Point) New Haven in the early 1900's, also had bought tonged seed oysters from the local natural growers. George McNeil recalled that the oyster growers were reluctant to work on river oyster beds because they were subject to sunken trees that could snag the dredge, which was similar to hitting a rock. Although they had a "weak link" to protect the dredge, the shudder could damage deck hardware. Worse then that, the hardware chain plate which secured the haul/boom would break and send the boom racing across deck, dangerous to any standing crew. George also stated that natural oyster beds were subject to "sludge," an event linked to floods and spring high waters. Heavy rains would send underwater "mudslides" of organic debris, leaves, sticks and occasionally old dead trees. Mr. McNeil, who often bought seed oysters from "tongers," told of how tongers at times reported three or more feet of leaves covering productive beds. This occurred primarily after heavy rains. To move the leaves, old hay

rakes or bedsprings would be dragged on an outgoing tide. Oysters that were killed by burial in this process were called "stools," and there were oysters, that when tonged, came up dead but with shells still connected. These areas were avoided, but according to Mr. McNeil, they formed a place in which oysters would again set. Thus, the phrase, "oysters set on the stools." Stools were often found on the "edge," nearer the channel, "reef" oysters on the edge, nearer the bank. The type, quality and quantity of oysters followed positions on banks and reefs. The natural tendency was for river oysters to "reef up" toward the surface. This process created reefs, bars and to some extent, drove the deposition and erosion processes within the Hammonasset River itself, he felt.

Oysters upriver were subjected more to burial from leaves and sticks; oysters near the mouth tended to form reefs or oyster bars. Oyster populations were not static; areas that were productive one year could be gone the next, only to reappear a few years later. Oysters in riverbeds often trapped soft sediments from upland runoff, which to some extent facilitated reef upward growth. Long, thin, tapered oysters typify this growth and required a special type of oyster tongs (long teeth and smoother basket), which tended to "pinch" these oysters together rather than scoop them into a pile. Curved or bent oysters marked areas of deposition while rounder, deeper cupped oysters were found in areas of firm bottom, hard sand, shell debris or gravel bottom.

Currents also played a huge role in the development of river natural beds. According to Mr. McNeil, several oystermen told of a constant process of oyster burial followed by bend sets, reef formation and erosion then burial and redistribution of dead oyster shells bend sets and the pattern would repeat. Bends in the river were often the site of such a process, scouring would happen uncovering buried oyster shells and "chips" dead small shells of young oysters that would roll in and cut with a tide. As more shells were exposed, the chances that some would "catch a set" and start growing increased. Trapping silt and forming a reef that would grow changed the current slightly, and the process would repeat upstream and downstream. According to Mr. McNeil, a growing oyster reef in one area could destroy another and set the stage for future growth. This was much more pronounced change in the winter if ice formed, it tended to channel ebb currents, scouring oysters while burying others. When the ice left, more oysters would be destroyed and entire reefs gone. Although it was frequently called "winter kill," the oysters use not killed by freezing as the term might suggest, but rather they were buried in the winter and not re-cultivated before spring so they suffocated in the leaves.

Mr. McNeil also had accounts of oysters living many miles inland as for up as the headwaters of the Hammonasset. But, after the 1960's, no

one oystered above Route 1. He believed the oyster beds were not gone, just buried in silt. The most productive areas for oysters were in the last 3 bends in the Hammonasset River, the biggest being the area just north of the Cedar Island Marine bulkhead. He also described the difference in quality and quantity regarding the area in the River from whence the oyster was harvested. Mr. McNeil felt the lower river was capable of producing an excellent oyster. Oyster growers had staked off his grounds before the town of Clinton had declared it a natural bed, so his oyster grounds and a couple of others were exempted.

The lower portion of the River resembled more of an oyster bed, harder, firmer bottoms and shell fragments that he called "chips." Oysters here were "cups," a nice round shape with plenty of space to grow. Upriver, however, contained dogs and raccoon oysters; these were twisted shells that raccoons gathered at low tide. These oysters were worthless to the half shell trade as they were long and thin and some reached across the plate. In earlier times, they would have been shucked out for the meats, but Connecticut lacked a plant to do this (1979).

Natural Location and Oyster Ecology

Mr. McNeil felt the oyster beds upriver "grew wild" unless harvested and could, if left alone, "fill the River." He felt that was one of the reasons the lower Hammonasset was dredged, because the oysters had set on the chips and started trapping silt and lessened the water depth. He had noticed this several times, and the bed would grow tall (up) and then change position, sometimes several hundred yards to the south or north. He likened it to a loose fire hose whipping back and forth in the confines of the river width, which in the upper or inner harbor, was quite wide. He said that the entire river was a natural oyster bed, and that sets occurred on a regular basis pretty much every year until the 1960's. At that time, the river really silted in badly and silt became a problem. He had to wash his oysters more often. This was a chore with his dredge boat, the "Mollie M." People would think he was oystering all day, but he was really cultivating the oysters and removing sticks and leaves from them. This added cost to the operation, but he was compelled to do it. He did not know why leaves were now such a problem. He thought perhaps there were more trees or people were dumping leaves into the water.

Leaves, sticks and silt were an issue, but Mr. McNeil felt two things had happened - more street water and a local barrier beach inlet, the Dardanelle's, had been closed. He strongly felt this increased the silt in the upper harbor, when the inlet was silting less. The upper river was deep and at high tide ebb, carried a lot of the river silt out into the "outer harbor." Now that this inlet was closed, the silt tended to stay in and "clog the river." Although he could not prove it, Mr. McNeil felt

(and other Clinton finfish and shellfish fishermen agreed) that clamming and oystering had "suffered" since the closure.

They also had noticed that the River got shallower, especially in the area that supported the oysters from Hammonasset State Park and Cedar Island Marina. Here Mr. McNeil the "Army Corps" was filling in for "Mother Nature" by taking all the black muck and silt out. He noticed a rebound in fishing activity after each time they dredged. He also observed enormous amounts of shells being uncovered by the Army Corps which washed upon his beds, "chips" as he described them. Thousands of bushels would roll or tumble down river toward the tip of Cedar Island. They would frequently catch a set and start growing in the River again. If left unharvested, the pattern would repeat. He showed me the condition of the beds in 1978. We dredged up nothing but dogs long thin oysters, stained black about half way on the shell. At the bottom, nearly every oyster was a small "chip" or small flat piece of shell. (They looked like potato chips). Mr. McNeil felt that the previous dredge project had removed much of the black soft ooze as he called it and uncovered the chips. Tides started rolling these chips back and forth, cleaning them and created a place upon oysters could again set. He wished that the Army Corps could take the entire black ooze, for they certainly had enough of it.

In 1981-82, I ran an experiment with 1000 of these "chips," – the right valve of the oyster. We would catch thousands of them in the center of the channel by hand oyster dredging at low tide with almost no current. When we dumped the dredge, it made a characteristic sound of chips. Seemed to be all we could catch so we took a break and ate lunch. Curious, I gathered about two bushels of "pure chips." I set out about 1000 of these chips and painted about 500 red and 500 blue with some leftover marine paint.

After drying, I placed the blue chips at the last bend of the Hammonasset before leaving the state park and placed the red ones just before the Cedar Island Marina wood bulkhead/breakwater. Within two weeks, some of the blue chips had made it all the way to the breakwater; the red ones had moved only slightly north. From this informal study and I concluded that the general direction of shells was out, toward the Sound. This confirmed what Mr. Dolan also has stated, shell movement tended to be down river.

After dredging, Mr. McNeil thought the oystering improved for a while and fishing in general improved. Although he thought the Army Corps took a lot of oysters out, he believed they made room for more to grow. The only thing he experienced was the mud (he needed to wash his oysters more often) and more shell. He wanted the dredge company to move the shell upriver where it could do some good and get a set again quicker, but it never happened. The chips, as he

described them, almost totally consisted of the right valve, something I was to experience myself while seed oystering with others in the early 1980's. Mr. McNeil felt that the waste of shell was shameful and that the area should re-shell after each dredging because oyster sets were hard to get, and here they came "naturally."

Description of the Hammonasset Natural Oyster Beds

Although he used the term beds, Mr. McNeil actually thought them as "bars" or grounds. Oyster beds was as a term left over from the previous century when oyster growers first bought "bedding stock" from southern areas to "bed down" for a season usually the fall before marketing. That is how the oyster industry started in Connecticut; we ran out of oysters and people started buying "bedding stock." The term "oyster beds" stuck. The first town management was by oyster ground committees, and the ground was where oysters lived. He liked the term "bars" because in his mind, a bed was a place that was cultivated, seed planted and watched for predators. The bar better described the river oysters because for the most part, they were in areas that were anything like "flat" or cultivated ground. In the rivers, oysters formed "bars" and had a definite shape (topography). They were "beds in density only" and were not equally distributed; some sections better than others. It took local knowledge to know the good areas. He described similar situations around the bends - on some you could use your tongs (because it was so deep) and on others very shallow. Upriver you tended to pull oysters out as compared to pulling them together in a pile on cultivated ground. In other areas, it was better to rake out the oysters with a special rake. In Mr. McNeil's mind, it is also has to do with the shells or chips. He had seen sets on clean sand and pebbles on the inner and outer harbors, but that was rare now.

