

**EPA/DEP Habitat Restoration Committee Long Island Sound Study
Updates to the Artificial Reef Report – April 2011
Tim Visel – Member Habitat Work Committee *
Potential Agenda Item for July Meeting
Can We Recycle the “Q” Pearl Harbor Memorial Bridge for Reefs?
Part I Connecticut Reef Experience, Part 2 Florida Reef Experience,
Part 3 South Carolina Reef Experience**

“Boats and artificial structures appear to be more popular among anglers than natural sites... A second reason for the popularity of boat and man-made structures is that these two modes, very simply are more productive. Man-made structures, particularly docks and jetties furnish natural cover, currents and back water areas which tend to attract fish.”

Source: Connecticut Marine Recreational Fisheries Survey, 1979-1980 Robert F. Sampson Jr. CT Dept of Environmental Protection Marine Fisheries (1980).

Since this agenda topic was first developed for the HRI committee (March 24, 2010) new initiatives have been reported for designing and approving artificial reefs. The Reef Ball™ Company and now a new Maine modified mooring system is in an experimental phase which both promise to provide information about some habitat creation research areas in the near future. However, a popular recreational fishing weekly newspaper The Fisherman recently ran an article in the March issued titled “A Woeful Record Still No Reef Program” (March 3rd 2011). The article details the lack of New England’s progress in many areas associated with artificial reef habitat enhancement. To many the concept building non-natural structures such as artificial reefs to create new habitats for fish and lobsters is a difficult one. Tim Coleman’s article in The Fisherman appeared in the #9 March 3rd and issue contains this paragraph on page 18.

“All up and down the east coast, New York to Florida, states have been working to enlarge their reef programs. This past winter, Florida Sportsman magazine published a four-page article on just the latest updates for all around the state. South Carolina used to put up posters in various public areas proclaiming its reef system, saying “Artificial Reefs Equal Good Fishing.”¹

* Tim Visel is a member of the Long Island Sound Study Habitat Restoration Committee. The view expressed here does not represent the Long Island Sound Study. No consensus has been obtained by the committee (2010-2011) as to supporting efforts, to build reefs to support recreational and commercial fisheries in Long Island Sound.

The issue which complicate reef building activities in Connecticut can be divided into two basic areas, regulatory and environmental. Maine now appears to be developing an innovative system that combines some of the features from the

¹Reprint permission Zach Harvey, Manager Editor, The Fisherman, April 26, 2011.

1960s experiments with triangle shaped septic galleries and traditional concrete mooring blocks. The Wind Reef Group is marketing a habitat mooring system in which the lower portion resembles the drywell leaching galleries with a mooring attachment at the top. Roughly large blocks of concrete, various size and level holes were incorporated into the design as habitat for lobsters. The concept appears to being doing gaining support in the state. A site is available for reviewing a short video and can be found at www.habitatmooring.com

Part 1 – Madison, Connecticut Reef Creation 1975-1978 – Historic Lobster Fisheries practices.

While the 2009 paper I submitted to the committee talks about alteration of natural habitats from environmental viewpoint and last years report (March 2010) recalls an attempt in 1973-75 to construct reefs with sidewalk concrete slabs, (unsuccessful) from the regulatory viewpoint. The March 2010 report however failed to mention a small private artificial reef constructed from old plumbing fixtures – mostly old bear claw bath tubs and cracked cleaned porcelain fixtures during the same period. Although not personally connected or involved in the reef building and learned of it after it was well underway. It did support it, was influenced by my earlier conversations following exposure to the Florida artificial reef program in 1974. A Madison neighbor who liked to recreationally lobster asked about a creating a reef for them. After several conversations about lobster carrying capacity (mostly about the lack of it) in our area except for the few existing rock out croppings. One day we were discussing the lack of structure, he asked how large it would need to be and how the cobblestone/kelp habitat was needed for post stage 4 lobsters. Would structure extend to even the size of water closets, tubs and broken sinks? He was a plumbing and heating contractor and a relative of the person who had the Hartford, Connecticut sidewalk slabs recycled into a retaining wall. They shared cottages on the same property. The response I gave was yes, it was during the 1970s fuel crisis and the desire to have a suitable reef closer to the beach was of great interest. It meant less fuel for lobstering and rod/reef fishing for my neighbor. As part of his business he would remove old fixtures and at time landfill them. After our discussions he saw the utility in

² It is illegal to build artificial reefs in Connecticut without a permit even if the framework for obtaining such permits does not yet exist. In no way do I support artificial reef construction to enhance fish and lobster habitats or populations without regulatory agency approval. The placement of materials even small stones in Long Island Sound without permission violates state and federal law. Habitat enhancement or creation for enhancing recreational marine fish species is a

regulated activity which has at present has no policy or regulatory endorsement. The purpose of this report is educational and to assist such policy development if it is deemed to be in the best interest of the state, it's citizen's and the Long Island Sound Study, T. Visel

recycling them as habitat, durable and once cleaned. Apparently, he was a bit ahead of his time, several green initiatives are in place now to recycle/reuse such fixtures and crushed porcelain has been used to build oyster reefs in southern waters, see Alliance for the Chesapeake Bay – Journal November 2004. The bear claw old fashioned tubs have come back into fashion and as one of my Rhode Island contacts mentioned these most likely today end up in antique stores. But yes they could provide suitable structure for lobsters (J. Stanley Cobb, personal communication T. Visel, October 15, 2009.) From descriptions of materials, the pieces never measured more than 15 inches high and were broadly distributed over a shoal area south of the western of Hammonasset Beach.

