Town of Chilmark
Chilmark Shellfish Department
Shellfish Propagation Report
2010

Introduction

The Chilmark Propagation Program has continued to grow and become more successful each year. The framework for a consistent scallop and oyster season, the goal of selectmen and town's people, has been accomplished. The amazing natural seed set for both bay scallops and oysters, along with continued expansion of growout equipment, is the major factor for this success. Refining methods and managing time to allow for good growth and the proper environment to maximize the survival of each species has proven to be the best way to accomplish our goal.

Oyster enhancement in Tisbury Great Pond (TGP), was a duel town project for Chilmark and West Tisbury. The extra man power, supplied by volunteers from both towns, helped create more shell reef sites. The shell reefs on both sides of the pond were particularly effective for allowing recruitment of oyster spat. The entire pond, in addition to these reef sites, experienced an extremely good oyster seed set which, if it survives, will be fruitful for years to come.

The Chilmark Shellfish Department applied for and received a temporary permit, from West Tisbury, to place the town's upweller at Flat Point Farm in TGP. The use of the upweller in such a nutrient rich pond such as the TGP caused oyster seed received from the Martha's Vineyard Shellfish Group (MVSG) to grow at a phenomenal rate. The upweller was used to grow both Chilmark and West Tisbury's single oyster seed. The upweller allowed a reduction in oyster growout equipment at the early stages of growth and kept a minimal amount of buoys and growout lines from being a visual nuisance for pond users.

The Martha's Vineyard Shellfish Group (MVSG) supplied each town capable of growing quahogs 1,084,000 seed. This has been a fairly consistent amount of seed supplied over the last few years. There were four new quahog rafts constructed to allow for an additional 400,000 seed to be grown to a field plant size. This was a 40% increase from the previous season. Over the summer of 2010, conditions for quahog seed growth was just right. During weekly checks of each raft seed had to be thinned out to allow more room for smaller ones to grow. At certain points each raft had quahogs pushed out of the sand and laying on the top.

The quahog harvest in Chilmark still remains to be mostly a family fishery. The non-commercial harvest is starting to increase. Not only is the number of bushels harvested yearly increasing, but also by the licenses sold and the different people frequenting the pond. The areas that have been enhanced over the last few seasons are beginning to yield lots of littlenecks and cherrystones. The reasonable price of our license coupled with easily available adult quahogs is great for those people that want to spend a few hours digging their dinner.

Bay Scallops are still the most sought after shellfish to harvest commercially. The 2010-11 scallop season was the best since the program started. A good growing year and a phenomenal seed set in the summer of 2009, helped many fishermen harvest scallops through January. The high scallop price over the season was attributed to the lack of landings from other producing ponds throughout Massachusetts. Menemsha and Nashaquitsa Ponds were one of the few places that had enough scallops to be considered a good season. Over the scallop season 1,705 bushels were harvested (both commercial and non-commercial catch) with a raw meat value of $281,325. Even though Chilmark had a good 2010-11 scallop season, setbacks did occur. The potential for an estimated 3,000 bushel season was altered by severe weather, seasonal duck predation, and a non-typical macro-algal bloom. Despite these few hurdles, a good percentage of seed survived to adulthood, making the 2010-11 season more than sufficient for the commercial and residential fishermen alike.

This is the first consecutive natural bay scallop seed set that has occurred over a two season period in quite a few years. There is more seed in Menemsha Pond then the Chilmark Shellfish Department has seen since the beginning of the program. The seed is also in the places where it will grow best. The bay scallop season should prove to be moderately good again over the winter of 2011-12. The seed set on the Menemsha Pond flats is a result of good management of the resource and sound propagation methods.

Bay Scallop Enhancement

Stage 1 Growout

The Chilmark Shellfish Department (CSD) propagation efforts begin many months in advance of receiving spat from the MVSG. Spat bags are taken out of winter storage and cleaned by pressure washer. Recycled bags from the previous season often need to be repaired by fixing holes or replacing strings that are used to tie on the growout lines. Netron, a rigid plastic mesh, is stuffed into each spat bag to retain shape and prevent bags from collapsing. Bags that are beyond repair are discarded or used for natural spat collection. The growout lines must be checked completely for any wear so storms will not cause them to part off. All growout lines are attached to anchors, on either end, and placed in the best growing areas of the pond.