Oyster Reef Formation at River Bends

Mr. McNeil believed the currents swept dead shells or chips into the channel. Currents kept the silt off them, and they would catch a set. See Diagram #1.

The process is guided by currents and the shell shape; the rounder "cup" valve rolls and the flat valves tend to remain in the channel. We would dredge the chips at slack tide. He used the example of poker chips and marbles in a shoebox and shake, eventually the marbles will tend to be on top and "chips" underneath.

George McNeil would often say about the Army Corps that they were "most welcome to the muck, but return the shells." It was his feeling that oyster productivity had actually improved after each "cleaning," especially with the clearing the trees and logs. One large tree could ruin a lot of ground (river). Years later, coastal residents would learn about this in the Branford area. A tree dislodged by Gloria had blocked part of the Branford River. At that time (1988), "residents complained that the tree caused debris to collect since it crossed the Branford River. The National Guard removed the tree in August of 1988.

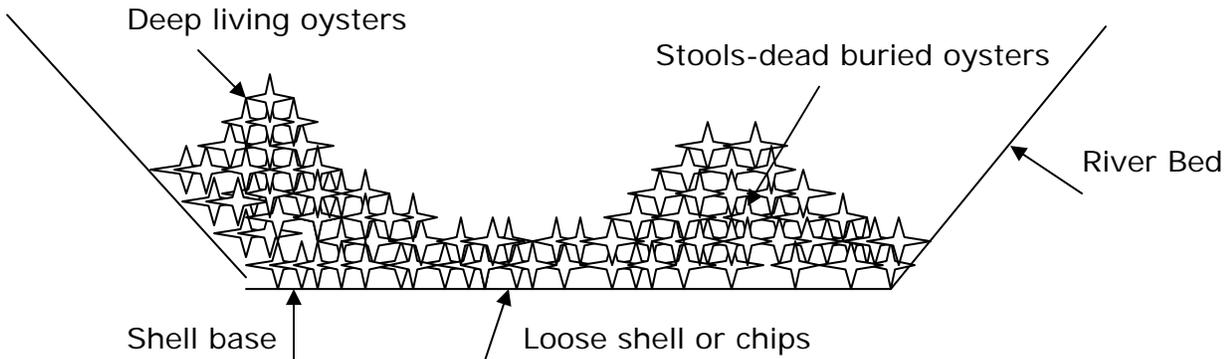
Mr. McNeil believed the Army Corps did a service for the fishermen, both shellfishermen also finfish fishermen, by "cleaning" the river. He pointed to a popular flounder fishing adjacent to Holiday Dock. He attributed what to his washing and dumping of shells in the channel at this location. He called the Army Corps of Engineers the largest "shell washers" around. He felt that oyster production would recover faster if the washed oyster shell could be returned to the channel edges. The Hammonasset River had a wide-shell base, so some shells were always left on the edges. The river therefore could in time heal itself since oysters often set and live naturally. However, he had seen changes in the way oystering had evolved and changes in the practice.

In the last years of his business, more and more of his time was spent washing shells, dredging up his oysters as a cleaning/lifting process. Many people felt he was oystering, but in reality, he was washing the shell and provided me an old newspaper article that appeared in the Shoreline Times. Much more silt and muck was in the River than in years past, and more "weed" (reference to sea lettuce) was present than in the 1940's. Much of the difference he attributed to street water, sticks and leaves. Leaves, he felt, was more of a problem, and oysters naturally grew to live above all the dead grass and leaves. The oystermen (tongers) would dislodge (clean) the beds by the annual cropping aspect of the oystering process itself. When that stopped, the leaves started to accumulate and decomposed over the oysters. Those that were buried, died and those in areas of the flow (both flood and ebb) could survive but tended to grow up and form a bank (reef). One side of the River reflected the flood reef which was usually not as dense or as large as the ebb bank (reef). These reefs would move according to the current in the channel, which over time, tended to whipsaw like a loose fire hose. He had seen the natural beds change. Over time, he felt the level of silt and leaves had

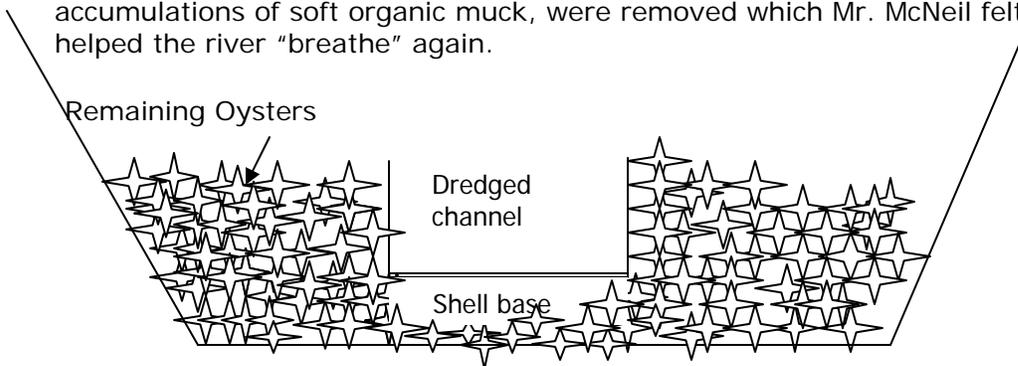
dramatically increased, almost to that point he suspected "dumping." According to Mr. McNeil, the Army Corps of Engineers had in fact become the "leaf rakers" by default. All the sand and street runoff carrying leaves, ended up on "him" or rather his oyster beds. To prevent burial, Mr. McNeil washed his oysters (mostly of the ebb tides) watching the debris washing out with the tide. Washed out oysters tend to "bank" and spread trapping leaves which decomposed and reduces the channel depth. He feared boaters would notice this and ask for more dredging.

Lower Hammonasset River – Pre-dredging

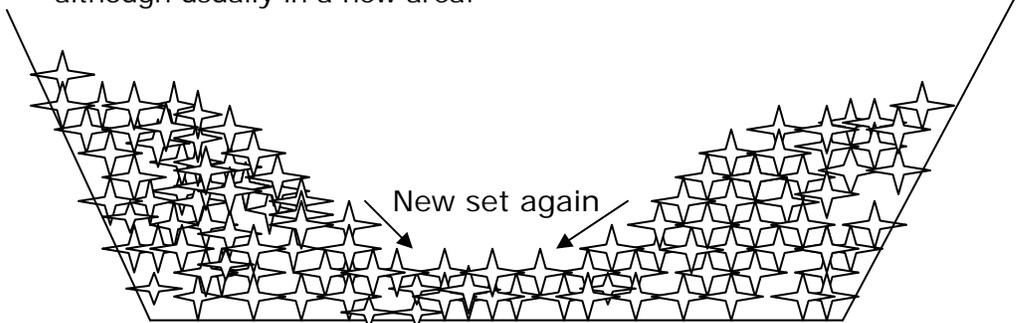
1. Mr. McNeil believes the shell base in the Hammonasset River is very deep because of his experience with dredging.



2. Post dredging – Large amounts of the oyster reefs as well as large accumulations of soft organic muck, were removed which Mr. McNeil felt helped the river "breathe" again.