Previously devoid of structure the site was located using NOAA navigational charts. It was not a lobstering area consisting of smooth mud/sand bottom. The shoal area was picked hoping that the bottom was firmer. I learned about the reef building activities about four years after it had commenced². In the late 1970s word of it spread into the local Clinton fishing community.

According to my neighbor the reef took many years to build and it was supplanted from time to time with stonewall sized fieldstones and “ballast stones” from lobstering wood traps. The results were almost immediate first, the presence of small lobsters occurred between the yellow marking buoys only after three weeks after the initial placement. Many short lobsters (non legal sized) had congregated around the new reef. Within one year legal size lobsters were being caught constantly and within five years it became very productive area for both sub legal and legal lobsters. Reefing building continued for several years from 1974-1979. Although I did not help sink the broken porcelain clay fixtures or pieces of cast iron tubs – I did know about it after 1979. When informed I strongly suggested these efforts cease as the state was formulating its coastal area policy regarding marine resource restoration, shellfish and finfish restoration guidelines (CAM Planning Report #27) and were in the process of being developed (1978). Artificial reefs were most definitely going to be a regulated activity even if old lobster pots were filled with stone, *see note 3.

Note 3-

The practice of sinking field stones in lobster pots was an old one. Before lobsters traps utilized preformed bricks to sink them, fieldstones under a lath band or leather strap were used, wood traps without an extra stone would float away. Since field stones were common and easy to attain to lug these back and forth to shore was not productive and stones often were cast out to save effort. It soon was realized that the practice enhanced habitat for lobsters. Although not mentioned in many reports the practice continued in a modified way with wood traps into the late 1970s. When traps

were dry they would need an extra stone or cobble (called ballast stones) while the traps absorbed water and after a few days discarded. Thus the first lobster habitat enhancement effort came as a result of the lobster fishery itself. In the New Haven area old street pavers were used – later in the 1950's railroad tie nail plates (iron) were utilized but most used beach cobbles. With the conversion of the fishery to wire traps in the early 1980s ballast rocks were no longer needed. For about a century hundreds of thousands of such stones were placed over lobster grounds. A century ago the lobster fisheries were keenly aware of the importance of bottom structure. In Madison three such lobster grounds were reported to have been established by a long time Madison lobsterman Captain Dowd. Instead of throwing out ballast stones randomly over the years he had established productive areas by placing ballast stones in a series of locations north of Whale Rock off East Wharf in Madison. No one else was allowed to fish them except Captain Dowd as it was recognized among other fishermen that he had made them over the many years. This practice was agreed to by all other lobster fishers at the time – personal communication Charles Beebe/Tim Visel 1971. Old lobster pots built from wood and natural fiber heads lobster pot (funnels) were often filled with rocks. The wood and manila twine rotted away leaving the stones as structures.

So in all honesty I can't say that I know of no Connecticut artificial reef experiments in this area, I do. I also acknowledge that permits to build artificial reefs were under discussion then and today more than three decades later those discussions continue.

What it is important I feel is that this happened and potentially the artificial reef still exists and continues to provide measurable reef habitat functions. Porcelain is non toxic and should not break down – the cast iron tubs could be different and may have corroded overtime. It could now prove to be a research rather than enforcement opportunity, (see note #2). The location is approximately 2000 feet due South Tom's Rocks NOAA chart #12374 off Hammonasset, Madison, CT.

Therefore was ironically brought about by a desire to produce more seafood for less fuel. Something that strikes a responsive cord even now (see Note 4 below).

Reef Observations – Fishing on Porgies Reef 1980's

For many years the artificial reef had no name, I referred to it as Tub Reef but within a couple of years the reef had a new name Porgies reef – named by its builder for the dominate species now on it, Scup or Porgy as more commonly called in our area. Large Black fish were caught in the spring and fall here but summers it was definitely Porgies. For some reason the collection of stones and recycled building fixtures was especially suited for them. Toms Rocks two natural subtidal rocks about 2,000 feet to west had nowhere near the number of Porgies. My neighbor loved Porgies so this became both a surprise and great delight. Many times a year he would take out friends Porgy fishing and never came back disappointed. He had created an area that seemed to be perfect for them. In fact recreational fishermen from Clinton Harbor by the boat load preferred to come to this reef to catch Porgies. We came to watch occasionally small boats anchored next to the yellow marking buoys (our neighbor used reef marker buoys every year) and immediately starting hauling in Porgies. I would talk to them returning from

my own lobstering and they always were catching large amounts of fish. I did fish it a couple of times – in the fall for large blackfish and did quite well, Porgies although a great tasting fish was just a little to boney for my liking. Reef building stopped in the middle 1970's and my neighbor gave up lobstering in 1980's.

Note 4 –

Florida which had been building private artificial reefs since 1920 saw a tremendous increase in interest and applications after 1975. The Florida Institute of Technology – Jensen Beach Campus had a large diving program and the initial dive program was related to reef siting and monitoring. This was a huge concern at the state level that the recreational fishing and diving industries may be restricted by fuel shortages. Florida which was so dependent upon tourism dollars was greatly disturbed by long lines at gas pumps and was ready to approve smaller reefs closer to shore to support fishermen.

It's being 25 years since I have had any knowledge of the reef area. It would be interesting to see if any of the plumbing fixtures are still present or if the area continues to provide reef structure for lobsters or fish.