The Chilmark Shellfish Department received an estimated 1,800,000 scallop seed from the hatchery over the 2010 growing season. The first seed spawn occurred at the hatchery mid June, which allowed the allotment to be received by the CSD between July 2 and July 18. The second spawn was mid August and seed was received August 30 through September 11. Each allotment comes once every third or fourth day between those dates depending on how fast spat is growing in the hatchery.

When scallop seed is picked up at the MVSG it is the responsibility of the CSD to keep the package moist and cool for the tiny scallops are very fragile. This is done by setting a target amount of spat on sterile cotton or burlap material and bundling them with tissue paper. Each packet contains 1,000-3,000 seed which are quickly placed in a cooler between two cool packs so they can be transported to their destination. After they arrive at the pond each packet is carefully taken out of the cooler and a small tear is made in the tissue paper. Packets are then

attached to the inside of the spat bags and tied to the growout lines. The sealed bags are spaced out on the lines at approximately a foot apart which allows proper flow around the entire bag. As scallops drop off or swim from packets they will likely attach, by byssal threads, to the first thing they come into contact with. Spat spread out and attach to the inside of the spat bags and netron. They stay in place until ready to be moved to the next form of growout or they become overcrowded.

Stage 1 growout was challenging this year. The first 300 bags, containing spat from the hatchery, was received at the exact time the natural seed set occurred in Menemsha and Nashaquitsa Ponds. The result of this natural set on bags made the need for scallops to be thinned into a stage 2 medium much sooner than anticipated. The bags contained over 4,000 seed (see figure 1-1), in a range of sizes, from 1mm to 5mm. The larger of these two were more likely hatchery seed while the smaller was a natural set slightly behind developmentally. The scallops contained within the .75mm bags needed to split into six 1.5-3.0mm bags. This was good from the aspect of allowing the program to reach its full potential of seed production, but bad because many spat were too small to be placed in stage 2 medium. The smallest animals had to be released to allow enough room for the larger scallops to grow. The last 200 spat bags of hatchery seed missed the natural set and were divided into stage 2 bags as necessary (Stage 1 & 2 Growout Areas can be seen on Map 1-1).

Figure 1-1 Hatchery and natural seed sets from stage1 spat bags.

Stage 2 Growout

Stage 2 growout begins when seed can no longer grow due to overcrowding. Scallop growth is linked to the temperature of the water, abundance of food, and oxygen levels. All of the seed was ready to be moved to stage 2 within three and a half weeks of receiving them from the hatchery. This means that if they are not split then some mortality and stunting of growth would occur.