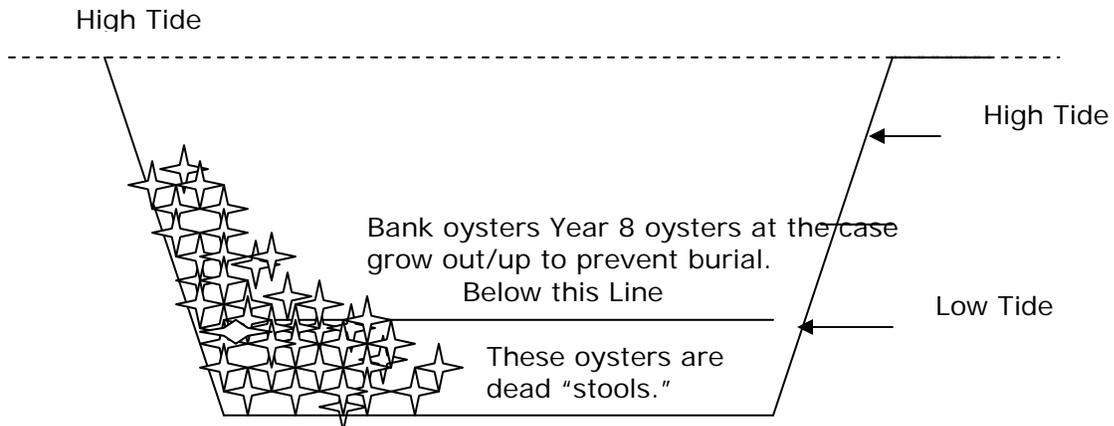
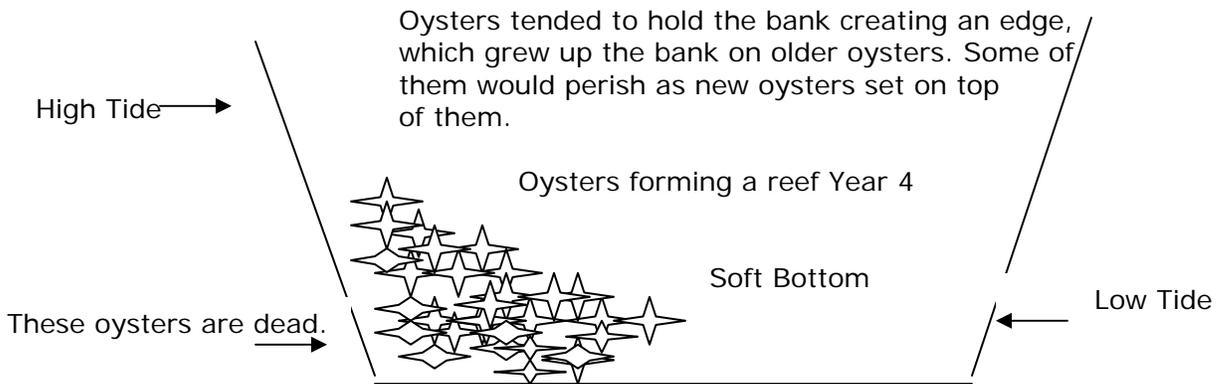
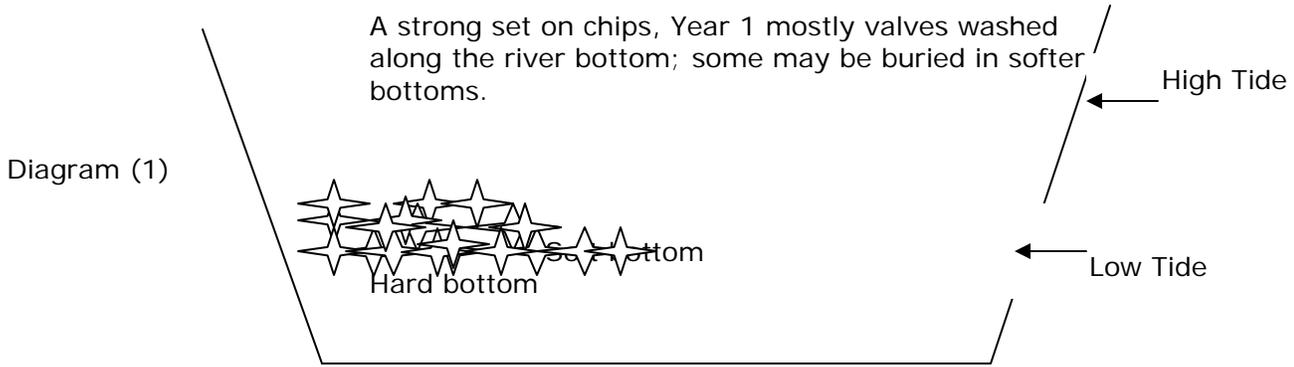


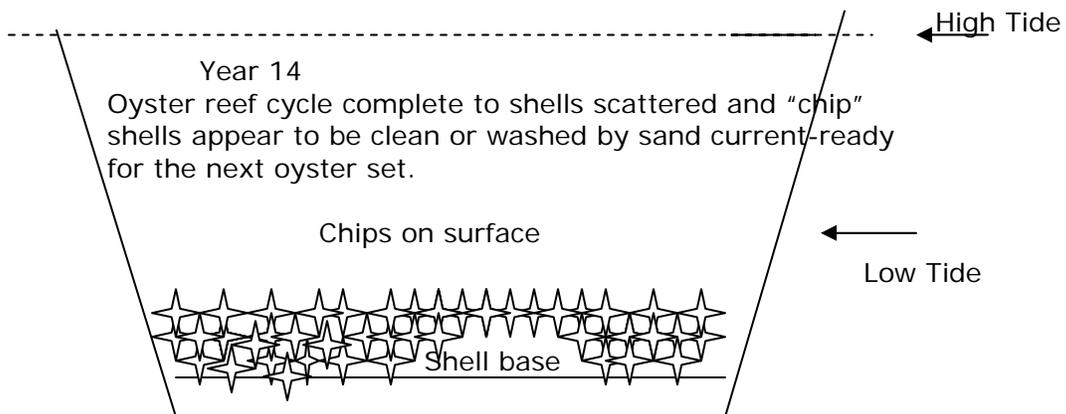
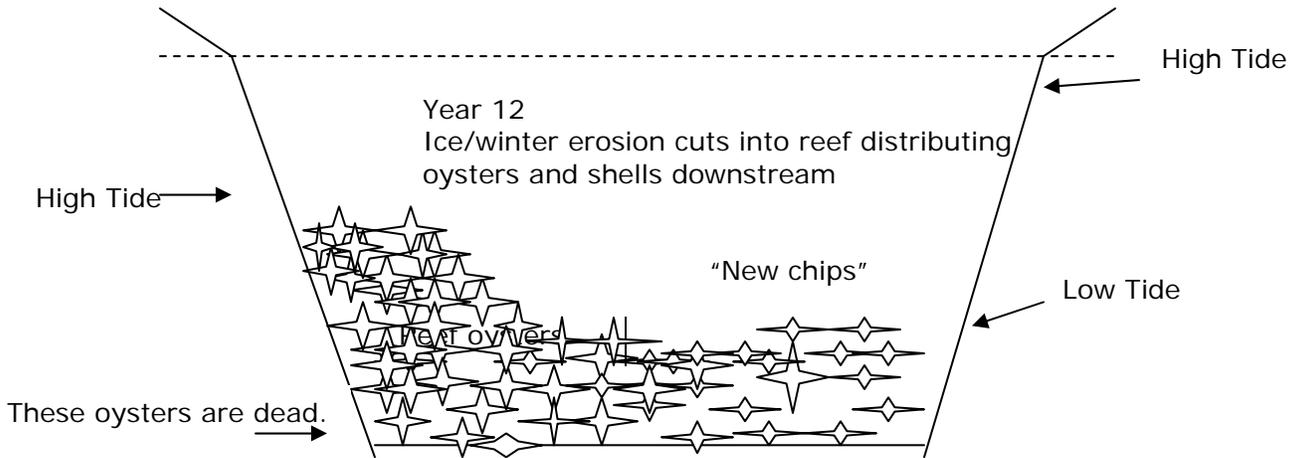
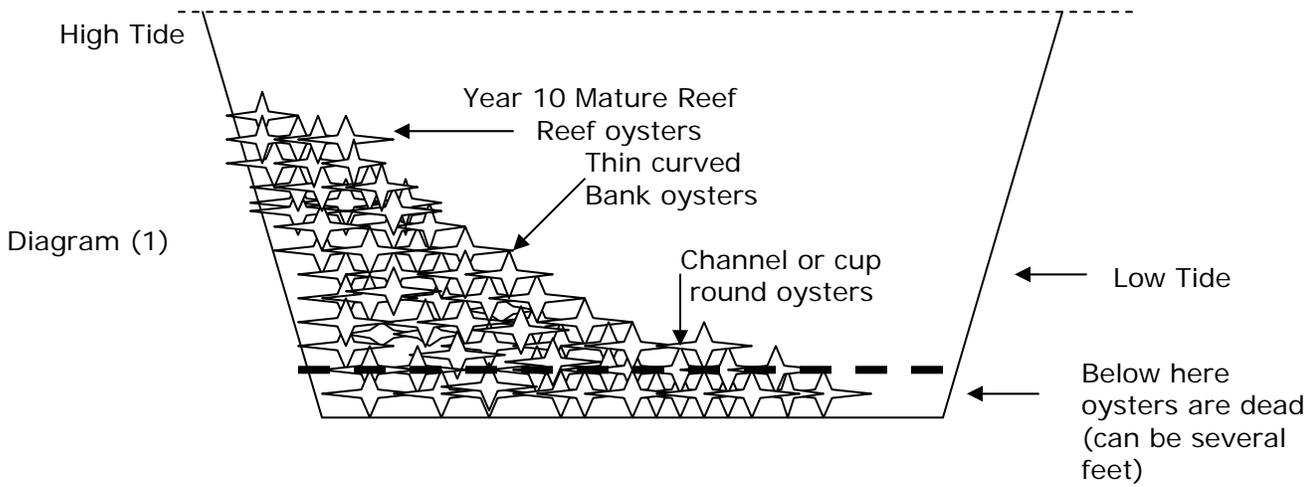
3. Redistributed oyster shells – currents wash and roll chips into the new channel, chips begin to obtain new oyster sets, and the reef begins again although usually in a new area.



Oyster Reef Formation at River Bends

Mr. McNeil felt the currents swept dead shells (chips) into the channel. Currents kept the silt off them, and they could catch a set. See Diagram #1





The lower section, Mr. McNeil described the bars as on the edges were currents kept the oysters free of silt and leaves.

Robert Post, Westbrook Shellfish Commissioner, Oyster Grower and Robert Ketchale Guilford Shellfish Commissioner, Oyster Tonger

A series of conversations and meetings with Eileen Daily, First Selectwoman of Westbrook, CT in 1987 resulted in a discussion with Mr. Robert Post, Chairperson of the local Shellfish Commission. He was very upset about the local shellfish situation in the mid 1980's which he termed "dismal." Water pollution and navigational dredging had taken its toll on the commercial and recreational shellfisheries. The town once boasted areas known as the "clam flats" where, according to Mr. Post, summer residents could clam by "the bucketful," for the soft shell clam "steamers" as the cooked version is frequently called. Water pollution from land however, had closed the town waters according to Mr. Post. It had been several decades since direct shellfish harvesting had occurred.