The only other similar group of structures man made which functions as a subtidal reef I know of is seven historic shad fishing “piers” in the lower CT River. I fish them each spring and fall in the lower CT River with my son Willard and daughter Abigail. We catch Stripers and Bluefish among the rips/currents these reefs produce. They also have a huge tautog populations when the freshwater flows lessens – usually in the late fall. Created from local field stone and local history claims earlier Native American stone fish weirs. Several hundred thousand small stones were placed to create mounds eventually becoming exposed at high tide. They functioned as Capstan hauling stations for the shad long haul seine net fishery from 1860 to 1910 when they were abandoned. They continue to provide artificial reef functions a century later and although still marked as piers on coastal charts – they are in fact now function as artificial reefs. For the unsuspecting boater it is possible to hit them at low tide. We towed a boat that lost the entire lower unit of his outboard motor after striking one of them at high speed in a fog looking for the pier. See Note 5 below.

Conflicts in Public Policies

I also realize that habitat modification continues to be somewhat controversial here in Connecticut – the concepts of habitat creation, enhancement and mitigation have been discussed since the early formation of our Coastal Area Management Program (1977). The CT Department of Environmental Protection Marine Fisheries created a report titled A Marine Resources Management Plan for the State of Connecticut (July 1984 – 244 pages) and it has a section on artificial reefs. The report acknowledges several artificial reef policy concerns and conflicts mentioning them on page 207, section 2.7.2 under Reef Construction. That was over 25 years

ago (see appendix). The basic conceptual barrier remains what a natural habitat and the ecological values assigned to it. Connecticut has a mixed policy response in this area. For example it had made significant investments in preserving

Note 5 –

The fishing pier designation on charts should be dropped because many boaters hit them looking for the piers not realizing they were gone over a century ago. Anyone who fishes the lower Connecticut River knows of them and during one extremely low tide I hit one. I mentioned this to the Coast Guard in 1985 and NOAA also but to my knowledge the charts still show them as “piers.” They should now be remarked as “reefs” or at least “obstructions” to more accurately represent them to the boating public – T. Visel.

farmland for agriculture purposes which can be broadly described as non natural habitat modification. Coastal erosion, clearly a natural ecological process has had significant non natural habitat interventions, with a series of shore alterations of breakwaters, groins and jetties – many built with state funding. These structures can also be described as “non natural.” The discussion of State policies in this area are found in the Habitat Restoration Committee Report titled The Long Island Sound EPA Habitat Restoration Initiative Guidelines – Page 6 Coastal Barrier Comments – Page 9 - Modifications of Healthy Habitats – Alteration of Natural Processes dated September 2009. The report reviews erosion policies and the recreational fishing opportunities associated with breakwaters particularly Meigs Point at Hammonasset Beach. The second part discusses estimated carrying capacity for lobsters to various habitat types. The report is available from The Sound School Education and Outreach programs. Contact Susan Weber at email susan.weber@new-haven.k12.ct.us.

Habitat Creation, Enhancement and Mitigation Questions Needs to be Addressed.

At present salt marshes have also been subject to non natural processes with the application of chemical herbicides to control the invasive reed Phragmites. Here the concern is the loss of habitat necessary for shore wildlife – especially birds. The elimination of heavy concentration of this reed with salt water intrusion mitigates lost habitat values. The erection of Osprey nesting platforms is a form of habitat creation the practice of beach nourishment is a form of habitat enhancement. With these huge public policy and regulatory interventions such as those listed above the concept of habitat modification to enhance fish and lobster populations should now move forward. It has been suggested that fees from recreational fishing licenses be used to help defray reef costs. And I also suspect a volunteer or stewardship role similar to the Trout Unlimited organization which sponsor programs to build trout pools with stones and wood to enhance fish habitat carrying capacity. Connecticut bait and tackle stores I believe would be interested in such a artificial reef program and matches one of the goals of the Long Island Sound Study to maintain and expand recreational fishing access. The economic

benefits to the state has long been associated and acknowledged from recreational fishing.

Shallow water rubble (low profile) reefs can be constructed from clean concrete waste, broken concrete barriers, concrete curbs and other clean non toxic materials. The March 24th 2010 report suggested on page 14 that the State of Connecticut Department of Transportation recycle 500 to 1,000 concrete road barriers that are no longer usable into a reef in about 30 to 35 feet of water. Since its intended purpose is to assist recreational fishing and it should be sited near a marina or harbor area to maximize fishing opportunities. In the 1950s and 1960s many marinas had boat rental fleets for people that wanted a day out on the water fishing. Smaller shallows water experiments in 12 to 15 feet should also be examined for them. Deeper water reefs hold greater promise for assisting lobster fishers. One of the things we could do is build a few experimental rubble reefs for stage 4 lobsters. The US Fish & Wildlife Service was experimenting with this in the late 1960s before they became NOAA-NMFS as a form of extensive aquaculture.

From: Our Changing Fisheries, USAPO, 1971, NOAA (In press as a US Fish & Wildlife Service Publication) on page 459 includes this reference:

“Current investigations include improving propagation techniques and living conditions for lobsters in their natural environment; one promising technique for improving lobster abundance is the construction of artificial reefs and burrows using such objects as tile pipes. An artificial reef was constructed in Boothbay Harbor in 1966 observations by a scuba team revealed a dramatic increase in the lobster population. By December 1967, lobsters utilizing the new reef and increased in number until they were six times as abundant as an adjacent natural grounds.”

With the evidence for Global Warming and species responses to climate change there is increasing evidence that artificial reefs not only have the ability to increase fish populations but may now act as one of the first “green plans” to formulate an effective habitat program for climate change. Reef fisheries represent renewable natural resources – artificial reefs may replace functions lost or enhance emerging significant habitat types such as estuarine shell. Although habitat restoration is certainly an important goal we must review various habitat types as now in a period of long term changing ecosystems. Finally as the global community struggles to feed an increasingly hundred population those methods that produce food in low energy input systems should be evaluated. Trap fishing produces a better quality seafood with fresh harvests and extremely low discard (undersized illegal fish) mortalities. Static fishing gear, pots and traps produce a much more “green” product than active or towed fishing gear. Reefs resemble living machines cropping estuarine tropic levels with less cost and resource efficient methods which is a small way represents European coupling of industry and ecological practices

(see Note 6). Recycling building debris such as the razing of the Quinnipiac Bridge and converting usable portions into a reef complex(s) satisfies several environmental initiatives.