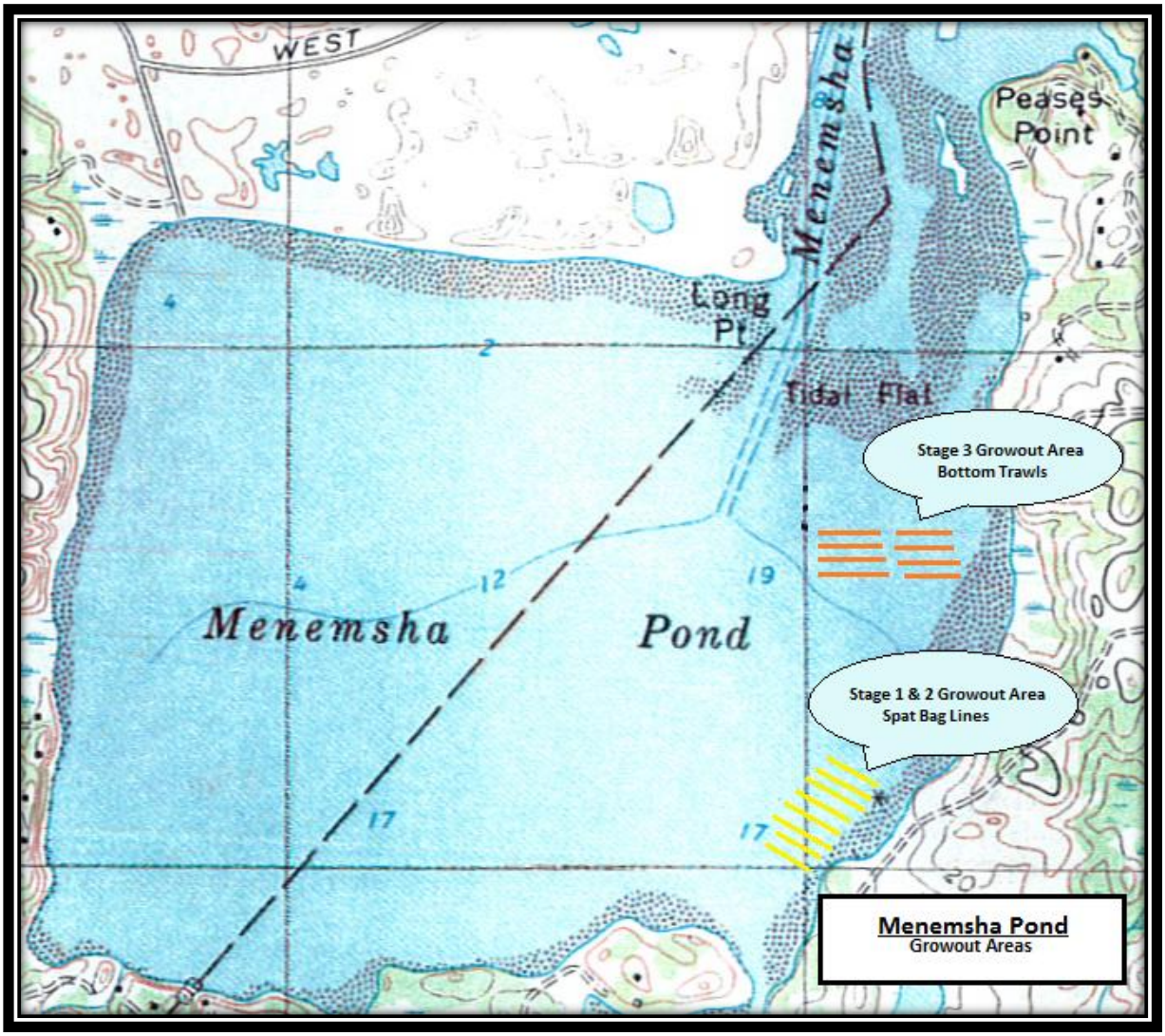
Netron is stuffed into the 1.5-3.0mm spat bags and brought out on the boat where thinning or splitting of seed begins. The stage 1 medium is removed from the water and placed in a tub filled with water, on the boat's culling board. Each bag is untied and the netron removed. The netron has many scallops attached to it so it is immediately put back in a 3.0mm bag and returned to growout lines. The stage 1 bags are turned inside out and carefully brushed, by hand, to remove seed. In some instances, there was almost as much spat on the outside of bags as on the inside depending on how much they migrate to the outside at a small size. The dirty .75mm bag is removed for future cleaning, so it can be recycled. The seed that remains in the tub is then scooped out using a mesh strainer and placed in a clean stage 2 bag. The goal is to get 500-1,000 scallops in each bag depending on their size. Spat bags are then returned to growout lines, where the scallops continue to grow and reattach themselves to the bags. The closer the seed is to 3mm the more they seem to spread out and reattach to the medium. This happens because seed is very light, which allows bags to float parallel to the water's surface during heavy tides. The more spread out seed is in the bags, the better growth becomes.

Stage 3 Growout

Both 3mm spat bags and plastic bottom growout bags are utilized for this next stage of growth. The variation of mesh sizes (1/8", 3/8" and 5/8") of each bottom bag allows seed to be sieved. Sieving seed into different sizes reduces competition. Larger faster growing seed will eat more food and not allow smaller seed to get what it needs. This practice is used for many types of aquaculture, especially oysters. The same process is performed as with stage 2 growout by removing bags and placing them in a tub of water with a continuous supply of pumped fresh sea water. Netron with seed

on it is sometimes stuffed back into a new 3mm bag if not much fouling has occurred. The remaining seed is transferred into plastic bottom bags of the appropriate size and placed on bottom trawls on the East Flat (See Map 1-1). Bottom Bags remain on the flat for the remainder of the growing season.

Maintenance of this equipment is quite easy, but time consuming. The majority of work is done by wading on the flats at low tide and flipping the bags once every two to three weeks. The wave action removes fouling on bags by rubbing them on the bottom. Once bags are flipped the bottom portion is put on top where they became clean via wave action. This is good for overall growth and to spread seed out. Some of the scallops attach to the bottom of bags so when flipped they stay and those that are not attached fall to the bottom.