In the past few years, it was learned that some of the upriver sections of the Patchogue and Menunketsuck Rivers had old shellfish grants. Like many communities, Westbrook had the authority to grant title grounds similar to deeds for the purpose of growing shellfish. These were today (1987) being purchased and cleaned up from junk thrown in the river. The shellfishermen's biggest problem, according to Mr. Post, was that the most productive oyster beds were dredged out for navigation. They (dredging companies) took all the oysters and dumped them in Long Island Sound. Worse yet, they took the shells which were needed for younger oysters to grow. Some of the fishermen had noticed two or three times the oysters starting to come back, but then channels would be dredged again. The same thing had happened in the lower East River, according to Bob Ketchale, Guilford Shellfish Commission member and previous oyster tonger during a joint Shellfish Commission meeting.

Mr. Ketchale, during a Guilford Shellfish Commission meeting, commented about the lower East River located at the easterly border: "They left us a black muck hole where we once would catch flounder all winter long. Now, the only thing on the bottom is sticks and muck. It used to be good fishing there, winter flounder and sometimes blackfish, but nothing now."

According to Mr. Post, both Westbrook rivers contained natural oyster beds and off shore a large round clam or quahog bed. Oysters were harvested by tongs, mostly in the fall, after the middle of September. There was oyster tongs and clam tongs, which had a different shape, although the rivers contained mostly oysters. He had heard stories about bay scallops, but this was when Westbrook had fish houses and pound nets along its shoreline. He had not seen or heard about bay scallops in recent times.

About 6 to 8 individuals raked (tonged oysters) for resale mostly for local markets, although, when oysters were scarce, he knew of some being trucked to New York City. All that changed with the growth of the marinas in town.

It was clear Mr. Post still had negative feelings about the loss of the oyster beds. First it was the dredging which destroyed the beds and then the pollution for which he blamed boaters who sometimes pumped toilets "at night." I reviewed a similar problem in Guilford: according to Robert Ketchale, the lower East River had been dredged to accommodate about 12 town moorings, and we had partially rebuilt the oyster bed. The oystering process dislodged crabs and small clams, steamers, even fluke and blackfish could be caught while oystering this way. It was even a good way to catch small stripers. Guilford recreational fishermen knew this and used hand lines as the way to fish over the river oyster beds. (This account is similar to the large hook tub trawl flounder fishery of Niantic Bay although on a much smaller scale.) So when the Army Corps came and took the oyster beds, the recreational fishery also suffered. According to Mr. Post, fish come in with the tide and leave with the tide. Now, flounder fishing, which was very good each late fall in the Patchogue River is nothing. "There is no food, just muck, and fish don't eat muck; it's a shame.

Although Mr. Post was supportive at the reselling concept he felt that the dredging would just "stir things up again." The Army Corps would not give the oysters time to grow. A few of the old timers remembered flounder fishing with clam necks. Back then, they were so plentiful everybody had some or got their own. Now people eat what we called chum (steamers) you cannot even get the clam necks for bait anymore. A few of the local fishermen wanted to dig steamers as bait, but the State said Westbrook should not allow it. The area was closed by the Health Department (NSSP) so the clams went to waste.

Mr. Post was, in general, very discouraged about the shellfish situation in Westbrook. He thought the idea about reselling the bottom seemed like a good one. However, most people did not realize before the dredging how good the recreational fishing was over these areas, but the old timers knew and actually followed shellfishermen to the River. I told Bob Ketchale from Guilford Shellfish Commission that it was attributed to "free chum" during the process, tongs would occasionally crush the oyster. These would be tossed overboard and attract fish especially on the outgoing tides. The stirring of the bottom and oyster meats attracted flounder, blackfish, fluke, and even striped bass. Some of the older tongers, now long since gone knew about this and actually had hand lines (tarred hemp with hooks) off the back of

their boat. These hand lines had about 20 hooks baited with clam necks from steamers. These were tough and stayed on the hook. As tonging commenced, they baited the lines and threw them out. The tongers would put down a pole to keep them more or less stationary in the ebb tide and away from the boat. At certain times (tonging required occasional breaks; it was hard work), they would check the line or lines. It was often that several good-sized fish were caught this way, although hand lines had mostly been replaced by poles. Today, people knew this because they watched shell fishermen haul in the lines. Some of the largest flounder that were caught were behind the tongers. The oyster beds also had small shrimps and crabs that attracted the fish, according to Mr. Ketchale.

Howard Clark, Old Saybrook, CT– Fish Market Owner/ Commercial Finfisherman

In 1981, Mr. Clark owned and operated a fish market and tackle store at the foot of the Connecticut River at Saybrook Point. The Clark family has been part of Old Saybrook since Colonial times. His local knowledge of shellfishing was part of my University of Rhode Island Master's thesis regarding research with the Old Saybrook Health Department. Some for this research involved preparing maps of shellfish populations within Town of Old Saybrook waters (1980-1984).

Mr. Clark's information and his local insights of natural oyster beds was extremely valuable to my research. Mr. Clark knew of several natural oyster beds, two of which were in the Connecticut River. One was located on the flats off Great Island toward the Old Lyme shore, the other at the north end of the present breakwater close to the navigation buoy #4 inside of the Saybrook outer bar breakwater. These beds were large and were harvested each winter by local small boat fishermen. The oyster bed by the breakwater was more "of a reef" and produced thinner, longer oyster. It was about 5 acres in size. The oysters off Great Island (halfway between the abandoned shad long haul seine pier and Great Island) was a set on the sand that occurred about 10 years ago. This was not that uncommon. During the depression, men would tong oysters and clam around Great Island for quahogs and sell them door-to-door, according to Mr. Clark. Tonging for oysters was a lot easier off sand. (They were loose and nicely shaped, but bigger than off the breakwater bed.) Here, several fishermen modified bay scallop dredges used in the Niantic Bay scallop fishery by replacing the chain sweep (the dredge width in contact with the bottom) with a metal blade but no teeth. The modified dredge now was used to catch oysters. Mr. Clark was surprised to see our one bushel capacity hand-hauled seed oyster dredges with teeth that Mr. Jack Milkfosky of the Old Saybrook Health Dept. and I were using to survey for oysters. He had never seen an oyster dredge with teeth on the cutting bar before.

Historical Beds in the Connecticut River

Mr. Clark had knowledge of a second natural oyster bed up river in the vicinity of the bridges (Railroad Bridge and the Baldwin Bridge). At the turn of the century, fishermen used a modified push/pull rake to catch them as they were on the river's edge on the Old Lyme side, and they grew along the channel edge.

Fishermen at "slow water" slack tide would drift and drag the rake over the "edge" to catch oysters. Mr. Clark recalled seeing some of the rakes (Bull Rake) in the 1940's, but most was "retired" from service because outboard motors made it a lot easier to catch fish than oystering. Once in awhile, shad fishermen (including Mr. Clark who gilled Connecticut River shad during their migration up river to spawn), shad nets would tangle on the bottom and hook an old "black oyster shell" out of the muck in the area of the two bridges. He had caught many old oyster shells that way. He thought that the bridge construction or navigational dredging had destroyed the natural bed, which, according to Mr. Clark, was bigger than the ones we located with his help. What he did recall, was that several of his customers reported catching flounder over the oyster beds especially the one by the breakwater. Some of the old timers would tong some oysters, smash them and throw them overboard and fish among them.

With permission from Old Lyme and Mervin Roberts, Chairmen of the Old Lyme Shellfish Commission, we surveyed these two oyster beds, the breakwater bed on the left side and along the breakwater for about 600 feet. Oysters were caught in the dredge but were long and thin and tightly packed. The oyster bed by the breakwater was large for Eastern Connecticut, about 5 acres. Several thousand bushels were estimated to be found in this bed. It took about 30 tows before we started catch any in the dredge, seemed to have the characteristic reef appearance lower in the channel and rising higher next to the stone breakwater. The area off Great Island was larger, about 20 acres and consisted of 8-to-12 year old oysters on sand, a larger rounder "box" oyster about 4 to 8 thousand bushels. We couldn't totally really estimate the bushels at the breakwater-- both currents and depth made it difficult to estimate-- but concluded it was thousands not hundreds of bushels.

Mr. Clark confirmed our observations when we tied up our Brockway scow and showed him some of the oysters from the two areas. He said it was nice to see some "day time" oystering in town. We had permission from the Connecticut Department of Agriculture/ Aquaculture Division, Mr. John Volk, Division Chief, who the following year allowed us to survey from the State Aquaculture Division research vessel *The Shellfish*.

Part of the shellfish study in town was to determine if excess oyster set could be planted in areas that would not "wash." In other words, could oyster set could be planted to maintain the oyster bed? Mr. Clark's explanation of the difficulty with the local fishermen was how the River was closed to shell fishing. You had families that depended economically on these shellfish (oysters) and the way it was handled - no notice, no warning just a paper that said you can't shellfish here any more -- made some of the fishermen angry. He also said that oystering was different in the east than in the west where they catch "seed" (small oysters) and sell it to others who have "clean water" in which to plant. Here in Old Saybrook, we don't have that. The water off shore is too rough; the oysters would be carried away. What we had is a small but steady market each winter for the adults that the Oyster River Connecticut River produced, market oysters, not seed oysters. He suggested that the Connecticut River water be tested for a winter opening. He had heard that the State would sometimes do that. The fishermen in the area would support that, if they could see the actual test results. In the end he agreed that someone should use the oysters and that they should not be wasted. His opinion was that the proposal (shellfish management plan) would have greater success if it were done with the local shell fishermen.