- 1) Efficient reuse/recycling of manmade materials for another purpose
- 2) Low tropic sustainable food production
- 3) Resource conservation and BMP harvest practices such as fish traps/pots
- 4) Low energy input for lbs food/unit fuel (passive fish gear methods versus active).
- 5) Seafood produced in near coastal waters saves energy in destination transportation/distribution costs (close to market efficiency).

The construction artificial reef also has the economic activity of the establishment and continue cropping/harvests for decades to come. It could be defined as building a green infrastructure for employment capacity. The life span of the artificial reef or habitat systems could well be over a century.

Note 6 -

Fish pots and traps have the best fuel/lb production ratio and the lowest catch per unit mortality (by catch). The fishing industry has struggled for hundreds of years with discard mortality or the killing of undersized fish (first recorded as a problem in England in the 1400's oyster/beam trawl records). Fish pots and traps keep fish alive and therefore the potential to release non target and species alive or undersized species unharmed with minimal industry/loss. Fish pots/traps constructed with biodegradable metals (wood and natural fiber) are even more ecological and could be made as a requirement for a conditional fishery. Trapped fish close to shore and potential markets is also some of the highest quality seafood available to consumers.

Part 2 -

Florida Lobstering Experience and Habitat Carrying Capacity Discussions
August 13 to 19, 2008
Boy Scouts of America
Florida High Adventure Sea Base Program

During August 2008, I had the opportunity to be the primary trip leader for my son Willard's Troop 12, Connecticut Rivers Council visit to the Brinton Environmental Center on Summerland Key, Florida. Part of the Boy Scouts highly successful Sea Base Program, Willard's troop opted for a relatively new program, The Florida Fishing Adventure. It was located at the Brinton Environmental Center on Summerland Key, 24 miles north of Key West.

The program consisted of a week exploring the Keys with a series of inshore and offshore fishing trips. Let me say first, that it was a wonderful trip, the Center staff and our boat crew/guides were top notch and extremely helpful. I can't say enough positive things about the program, the offshore fishing, reef diving, inshore bridge fishing and lobster trip were all great. Although we had to be evacuated at short notice due to the approaching hurricane Faye, staff worked through to night making trips to Key West so we could access rental vehicles. That was unfortunate, but we had four full days and everyday was booked with events, the food was good and plentiful.

The program had taken over a facility with a manmade channel and docking area. A series of two story structures and a central office/administration building resembled the 1960s "Boatells," built before the first fuel crisis. When asked I was informed that this was the case the channel and boating services resembled a modern marina, but structures for housing resembled a motel. The facility now housed about 15-21 fiberglass fishing vessels, resembling Grady White™ like vessels with sun canopy suitable for fishing and skin-diving. The grounds had picnic tables and all necessary water and electrical services. The shores here were hard coral structures and the channel in and out was sharp and deep but protected from the outer bay, cut in along to the main road. The boat basin had mullet in it as well as other fish.

The focus of the trip was Florida fishing and before the trip we had to purchase a Florida marine recreational fishing license, 16 years and older. As a group we discussed this and for an additional \$2.00 we could all add the lobster (crawfish) endorsement. Although we realized that this was the spiny lobster (no claws) and unlike our northern counterpart, the lobstering experience became a special item of interest for the group. The license costs for each participant was:

104	-non resident lobster permit 1 year	\$ 2.00
173	-non resident Saltwater Fish 7 days	\$30.00
	Internet Convenience fee	\$3.11
	Total	\$ 35.11

In the printed Florida Sea Base guide, the lobster season was listed August 6 to April 30. Our group discussions made this the time that when into planning our trip, we would take the August 13 to 19 slot; one week after the lobster season started, (during the early hurricane season), our Florida lobster licenses arrived from the "License Fulfillment Division" 3055 Lebanon Road, Nashville, Tennessee with the lobster endorsements. Skin diving for lobsters soon became a key feature to the trip.

The first part of the week, Wednesday to Tuesday, (6 days) we had several great days, offshore fishing, offshore diving on coral reefs (which I enjoyed immensely)

but at the end of each day was one or two comments, “When do we go lobstering”?

“Tomorrow.” A cheer went up and or two staff seemed surprised. I had a chance to speak to our primary staff person that this was something that had been the subject of many discussions in CT. The next day (day four) would be snorkeling for lobsters. Great anticipation was an understatement and even my son Willard who had a 10 pot recreational lobster license for Connecticut constantly talked about it. However considering my lobstering experience in CT, 1967 – 1982, I was concerned, shallow water daylight lobstering just didn’t sound that productive for larger lobsters.

On the morning of the lobstering trip our scouts were up, packed, ready and in the boat without any direction. This was it, finally it was lobstering. It was a great day in the morning, sunny and warm. But the night before we had heard reports about a strengthening tropical storm which started to raise eyebrows on the Florida Keys. There is no high ground here, the whole region seemed to be about 8 feet above high tide. The marine radio crackled with weather warnings and rough seas, thankful the offshore trips were done. We headed in amongst the key/coral outcroppings protected from the strengthening waves.

On the way, I had an opportunity to speak with Paul, our primary guide (who was great and can’t say enough positive things) about artificial reefs in Florida. Paul was familiar with them but that was mostly north of the keys, not too many in this area. There was a feeling that natural was better and areas were shallow and couldn’t have the structure associated with deep water reefs. Our accompanying staff person agreed with Paul, much of the key’s ecology was around the concepts of natural and bottoms here contained structure. I pursued a couple of times about rubble low profile artificial reefs or structures but again doubts were revised if they would get approved here. Another question about carrying capacity as to structure type for lobsters was met with, “we don’t know.”

The trip to our first spot was smooth on the bays; it was calm, nothing like was now developing offshore. Paul mentioned that some of the Brinton staff had been sent north to help evacuate other programs. No word yet for us but the group was focused upon getting lobsters for supper. Paul pulled out the Florida gauge for determining legal lobster size in Florida. With a few safety reviews, gloves, catch nets and tickle sticks, our scouts were ready. I was surprised by the currents in these keys and after a couple attempts by staff to find lobsters in these areas, we moved to another spot.

Here the currents were much less and five scouts went quickly over board. After 15 minutes no one had seen a lobster. We moved again and here I went in. The bottom was mostly brown, and silt was disturbed when touched. Structure was old

coral, mostly brown which looked like brown pots placed on the bottom. Large flat open areas were between these features. After awhile, our scouts kept bringing up the same shorts (not legal size lobsters) many times to be measured by Paul. The decision was made to move again by this time the sun was quite high in clear Florida water the bottom was bright. But this spot yielded a series of lobsters all short (sublegal) and it was decided that only one side of the boat would be catch only and one side release only; this prevented the same shorts from being recaptured to be remeasured etc. from our eager crew. I commented again about the habitat for larger lobsters, and Paul said that the inside areas were mostly nursery for smaller lobsters; when they got larger, they tended to migrate out to deeper areas and offshore. Unable to dive in strong currents and in bright light it was decided by Paul's partner in front of everyone to move to a secret spot almost assured to have lobsters. That got a loud cheer from scouts in and out of the water. We quickly assembled everyone and moved again. This time our crew grabbed two dive sticks and after a couple of drifts in clear water, Paul threw out two dive sticks and anchored about 25 feet off the "spot."

After a couple of minutes I asked about the markers, Paul turned to me and said "It's a pipe."

"A pipe?" I asked.

"Yes," he said, "lobsters love pipes; they love them especially in shallow waters."

With that, Willard and his friend Matt already in the water and ahead of the rest, came back with the first report.

"Dad, it's a big white pipe with two huge lobsters one in each end."

"That's great," I responded, and by this time, everyone was at the pipe. The pipe was a 6 inch diameter 10 foot section of house hold waste PVC pipe. The pipe according to Paul had been discovered by accident during one of the previous boat trips. It had two large lobsters in it so the decision was made to leave it there (It was determined that it had accidentally fallen off someone's boat.) It was a back up, in case (as with what happened today) a lobster trip was unsuccessful. The capture of lobsters accomplished with dive sticks and capture bags took quite a while but after awhile both lobsters about 1.5 lbs each were aboard. While most were examining the lobsters Will and Matt decided to go back and without anyone's knowledge to remove the unnatural pipe.

"We got it, Dad" was heard and Paul responded, "Got what?"

Will said, "The pipe."

Paul, slightly horrified, responded, "You got the pipe?"

"Yes, as the end came out of the water lifted by Matt, Will continued, "someone had piled pieces of coral/rock on it in the middle." (It had been down there for awhile, the outside was encrusted with marine growth but you could clearly see it was standard household drain and vent pipe.)

Both Sea Base guides looked at each other and Paul said, "Please put it back, okay?"

Will said, "Okay," and told Matt to take it back. Paul dove in and supervised the replacement of the pipe.

When Paul got back aboard, I said, "We need to talk."

Laughing, he said, "I thought that is what you were going to say."

By the time Paul returned to the boat with Will and Matt, the portable radio announced gale warnings for the Keys and it was quickly decided not to wait but to head back as by now the sun was partially blocked and a forbidding gray sky was offshore. On the way back Paul and I had a chance to talk. First of all, the several questions about artificial reefs on the way out made him nervous about talking about pipe and structure for lobsters. It was an open secret that the lobsters liked pipes. It was well known in the diving community that larger pipes held larger lobsters. It had gotten out of hand years ago in some areas. (Private placement) but it was larger precast concrete pipes. Larger lobsters need larger different types of structures than what's in the shallows here, according to Paul.

They had tried the deeper area first, the tendency is that lobsters do well as smaller sizes, but migrate offshore as they grow. The same situation has been referenced to Connecticut lobsters also. Larger lobsters need larger habitats and without harvesting lobsters left habitat limited areas moving to deeper areas containing larger structures. This made much sense to me as a constraint feature of the New England Lobster Fishery. (See Appendix #3).

Responding to our concerned guide, I chuckled, "Then why didn't you say that on the way out?" He was concerned because he thought I was investigating the pipe, no certainly not, my questions were from a year in Florida at FIT years ago and exposed to the Florida reef program and my continuing habitat discussions in CT. I thought the pipe was a great idea, it certainly saved our shortened lobstering trip it clearly brought home the artificial reef concept to my son Willard. I continued, "The PVC is a non-toxic form, wasn't hurting anything, was stable, etc., so why the concern?"