According to Mr. Clark, sets of oysters off Great Island was not that "regular," but occurred occasionally. The lack of success of the Niantic Bay scallop fishery supported these oysters in an "off the book" fishery (Clark's terminology) in early winter. Although the Connecticut River was designated and closed and did not meet National Sanitation Shellfish Program harvesting guidelines, signs were posted as "no shell fishing" area. He suggested that harvesting was still an ongoing activity. Although he had "tags" for his shellfish, others didn't bother and kept oystering the way they had for years, not with tags. One of the problems, he thought, was how communications were handled. Some of the fishing families were multi-generational and consumed the oysters with no apparent problems. So when the River was closed to shellfishing with no explanation or proof, it was not trusted. What made it harder to explain was people kept telling fishermen those were "the best oysters I ever had." Mr. Clark said Connecticut/Old Saybrook oysters had an excellent reputation and were frequently listed on the menu of the Grand Central Station New York Oyster Bar. He had never heard of anyone getting sick although he thought the winter harvest had something to do with it. The summer boating traffic was gone and some boaters "dumped their heads in the area during the summer." Water quality during the winter was at its best. He wished us well for the success of the local shellfish management programs.

Anthony Ronzo, Recreational Fishermen, Oyster River Old Saybrook, CT

The Oyster River is located on the western side of Old Saybrook, Connecticut. The River, which contains a historic natural oyster bed, was the site of my University of Rhode Island Master's thesis on municipal shellfish management plans. The Town of Old Saybrook supported my research work and provided its resources, mostly by the involvement of the Old Saybrook Town Sanitarian Jack Milkofsky and then Old Saybrook First Selectwoman Barbara Maynard.

Mr. Milkofsky arranged for vessel usage, assisted with all shellfish surveys, and introduced me to several residents, some who lived along the Oyster River. Initial shellfish surveys revealed some of the characteristic conditions in unmanaged or uncultivated oyster beds. Residents would watch the work and within a few days, the newspaper articles in the local papers explained the shellfish management program and its purpose.

Surveys included mapping these beds which followed similar patterns, although much lower entering bends, oysters behind the deep areas, and oysters on the straighter sections. Several times the hand-hauled oyster dredge sunk into thick, deep muck, hitting long-since dead oysters. In general, the oysters were being buried in silt and soft muck. Penetration tests revealed several areas of about 3 feet deep of mud accumulations over shell. Pipe tests were often a quick way to measure the depths of soft organic deposits to the shell base. Examinations of the shells also indicated a lack of recent oyster sets and larger, elongated shell shapes. The average shell shape as described by Galtsoff in 1964, was in the high range, indicative of environmental stress. Oysters were being suffocated under larger adults in several areas. In 1981, about 70 bushels of bay scallop shells were purchased from Mr. Charles Potter of Charlestown, Rhode Island. They were part of a management experiment to determine the extent of shell movement in the Oyster River and also to see if oyster recruitment was possible. Bay scallop shells are relatively light and tend to roll in high currents. They would provide some information on the feasibility of future cultch planting and oyster setting.

Shells were transplanted to the Oyster River and off loaded at a public boat launching ramp located adjacent to Pelton Avenue. Scallop shells were shoveled overboard between Chartier and Beachman Avenues. Upon returning to the boat launch area, when Mr. Ronzo introduced himself to us and told us he was very much opposed to what was planned in the Oyster River. He described his feelings as a person who was involved and interested in the River's health and productivity. The oysters were doing fine in his mind and needed no assistance. After a

few brief, tense minutes, he inquired about what we were putting in the River, and we responded scallop shells as a test for oyster recruitment. The oysters were okay as far as he knew, and he seemed more concerned about street drains that carried sand and silt into the River. We mentioned that the Oyster River was closed to direct shellfishing with high bacteria counts and that the shellfish was going to waste. He disagreed; he described a situation of a continuing oyster harvest, by some of the local river residents. Therefore, unofficially they considered it to be "their oysters," and the concept of out-of-town fishermen, such as the "natural growers," would be strongly opposed.

In an effort to provide some instant education, we invited Mr. Ronzo to go back out and to do a few dredge tows with us. We selected several locations: one close to his home, one half-way between Pelton and Whitney Avenues and one upriver halfway to the Route 1 bridge. The tows yielded large adult oysters and some of the recently transplanted scallop shells. We landed two or three bushels of live large oysters. Mr. Ronzo was amazed about how quickly we could catch them. When we made the last tow, we asked Mr. Ronzo to help separate out all the small oysters one to three years old. He could not locate any -- that was the problem, the oysters were being buried and recruitment had stopped. We next moved upriver to a spot where we hit all dead oysters the day before, and made a couple of short tows. The water turned muddy brown around the boat and a half bushel of dead oysters, all "black shells". These oysters were buried about 5 to 10 years ago, they were below 1 to 2 feet of ooze we termed "black mayonnaise," a soft, jelly-like muck with low pH, that (it would quickly leave a black stain on our hands). The characteristic hydrogen sulfide smell was strong in the dredge contents; most of the oyster shells were still paired. While in the boat, Mr. Ronzo changed his mind about the shellfish program that day, and the more we talked, the more he told us about the River. Mr. Ronzo, a World War II veteran, lived along the Oyster River for many years. He also had noticed the Oyster River getting "softer" in the area by the boat ramp at high tide, where he would often swim. The bottom had been hard sand and pebbles, but now there was the soft muck we had just dredged up. He had noticed after heavy rains the Oyster River was "brown" like some of the rivers he had seen overseas. He attributed the brown to what he called "street water" and storm water from development on the Oyster River watershed. He repeatedly mentioned the large expanse from the parking at the Old Saybrook Shopping Center. According to Mr. Ronzo, after heavy rains, the Oyster River turned brown, and these events were getting more frequent and longer in duration.

Mr. Ronzo said he walked to the River almost every day, and when younger, he had fished and tonged for oysters in the River. He caught flounder, sometimes big ones, over by the boat launch. He told us of

tonging for oysters in late fall. The use of tongs was not just found in the commercial fishery. Towns such as Madison and Clinton once had about 30 to 40 recreational shellfishermen who still had clam tongs (short basket curved teeth) and oyster tongs (long bushels straight teeth) they used to harvest shellfish. One thing he mentioned with a chuckle, was that he would "tong for flounder." It seemed that flounder would come to the spot where he tonged oysters, and sending the tines down to the bottom, he frequently hit a large flounder. He sometimes "tonged more flounder than oysters." This was a surprise as, in the other areas, flounder were mentioned close to the boats, but this reference put them directly below the tongs. Apparently flounder were already in the vicinity and were either attracted to the mud, shell activity or were consuming crabs/worms or oyster pieces coincidental to oystering. (It would be several years later that I found a similar comment in a US Fish Commission report. George Goode reports that tongs would sometimes catch fluke over the oyster beds "by the tongs.") He said the River also contained small striped bass, eels and an occasional "tautog" or blackfish. Years ago, he had neighbors who would catch blackfish at the mouth of the Oyster River. They would anchor off the mouth to the right, tong some quahogs (hard shell clams), break them up and throw them overboard. Within 20 minutes, they would start catching blackfish over the clam beds. Mr. Ronzo said it was a chum effect for them, but every once in a while someone fishing off the dock to the right of the boat ramp also would catch a small blackfish.

Fishing had declined in recent years; very little flounder, eels or stripers were now observed in the Oyster River. Mr. Ronzo attributed this to the freshwater "from the streets." He had tried to get someone to tell him where all the parking lot water went (from the shopping plaza), and he believed it was dumped into the Oyster River.

Although now convinced the Oyster River was in need of help, he did not feel his neighborhood had caused the problem. To Mr. Ronzo, the higher bacterial counts could be explained by animals and the street water. He wanted some of the drainage tested for pollution as he was convinced it came from "upstream" and not from his neighborhood.

He seemed okay with the oyster program, as he had seen the buried oysters and the lack of small ones, but he felt his neighbors would not be that supportive. Too many, he claimed, felt the oysters were theirs, and the concept of out-of-town oystermen coming to Old Saybrook and removing oysters would be hard to explain. In a round-about-way, he described that people still took oysters out each fall when the water "cleaned up." Nobody got sick so it was generally believed it was okay to use them during the winter, but not okay during the summer. The shellfish management plan included a recreational relay to a newly approved, rainfall dependent "conditional

area." Here oysters would undergo a two-week natural cleansing process and be opened for residents recreationally. Even though it was the Old Saybrook residents, the oyster removal plan, for some of his neighbors, would be "difficult to accept."