Paul replied that the prevailing opinion about natural in the Keys was so intense the concept of a lobster drain pipe education program would be hard to sell or even to mention. I suggested that perhaps it could be modified with a shorter section; a cement plug in the middle, the ten foot section could be made into two fives, for four lobsters. A study could be part of an experiment or research program for the Brinton Center? Paul doubted once out of the water it could never go back in, so they made a decision just to leave it and use it during the dive program. (I couldn't blame him really remembering some of the meetings our habitat committee has had on the same subject regarding habitat creation, enhancement or mitigation.) I asked if the creation of similar pipe assemblies would increase the carrying capacity of larger sized lobsters in shallow, usually habitat scare areas; he agreed, "Most certainly that had been known for a long time from the reefs made of pipes." Divers knew about this and had developed a tickle stick to capture lobsters from crevices, the larger the crevice usually the larger the lobster. Without the larger or sufficient habitats existing predator/prey relationships generally drove larger lobsters from shallow areas.

I again encouraged Paul to approach Brinton Center supervisors about a possible artificial reef study as an experiment of scout education project for lobster carrying capacity related to structure shape and dimensions, different size pipes and structures. He agreed but our conversation was cut off by the announcement that now tropical storm warnings were posted for the Keys. Conversation quickly turned from lobster artificial reef studies to the possibility of a hurricane strike.

Our scouts were delighted with the two large lobsters; I appreciated the comments about lobster habitat creation. At 2 p.m., while we were returning, evacuation orders went out and our trip was shortened. I did not follow up after the trip, so I don't know if the "lobster pipe study" was ever realized. But the experience was the foundation of habitat carrying capacity research a few months later here with our Habitat Committee. The period from 2008-2009 had many months of research and included in the HRI report containing the section on lobsters (habitat capacity) had references, some back to the University of Rhode Island and include it here, for review and comment. (See Appendix #1).

If anyone has done a study or has additional information to add or change these figures, I welcome the information. My research shows a direct relationship between lobster size and the size of the habitat structure. This association starts with stage 4 lobsters that the kelp cobblestone habitat is vital to that size, but to hold lobsters and maximize carrying capacity (if no other limiting factors are present) the size of the structure was related to size of the lobsters. Lobster fisheries (historic) referenced this and fishing practices mirrored the placement of traps. The larger boulder and rock areas seem to contain more and larger legal size lobsters.

In my opinion, we need to know more about this habitat/structure relationship for lobster carrying capacity in Long Island Sound and New England, in general. This information is timely especially when our present lobster population is highly stressed. Additional habitat in deeper cooler waters would seem research worthy or appropriate. The deep water habitat area may offer areas of refuge during warm periods.

Part 3 -

Artificial Reef Fishing South Carolina April 20, 2011 Aboard the 55 Foot Fiberglass Fishing Vessel – Drifter South Beach Marina Hilton Head.

Last week, I was extremely fortunate to spend a few days with family in Hilton Head, South Carolina. I had never had the opportunity to visit there before. One of the activities promoted in this area is “Artificial Reef Fishing.” My son Willard and I took advantage of the opportunity and provided a chance to experience South Carolina’s artificial reef program which is very far advanced compared to Connecticut.

The fishing vessel Drifter sails from South Beach Marina located in a tidal creek at Pine Plantation on Hilton Head.

The marina that had charter vessels is subject to 6-hour tides with a tidal range of 6 feet. At low tide the marina is completely dry. Our charter fishing vessel held 44 paying passengers and operates most of the year. We left about 8am in the morning with the incoming tide. Jerrod our mate who was to assist us fishing provided an update on what fishing we could expect.

The Drifter fishes an artificial reef (tire reef) near the Betsy Ross reef in 50 feet of water. The reef consists of a landing craft, several personnel carriers a 200 foot barge, a similar smaller barge, tires and military tanks. The Betsy Ross outer reef is named for liberty ship, Betsy Ross, two of the reefs consists of personnel carriers landing craft and old tanks, they about 14 nautical miles offshore. South Carolina here has built a series of four artificial reefs, 3 posted for fishing, 1 experimental. All were functioning reefs for 2 decades or more opposite Burkes Beach, Hilton Head. Three posted reefs on charts are open to fishing under all regulations – no special reef fishing permits needed. An Artificial reef several miles away is closed to fishing – it is a sanctuary to study fish reef population dynamics according to Mate Jerrod and Captain Forest.

The Redfish fishery closed 2.5 years ago and was a large loss to recreational fishing. Black Sea Bass were very prevalent but the season was over, today was catch and release only, but the fishery was described as healthy, Porgy – open, Weakfish open, Southern King Fish open, No mention of Grouper however according to Jerrod and Forest, the loss of the redfish fishery was a huge financial

hit to the recreational charter fishing sector. They believe the artificial reefs are now critical to the survival of the recreational charter vessels, "We need structure – healthy reefs on which to fish," (our reef was in 40 to 50 feet) without the reef we have no fishery." It was acknowledged that further offshore reefs in deeper water held larger fish with red fish closed and seasonal black sea bass restrictions it was now largely a catch and release business. Our 40 plus anglers (which soon dropped to about 20 in a slight offshore chop) caught approximately 120 small (10" to 14") Black Sea Bass –50% ripe ready to spawn - 3 Porgies and two legal size Weakfish. Several oyster toadfish were caught and released. At \$60/person the total trip netted 5 legal to keep fish but no one complained. Every one who was able to bait and drop a line caught something – Will and I each caught 5 fish with about 90 minutes fishing. There was no hook mortality observed including several oyster toadfish which were unhooked and released after pictures. The trip was advertised as five hours but over half the time was spent steaming to the reef about 90 minutes out and return. The reef complex is located just inside the Port Royal Sound Shipping Channel.