Old Saybrook Shellfish Management Program

In May of 1980, the town of Old Saybrook opened the Oyster River to natural growth harvesters. Thirteen permits were sold about half to residents and half to oystermen from out-of-town. Within a 5-week period, just under 3,100 bushels were removed. Although some neighbors did call Town Hall to complain about the theft of oysters, the Selectwoman at the time, Barbara Maynard, backed the plan. During this 5-week period, seed oyster harvesters (natural growers) towed the hand-hauled 1 bushel capacity seed oyster dredges with many equipped with the McKenzie plate. This plate was a relatively new addition to the old style seed oyster dredge. Based upon the research work of Clyde Mackenzie, then a field biologist for the US Dept. of Interior, Fish and Wildlife Service - Bureau of Commercial Fisheries whose functions were transferred in 1973 to the National Oceanic and Atmospheric Association, National Marine Fisheries Service in Milford, CT). Dr. Mackenzie had urged the State to change from tonging to these hand dredges which, when equipped with a pressure plate, tended to wash the silt off buried shells and improve the ability for oysters to set. After the State switched from tongs to hand-hauled dredges, production in the Housatonic River, which had averaged 8 to 12 thousand bushels in 1973, had passed 150,000 bushels within 3 years (1976).

During the seed oystering operation in the Oyster River, a similar scouring and burial process was discovered, in some places an estimated 3 feet. Live oysters were harvested from the surface, but many more bushels of buried, paired oysters shells were brought to the surface. We did catch a moderate oyster set later that summer however there was no doubt that the oystering had dislodged sticks, leaves and silt that had been building up on the oyster reefs. Several Old Saybrook small boat fishermen agreed with the need to "work the beds" to remove leaves and sticks. They just wished the water quality was good enough, so they could sell them once again directly to the "fish markets." They also realized that large sections had been buried for many years and worked to uncover the beds. Regardless of the rationale, it was clear that a large amount of soft organic sediment had washed from the Oyster River during outgoing tides. Although the cleaning process had occurred, it was not the primary aim or purpose of the study.

A few days after the last oyster operator had left the Oyster River, I took a call from Mr. Ronzo. He sounded anxious and began by

explaining that "they're back." Thinking it was more oystering activity, I asked who was back, and he replied "not who, but what." I was confused and said, "What was back?" and he said, "The fish were back." Apparently, within two to three days after the oystering has stopped, fish had started to be seen or caught in the Oyster River. The reports included some children catching flounder, which had not been seen in recent years eels in his neighbor's eel pots, blue crabs and something that looked like a silver fish or striped bass. Determined to find out what the silver fish was, he borrowed a seine net and made a small drag next to the boat launch ramp. He had caught enough sand shrimp to fill a "five gallon pail" in one seine. He said the River was full of shrimp. He also got some shiners and small snapper blues and "the usual" mummies and shiners or silversides. He had not seen anything like this in all the years he had lived along the River. Mr. Ronzo felt I should know what was happening. He was convinced that the silver fish he had seen were eating the shrimp, and the shrimp, he felt were eating something in the mud. All he knew was it was like somebody had flipped a switch, and the Oyster River was alive with fish.

Later that summer, I stopped in to see Mr. Ronzo and follow up on his earlier reports. According to him, the silver fish he saw were small weak fish, and that two of them were caught the previous week. In the last few weeks, things had died down; it was hot and although the blue crabbing had improved, reports of the fish had lessened. He wondered if the oystermen were going to come back and give the River "a good scrubbing." I said that efforts were going to be on laying down some clean shell in the hopes of getting a set. We talked for a while and he let me know that the River looked "cleaner." You could see the difference and that people that had been so dead against, the oyster plan could not argue against the fact that the River looked better and the fishing improved.

I would meet Mr. Ronzo one more time, in 1985, two years after the shellfish project had been turned over to the local Shellfish Commission. Mr. Milkofsky, a member of the Shellfish Commission, was concerned about the Oyster River beds which had obtained good oyster sets in 1983 and 1984. Some of the local residents had reported that "grass was growing on the oysters." Concerned, he arranged for a boat and dredged for a short shellfish survey. We dredged some of the same areas as in 1981-82 and found a good crop of 2-to-3-year-old oysters, but nearly every oyster had a long, thick blade of green sea lettuce or Ulva growing from it. Sea lettuce thrives in warm, nutrient enriched waters. At low tide, it did look like grass was growing on the bottom. The bed of sea lettuce was so thick it made oyster dredging difficult and some of the oysters had already died from the trapped silt, something that had happened to oyster growers on Cape Cod.

John "Clint" Hammond of Chatham, Massachusetts an oyster grower, described a similar situation in which sea lettuce grew on top of his planted oysters. It got so bad that he hired two high school students to tow a section of page fence over his planted oysters in an effort to cut it off. He said it worked very well but needed to be done at least twice before the winter time. Mr. Ronzo had seen the seaweed increase also. When we saw him again, he was still trying to get answers from the town about Route 95 and Route 1 storm water (street water) discharges. He continued to be convinced that the problems in the lower river were caused by watershed changes up river. He also felt excess nutrients were finding their way into the watershed since he had never seen so much seaweed/sea lettuce as now. He remembered seeing "a patch" now and then while blue crabbing; he would look for soft shell crabs under it, but it was nothing like it was today. To him, it seemed as if the entire river bottom from bank to bank was covered with it.

My experience on Cape Cod, with Green Pond, a small coastal salt pond, had the same type of sea lettuce growth. In 1981, it was undergoing intense eutrophication. The sea lettuce got so thick and oxygen levels got so low that the blue crabs left the pond by walking along the shore. Green Pond became anoxic one August afternoon and killed many winter flounder. Just a few days before, many of the residents along Green Pond had complained to the Cape Cod Extension Service in Barnstable (where I was employed) about a rotten egg, hydrogen sulfide smell coming from the pond. It was a warning that the pond was about to go anoxic. Unfortunately, Mr. Ronzo reported the same type of smell several times in the morning on calm days from the Oyster River. To him, the "marsh gas" smell was becoming more frequent.

Jack Milkofsky wanted to see if a similar device or devices which Mr. Hammond had used on Cape Cod to "battle the seaweeds" could be used here. The Old Saybrook Shellfish Commission would purchase the needed materials. Two types of "cultivators" were built, one of 4 foot wide by 4 foot long section of collapsible "page" type metal fencing that was attached between two one-inch diameter black iron water pipes; a bridle towing point was attached. After a quick couple of tows, it was necessary to add a second section of pipe to keep the fence on the bottom and in contact with the bottom. The sea lettuce did get pulled off the oysters, but the "cultivator" had to be frequently cleaned. The fence itself turned into a green carpet of sea lettuce and tended to come off the bottom. A second cultivator was built two weeks later out of chain mail, the same rings and connectors as the bottom bag of the hand-hauled seed oyster dredge. Long chains of rings (8 feet) were connected to two one-inch diameter black iron pipes. The pipes need to drilled to accept eye bolts at regular

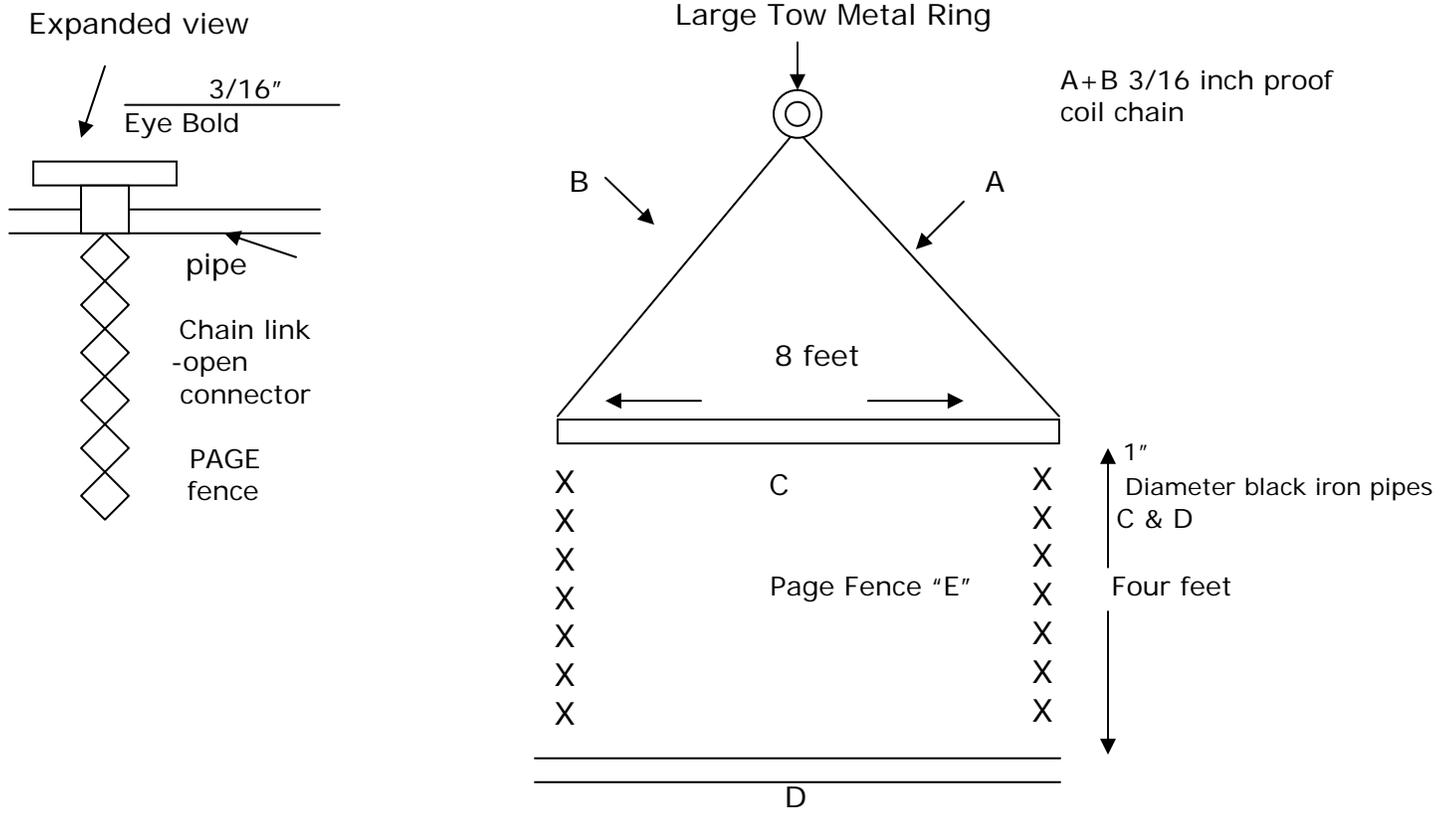
intervals. The second cultivator was tried in the same section of the River between Pelton Avenue and Waterbury Avenue with Mr. Ronzo watching. This cultivator worked better. The spaces between the rings tended to pass limbs, sticks and leaves as well as pull off the blades of sea lettuce. Once detached, the sea lettuce tended to float between the rings and be carried by the ebb tide. (Note: Most cultivating is done on the ebb time. We noticed that fish tended to "flee" when the noise of the outboard and rig approached; they returned quickly when the operation ceased.) This process tends to wash the oysters of silt, muck and partially decayed leaves. This material, when cast down river, seemed to attract large numbers of sand shrimp. It would be helpful to know the responses of bottom organisms with such bottom cultivation in the field with oyster shells. After a few tows, we waited for the water to clear and dropped the hand-hauled seed oyster dredge. Although the dredge quickly loaded with sea lettuce, it was loose sea lettuce, so Mr. Milkosky and I felt the second cultivator was more effective. At the end of the tide cycle, we observed rolls of sea lettuce near the banks.

At the end of the second trial, he was going to contact some local commercial fishermen to see if he could enlist someone to help cultivate the beds so the young oysters could mature.

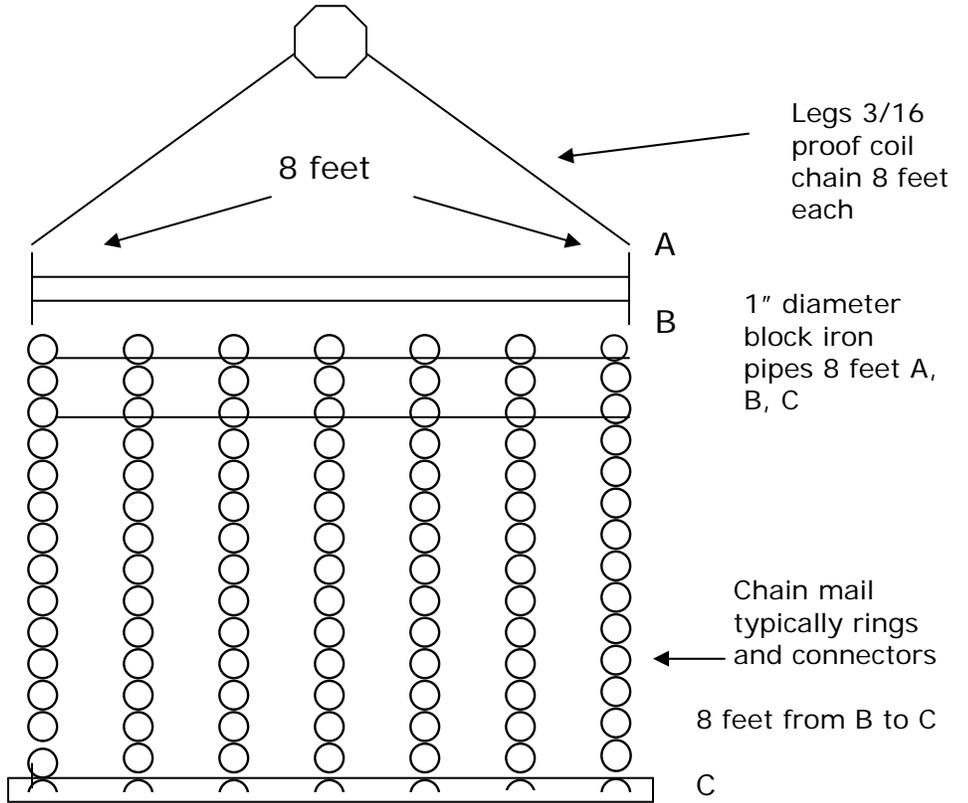
That was the last time I was on the Oyster River and spoke with Anthony Ronzo. When we last spoke at the boat ramp off Pelton Avenue, he was still pursuing the storm water problem. By that time, the Old Saybrook Shellfish Commission/Health Dept. had suffered some serious budget cuts, and Mr. Milkofsky stated that the problem storm water and bacterial counts was seen to be beyond the scope of his current assignments.

Old Saybrook Shellfish Commission Cultivators (July 1985) materials for Chain Mail purchased from Wilcox Marine Supply, Stonington, CT.

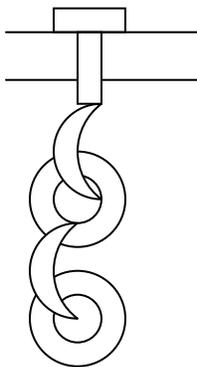
The "Page" fence type cultivators John C Hammond, Oyster River Chatham, Massachusetts.



The Chain Mail type Cultivator (Note the addition of the second piece of 1" black iron pipe)



Expanded view
3/16" eye bolt



← Pipe

Chain link

Split open

For more information about the Old Saybrook Oyster River Study, please contact the University of Connecticut Sea Grant Program and ask for Sea Grant publication # CT – SG – 88-06 – “Shellfish Management Procedures for Southern New England Towns,” A plan prepared for the Town of Old Saybrook, CT or contact The Sound School.

For more information about the Tidal Oyster Beds in Guilford, CT, ask for “An Oyster Bed Restoration Program for the East River – Town of Guilford, CT.

A more recent publication titled "Connecticut Shellfish Restoration Projects Linked to Estuarine Health" presented at the 9th International Conference on Shellfish Restoration contains a large review of the Oyster River project.

Copies of the above can be obtained from:

The Sound School Regional Vocational Aquaculture Center
17 Sea Street
New Haven, CT 06519

The Nature Conservancy - National Office in conjunction with NOAA The National Oceanic and Atmospheric Administration of the US Dept. of Commerce has produced a practitioners guide to the “Design and monitoring of Shellfish Restoration Projects” this 28 page publication reviews several critical parameters for designing and monitoring shellfish restoration projects. It is a fantastic reference to anyone or organization who wants to learn about or attempt shellfish restoration. To find out more about this publication contact:

Robert D. Brumbaugh
Global Marine Initiative The Nature Conservancy
University of Rhode Island Narragansett Bay Campus
South Ferry Road
Narragansett, RI 02882
rbrumbaugh@tnc.org

In 2000, I learned from Judy Preston of the CT Chapter of the Nature Conservancy that the Oyster River is the site of one of its new stewardship projects. A group of concerned citizens living along the Oyster River had formed and was looking at ways to improve the Oyster River. Several partnerships were involved and information about current research projects underway is best obtained from the Nature Conservancy.

Connecticut Chapter of The Nature Conservancy can be reached for more information at:

The Nature Conservancy
Connecticut Chapter
55 High Street
Middletown, CT 06457

I am always grateful to readers of my fisheries history papers that provide me comments/connections. It is also how I can add additional information and update what is available. My research work during the past four years has been the habitat association between oyster beds, oyster reefs and shell bottoms to winter flounder and other fish populations. Any information on that particular topic, but also any related information account records about tidal River Oyster Beds would be grateful appreciated.

© Tim Visel December, 2007

I can be reached at the following:

Tim Visel
The Sound School Regional Vocational Aquaculture Center
17 Sea Street
New Haven, CT 06519

List of all Appendices -

- 1) Newspaper Articles "Oyster Problem is Not Simple"
"Oyster contact goes to Joe Dolan"
Correspondence "East River is closed to Shellfishing"
(transcript).
- 2) Legal Notice – Invitation to Bid – Towns of Guilford and
Madison
- 3) Correspondence – S. Jackson Wommack, August 8, 1983, July
1988 (transcript).
- 4) Newspaper Article – Oysterman Fights for Crop"
- 5) Newspaper Article – "State Oyster Program Showing Returns"
- 6) Newspaper Article "Marine Scientists Study Oyster Beds"
- 7) Report – "Diver/Video Survey of the Lower Neck River and
Lower East River, Guilford, CT.
- 8) Reports – Water Quality – Guilford to Old Lyme, CT
- 9) Photographs – Newspaper Articles "Cutlers Clam Stove"

Appendix #1 Newspaper Articles

Provided by Mr. Joseph Dolan – Guilford, CT

“OYSTER PROBLEM IS NOT SIMPLE”

“Guilford Has Rare Opportunity for Development”
THE CLINTON RECORDER, Thursday, December 1, 1949

Correspondence Provided by Nathan Walston

Susan B. Spencer M.D. “To Whom It May Concern”
December 2, 1966 – Transcript – Madison

“Oyster Contract goes to J. Dolan”
Shoreline Times, April 12, 1979

Appendix

SUSAN B. SPENCER, M. D.
Island Avenue
Madison Connecticut

December 2, 1966

TO WHOM IT MAY CONCERN:

Insofar as the East River has not been certified by the State Department of Health for commercial harvesting of shellfish, no shellfish taken there of from may be sold until further notice.