Fishing gear was a stiff 5 foot boat rod – PENN™ open face reel standard clutch/drag assembly – A 8 ounce sinker with a hook about 1 foot above the sinker – bait was small menhaden cut into thirds. Foul hooks did occur and 3 lines/cut broke free during the trip. At one point we were fishing over the old 200 foot barge, Jerrod knew of no plans for new reefs were known although they would be welcome, miles x miles of flat feature less bottom was available for more reefs. After the trip out and back I would agree. A shallow reef closer to shore would be help – it would most certainly cut down on fuel transit time. Although the reef is regularly fished the last time they fished it was about 3 weeks ago due to rough sea conditions. It was relatively smooth on the way out but closer to the shipping channel a pronounced ocean wave series developed. Anchoring in this chop soon had a negative impact upon some of the passengers. South Carolina posts and marks all of its artificial reefs and is available from site. PA-49 Tire Reef 1 yellow buoy marks reef bearing 195° five nautical miles from Port Royal Sea Buoy, water depth 50' Hilton Head Reef.

Our reef was #PA 49 which consists of a 35' Navy Boat, a 200' Deck Barge (over which we fished) concrete reef balls™ army tanks and APCS, recycled concrete fixtures and about 20 old shipping containers. South Carolina Department of Natural Resource has a website for its artificial reefs providing exact locations of each reef feature. The website address is https://www.dnr.sc.gov/reefguide/artificial_reef?p_location=South

The day was great, we didn't load up with fish but that wasn't what the trip was about it was the artificial reef aspect that caught our attention. The cruise itself was worth it, we saw a large school of spanish mackerel on the surface feeding, several

dolphin, a giant sea turtle (species uncertain) and about 300 manta rays on the surface all no charge so to speak.

At the end of the trip we were given two of the Porgies – that made three which Willard turned into a delicious pate for an appetizer.

The reefs here are much larger higher profile than would could perhaps be sited in shallow Connecticut in shore waters. Low profile reefs however hold much promise here and is worthy of consideration and potential policy development.

Summary -

We must move forward to develop the regulatory and environmental policy framework in which they may soon happen here. In southern waters even structure the size of an automobile is estimated to be capable of supporting 400 lbs of reef fish each year*. The carrying capacity of lobsters is largely unknown but is extremely structure dependent as most predator prey species studies conclude. Dave Simpson, Director of DEP Marine Fisheries during a lobster meeting last July 15th at The Sound School also described an increasing problematic discard/release mortality with the lobster fishery. Small lobsters released in daylight are easy prey for tautog – (Blackfish) especially over smooth or feature less bottoms. Increasing structure may enhance survival of discards (short lobsters). Black Sea Bass, a recreationally important species here as well as South Carolina does well on artificial reefs. Warmer waters with sufficient oxygen is not a habitat constraint for this species.

* Source – “If you build it, they will come” Florida Sportsman – Rick Farrent.

Reefs in deeper water may provide refuge ecological services for colder water species while shallow water reefs create habitats for species that can tolerate warmer water.

Every day I cross old Quinnipiac Bridge and watch progress on its replacement. While most people focus on the new bridge, I think about all the structure and seafood the old one could provide fishers here in Connecticut. If the old bridge usable concrete features were “recycled” as artificial reefs, it could perhaps over time repay its original cost, (6.4 million) in pounds of seafood. The duration of the reefs could provide a renewable supply of seafood for a century or more.

In Southern waters a reef even the size of an automobile is capable of producing 400 lbs of reef fish each year. At 200 lbs half that amount and a per pound price of

\$1.00 which is low for our area – could generate value as high as \$200/year/section of Q Bridge concrete rail (approximately 7 feet by 4 wide). Just the rail sections alone (about 1,000 reef units total) could provide seafood fish worth 200,000 per year. If each section provided habitat for lobsters (which all research indicates it would) the value could be as high as \$300/section. If the entire bridge was recycled it could yield an estimated 15,000 pieces 7x4 feet, and 30,000 pieces of rubble, smaller concrete chunks, enough for several good sized reefs or is 15,000 reef units / 50 lbs/unit or 750,000 pounds/year of legal size fish – even at \$1.00 lbs the value generated in several years could top 6 million, the entire cost of the original Q Bridge. Because of the life span of the concrete, the reef could last a century or more. Natural resources dollars multiply of the economic activity they generate by reef fishing almost triple in the overall economy (tourism, bait and tackle, fuel, marina services, charter and guide services, licensing, restaurants trip expenses). The economic benefit long term could be in the tens of millions dollars to the state. Southern states have detailed the economic value of reefs to their states economy – even if the project value is just 10 percent of estimates it would seem worthy of an “in house” no cost agency study for the Connecticut Environment Committee.

Financial incentives may include tax credits, involvement in the nitrogen cap and trade allowances (fish are part of marine food webs) or tax deductions. This would be a win-win for the state, jobs and economic activity with creating the reef and the economic benefits that accrue (fishing) to the state after construction.

One study conducted by Broward County Florida capitalized the value of its artificial reef use in excess of 2 billion dollars. Florida’s funding source of its artificial reef building program is both derived by the sale of recreational salt water fishing licenses (about half) and federal departments collected from a federal excise tax on fishing tackle as the remainder. But private funding sources shouldn’t be eliminated as a possibility.

The marine mooring system which enhances lobster habitat mentioned earlier is the product of a private commercial business Wind Reef Group which donates 10% of its sales to support the Maine Lobster Institute. The web address is www.habitatmooring.com with links to the Maine Lobster Institute.

The potential economic benefits to the State of Connecticut from reefs are difficult to dismiss. They work and fishermen have known for a long time that they work but will need proper planning and a positive regulatory framework in which they can happen. May we schedule this agenda item for July?

Tim Visel, April 2011 – Draft only, no references.