Susan B. Spencer, M. D.
Director of Health
Town of Madison

Appendix #2

Legal Notice – Shoreline Times March 22, 1979

“Invitation to Bid Towns of Guilford and Madison”

Page 32-M

Appendix

March 22, 1979

SHORE LINE TIMES Page 32-M

Legal Notice

INVITATION TO BID
TOWNS OF GUILFORD
AND MADISON

Bids are being considered by the towns of Guilford and Madison for the transplanting of oysters from the East River on a no-cost basis to the towns.

The bids shall be "So many bushels of oysters for the town and so many bushels for the bidder."

The Towns shall reserve the option to award more than one contract.

The Towns shall reserve the right to reject any or all bids.

Oysters to be transplanted between April 1 and June 1, 1979.

Maximum number of bushels to be transplanted approximately 20,000.

The transplanting for Guilford will be to an area off Guilford Point.

The transplanting for Madison will be in the vicinity of Tuxis Island.

Questions may be directed to Nathan Walston of Guilford at 453-4128 after 6 p.m. or Donald Stone of Madison at 245-9730 after 1 p.m.

All bids should be sent to the First Selectman, Guilford Town Hall, Park Street, Guilford, Connecticut 06437.

Bids close March 30, 1979.

NATHAN WALSON

Chairman

Guilford Shellfish Commission

CHARLES SCHROEDER

Chairman

Madison Shellfish Committee

T12-1tM

Appendix #3

Correspondence S. Jackson Wommack, August 8, 1983
 S. Jackson Wommack, July 1988

Letters sent to Tim Visel – Transcripts (Madison)

Appendix

August 8, 1983

Chairman, Madison Shell Fish Commission
Madison, CT 06443

Dear Sir:

Our property located at 14 Circle Beach, Madison, fronts on Neck River for approximately 200 ft.

The 200' of Neck River along our property has been surveyed by a member of your commission. Oysters 1" to 3" in size were found in abundance. These oysters have accumulated rapidly over several years to a depth of one to 3 ft. It was estimated that in excess of 1,000 bushels are in this area.

We request these oysters be removed. We would be willing to have these oysters removed by commercial oystermen who would be permitted to use our dock on Neck River in carrying out this operation.

Thank you for your courteous and prompt response to my request for assistance.

Sincerely,

S. Jackson Wommack
#12, 124 Circle Beach
Madison CT

July, 1988

Univ. Conn.
Sea Grant Marine Advisement Service
Avery Point Campus
Groton CT 06340

Attn: Mr. Tim Visel
65556

or

S. Jackson Wommack
12 Circle Beach Road
Madison, CT 06443
245-2565
P O 820
Richland, Missouri

Subject: Removal of oyster shells, Neck River

Dear Mr. Visel,

The buildup of oyster shells in Neck River for which you managed the removal 5 years ago, has again reached dangerous levels. The Neck River, flowing thru extensive tidal marsh is prolific in growing oysters which accumulate in excess of one foot each 4 years. Now this growth renders Neck River navigate able only above ½ tides.

The Circle Beach Association, representing 21 houses and other property owners, has requested the town of Madison to clean up Neck River. A copy of the letter, sent to the town selectman is attached. You will note reference to your last efforts in solving biological/zoological problems that seem to have been beyond the management capability of the shellfish commission of that time. The present shell fish commission appears to be very competent but have expressed interest in your again assuming a leadership role.

The Circle Beach Association solicits your help.

Attached is a chart indicating Neck River depth from the Guilford town line at East River to the Madison town dock. Tide was 2 hours from low, but 3 ½' deep in bad spots.

Appendix #4 Newspaper Article

Provided by George McNeil, Clinton CT

"Oysterman Fights for Crop"

THE CLINTON RECORDER, Thursday, April 23, 1953

Appendix #5 Newspaper Article

"State Oyster Program Showing Returns"

THE DAY Regional Section September 3, 1989

Appendix #6 – Newspaper Article

THE HARTFORD COURANT South Central/Shore Edition September
2, 1988

“Marine Scientists Study Oyster Beds”
Divers filming under water in Guilford

Appendix # 7

Report Provided by Robert DeGoursey University of Connecticut
Marine Sciences 1/9/88

"Diver/Video Survey of the Lower Neck River and Lower East
River, Guilford Connecticut"

Appendix # 8

Water Quality Reports – Obtained by John Bowers Madison Dept of Health, James Citak CT Dept of Agriculture – Aquaculture Division and Malcolm Shute, CT Department of Agriculture/Aquaculture Division

Water Quality Reports – Appendix #8

<u>Location</u>	<u>Date</u>	<u>Report Author</u>
Madison East River	Dec. 2 nd 1966	Susan B. Spencer, M.D. Director of Health Town of Madison

Summary: Insofar as the East River has not been certified by the State Department of Health for commercial harvesting of shellfish, no shellfish taken there from may be sold until further notice."

Note: Letter obtained from Nathan Walston, August 1987. To his knowledge the first time Water Quality in the East River was questioned.

Hammonasset River Clinton CT	Nov. 23, 1965	Theodore C. Willerford Principal Sanitary Engineer CT State Dept. of Health
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Summary: Recommend closure of Hammonasset River Watershed (permanent) Pollution Service 27,000 gpd waste water/sewage plant at Hammonasset State Park. Several marinas, Chesebrough Pond Company, 13 overflowing septic tanks on the Indian and Hammock Rivers.

Justification: 1962-64 8 samples station #292 68 MPN Bathing Beach Program.
1956-1960 12 samples station #292 460 MPN Bathing Beach Program.

Madison (All Tidal Streams)	April 26, 1971	Alan J. Buzzetti, Sanitarian – CT Dept of Health
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Summary Previous Sanitary of Madison Shoreline (State Dept. of Health) Feb 4, 1938, July 15, 1955, November 1, 3, 7, 1966. This survey has found several possible pollution sources along tidal streams and suggests immediate dye testing.

Guilford and Madison East and Neck Rivers	Nov. 10, 1971	Michael Rossetti Principal, Sanitarian CT State Dept of Health
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Summary: Madison is to stop issuing shellfish permits for East and Neck Rivers – Effective 2nd December 1971 – Madison water quality tests of these areas were good but area was closed by the State of Connecticut

Health by order of commissioner Franklin M. Foote, M.D. (Poor water quality since 1966).

Neck River (Madison)	Dec. 6, 1971	Anthony V. Sardinas Sanitarian - CT State Dept of Health
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Summary: One direct discharge of sewage was observed. Middle Beach Circle Beach and Garnet Park areas should be dye tested during the summer.

Madison (Neck River)	Oct. 17, 1972	Hebert Lunt The Lunt Soil Water Laboratory
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Summary: Good, very little contamination MPN/100mL (93)

Madison Shoreline Survey (NSSP)	Jan. 7, 1974	CT State of Dept. Health (Hartford)
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Summary: 1971 Survey identified several pollution sources (April) 1971 resurvey identified 1 source (November).
Recommendation water sampling that be done along Shoreline in summer months to check for water quality during most unfavorable pollution conditions (rainfall).

East and Neck Rivers (Madison)	Sept. 18, 1974	Robert M. Cosgrove Sanitarian - CT State Dept of Health
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Summary: East River is presently classified as conditional based upon samples meeting harvesting criteria. The Neck River remains prohibited and closed to harvesting. Recommendation increased testing under various hydrographic conditions that dye testing of several areas (Applehurst) required in Neck River area.

Madison, CT All Shoreline Survey NSSP	Sept. 20, 1974	Robert Cosgrove Sanitarian, CT State Dept. of Health James Citak, Sanitarian - CT State Dept. of Health
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Summary: Some homes on the Tom's Creek Watershed (Pent Road) appear to be contributing possible sewage pollution. Recommendation that shellfish waters of these two creeks will be sampled to determine pollution sources.

Appendix # 9 Photographs and Newspaper Articles

Obtained from Nancy Farnan Courtesy of the Charlotte L. Evarts Memorial Archives (Clema) Madison, CT

- A) From the Bassett Collection – Shoreline Times Circa 1900 photograph showing the Madison side of East River Route One Bridge (Cutlers Clam Store” notice two oyster scow boats to the left adjacent to bridge guard rail.

- B) Some photograph – Circa 1942 – Cutlers Seafood - Madison, CT.
Note – Oyster skiff with culling table at bow small outboard motor. At dock above oyster skiff at least one set of oysters tongs – also empty shells in driveway shipping barrels for shellfish surround buildings. Under the large clams sign there appears to be hand hauled scallop dredge.

Note – Most of the conversations acknowledge that much of the commercial oyster tonging activity was from Guilford. Two people frequently mentioned from Madison were John Blakeman and Harold Griffin while some 6 to 8 Guilford individuals were engaged in the commercial fishery.

Thank you Sue Weber for enlarging and scanning these photos.

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