A Marine Resources Management Plan
For the State of Connecticut

Prepared by

Mark M. Blake, Marine Biologist
Marine Fisheries Program

Eric M. Smith, Assistant Director
Bureau of Fisheries
Marine Fisheries Program

July 1984

2.7.2. Reef Construction

Pg 207 Direct Citation

“Investigate the feasibility of creating artificial reefs or other habitats in appropriate areas, and the potential for increasing the abundance of marine fishery resources in such areas.

The construction of artificial habitat has the potential to increase commercial and recreational fishing opportunities, thus helping to achieve other objectives of the Management Plan. However, such construction activities would have to be carefully studied to determine environmental impacts and options for the most feasible methods, materials, and areas for construction.

This type of habitat enhancement activity should be avoided if it disrupts either existing fishing practices or navigation, and it should not adversely impact either existing fish and shellfish populations or the Long Island Sound ecosystem.”

The Long Island Sound EPA Habitat Restoration Initiative Guidelines – Page 6
Coastal Barrier Comments – Page 9
Modifications of Healthy Habitats – Alteration of Natural Processes

The Hammonasset Beach Erosion Problem
A Case History of Habitat
Creation, Enhancement and Mitigation
Reference for the Lobster Industry Pages 21-22

Comments from Tim Visel – Sept 2009
The Sound School Regional Vocational Aquaculture Center

Lobster Habitat Carrying Capacity – Tim Visel – September 2009

This summer I have contacted several organizations seeking more up to date information on the carrying capacity of various types of lobster habitat. By the end of September 2009 no responses as yet have arrived. Until I have more recent studies I'm using notes from a 1978 fishery economics course at the University of Rhode Island for estimates of habitat capacities.

The example below provided by a guest lecturer who used a 60 foot circle dropped over a certain habitat type (the example was a drinking glass on a desk). The circle when placed over smooth featureless bottom yields less than one pound/year (harvest size). Cobble stone/kelp circle – 3 to 5 lbs/year with more structure such as small stones – glacial boulders 5 to 8 lbs/year. Large boulders/reefs up to 12 lbs/year of harvest size lobsters. For the carrying capacity the highest value can be one 12 lbs or 12 - 1 pound lobsters. Nature tended toward larger lobsters. This can be considered a background or heritage value.

Today, lobster fishers seek out habitats with structure so the above capacities may seem smaller than actual but the difference between smooth featureless bottoms (no structure) to those if that contain a high degree of structure should yield 12 times as much lobster each year. Lobsters can be trapped on sandy and even muddy bottoms as they search for food or burrow into muddy bottoms for shelter. The lobster fishery has enhanced the carrying capacity of the existing habitat by providing both, food/shelter and maintaining a constant reproductive population (gauge limits and the Vnotching of female egg bearing lobsters). Food availability among rocks/ledges is slight but provides key habitat as lobsters increase in size. This is not to say the other habitats are not important but similar to the oyster

industry with supplemental shell, balance is needed to sustain lobsters at different stages of their life cycle.

Lobster Habitat Carrying Capacity – Fisheries History United States Fish Commission

The Fisheries and Fishery Industries of the United States by George Brown Goode, Assistant Secretary of the Smithsonian Institution and A Staff Associates, Section V, History and Methods of the Fisheries, in two Volumes, with an atlas of two Hundred and Fifty-Five Plates, Volume II, Washington, Government Printing Office 1887.

The Lobster Fishery – Page 701

South Harpswell, ME – Between 1850 and 1855, at South Harpswell, the fishermen were accustomed to go out two in a boat, each boat setting from fifty to seventy-five traps, and obtaining a daily average of from 400 to 500 lobsters of marketable size. All lobsters weighing less than 2 pounds were thrown away, and the remainder were sold to the canneries at an average price of 3 cents each in the spring, and 2 cents each in the fall, the canneries agreeing to take only those above 2 pounds weight. The fishing season lasted from March until May, and again from September until about the middle of November. When the factories were closed, the fishermen sold to the smacks running to New York and Boston, scarcely any of the lobsters being disposed of to Portland parties. The smacks paid about the same prices as the canneries, beginning in the early spring at 3 1/2 to 4 cents, and falling later as low as 1 1/2 cents, when the lobsters had become more abundant. Frequently, when the markets were dull, the fishermen, after culling out all lobsters under 2 pounds in weight, would bring the remainder to the smacks, where about one-third more in number would be rejected, only the larger individuals being bought. This would happen only late in a season, or during a very dull market. Marketable lobsters then averaged about 3 1/2 pounds each.

At all points along the coast, from Cape Small Point to Pemaquid Point, the fishermen are agreed in saying that formerly lobsters were very abundant and of large size, and that overfishing has reduced them both in size and in numbers. They are quite unanimous in the opinion that if the present State law is continued, it will be better for the fishermen.

Appendix #3

At The Sound School lobster industry meeting organized by DEP Marine Fisheries (July 15, 2010), several speakers comments mentioned that large number of female V-notched lobsters were caught offshore of Montauk, New York. That was not a surprise to me as earlier studies largely regarded Long Island Sound as a nursery ground for lobsters. Larger lobsters within established habitats capacity balance would displace others creating a general migration out of Long Island Sound. Although increasing the gauge would alter habitat carrying capacities most lobsters were caught up before they could migrate out (west to east). V-notching females to some extent would reestablish this previous migration pattern. Naturally larger lobsters would establish larger territories and fight to keep competition of other lobsters out. The extremely large lobsters with large territories were mostly caught up by the early 1800s. Anecdotal reports were attributed to early spearfish fisheries and spearing four foot long lobsters. Large lobsters were reported being speared in Connecticut and continued until the 1830s. As bottom trawls fisheries developed in the 1950s and 1950s, relic large lobsters were found in untapped lobster populations offshore on Georges Bank.