Map 1-1 Stage 1,2 and 3 Growout areas 2010

Seed growth was phenomenal this year. The end result was large seed with very healthy looking abductor muscles. The large seed set in the area of these bags did not seem to affect the growth for propagation. One of the eight trawls is capable of holding at least 75 bags. Over 600 bags were utilized for bottom growout over the season. The average density of seed in these bags is

around 600 for a total of 360,000 seed with an average size of 40mm. Scallop seed were over-wintered in these bags and distributed in early March in Lovey's Cove. Over-winter mortality was predicted to be 15%, leaving the distribution number at 306,000 in this area (See the Seed Distribution section of this report).

Natural Bay Scallop Spat Collection

This year's natural scallop seed collection was one of our best over the past four years. Recruiting spat continues to be a consistent and successful way to enhance the scallop population. The CSD utilized their eco-friendly abilities by fixing the spat bags with small holes for spat collection. Therefore, the natural seed set results have been on the rise over the years with little effort. Refinement and timing of how the Shellfish Department deals with each portion of the program made recruitment better and allowed more natural seed to be saved. Also, the natural seed collected was planted at a bigger size.

Spat collectors were placed in the water between July 1st and July 6th. The 400 collectors were positioned throughout the pond in the locations where we have experienced good collection historically (See Map 1-2).

- Four lines at Scheuer's Dock in Menemsha Pond (250 spat bags).
- Four spawning cage lines at Muddy Cove in Nashaquitsa Pond (100 spat bags).
- Two spawning cage lines between the Mayhew's Dock and Lovey's Cove in Nashaquitsa Pond (50 spat bags).

It is ideal to use 3.0mm spat bags because they take longer to become fouled, but some 1.5mm were utilized with the intention of splitting seed for growout.

On July 16th the first seed was noticed in and on the bags. On July 28th it was clear that we had experienced a massive spawning throughout the pond and bags were checked again. The picture below illustrates the findings for the collectors at Scheuers' Dock. The seed that you can see from this photograph is mostly on the outside of the spat bag and is estimated to be over 1,000. In some instances, there were bags recorded with 3,000 seed per bag. The average collection for all 400 spat bags were 1,500 per bag. The seed outside the bags, eventually fell off at each site. Any of the bags containing more than 1,500 seed, or were 1.5mm in mesh size, had to be split into other mesh bags. This was done in the same fashion as hatchery growout seed. During the splitting process any seed smaller than 3.0mm were released at the site of each collection line. The reason for releasing some of these recruits was due to the CSD's restraints on the amount of seed it could successfully grow out. The small seed released at this

point are not calculated into distribution for 2010. At the end of the season, the CSD estimated a total 352,000 scallop seed planted at an average size of 28.1mm (See Seed Distribution Table).

Seed Distribution

Bay Scallop Seed Distribution 2010

Menemsha and Nashaquitsa Ponds

Hatchery Bay Scallop Seed

Date		Amount	Size (mm)	Area Distributed
September	1	45,000	30	East Flat
September	8	55,000	35	East Flat
September	9	29,000	30	East Flat
September	20	20,000	35	Clam Cove Flat
September	23	20,000	35	Chocker's
September	24	80,000	35	Wash Rock
September	27	30,000	35	West Flat
September	29	50,000	30	Scheuer's Dock
October	5	3,600	40	East Flat
October	7	36,000	35	Wash Rock
October	8	15,000	35	Chocker's
Total		**383,600**	**34.1**	

Menemsha and Nashaquitsa Ponds

Bay Scallop Seed from Natural Collectors

Date		Amount	Size (mm)	Area Distributed
August	20	30,000	25	Chocker's
August	26	60,000	25	Wash Rock
August	26	60,000	25	East Flat
August	26	60,000	25	Chocker's
August	27	25,000	25	Wash Rock
September	9	40,000	30	Clam Cove Flat
September	30	45,000	35	East Flat
October	15	32,000	35	East Flat
Total		**352,000**	**28.1**	

Table 1-1 Seed Distribution 2010

Bottom Bag Bay Scallop Seed Distributed after the Scallop Season…….306,000
Hatchery Bay Scallop Seed Distributed as of October 8……....383,600
Bay Scallop Seed Distributed from Natural Collectors……..352,000

Total Estimated Bay Scallop Enhancement 2010…..……..1,041,600*

*The highest amount since the Propagation Program started.

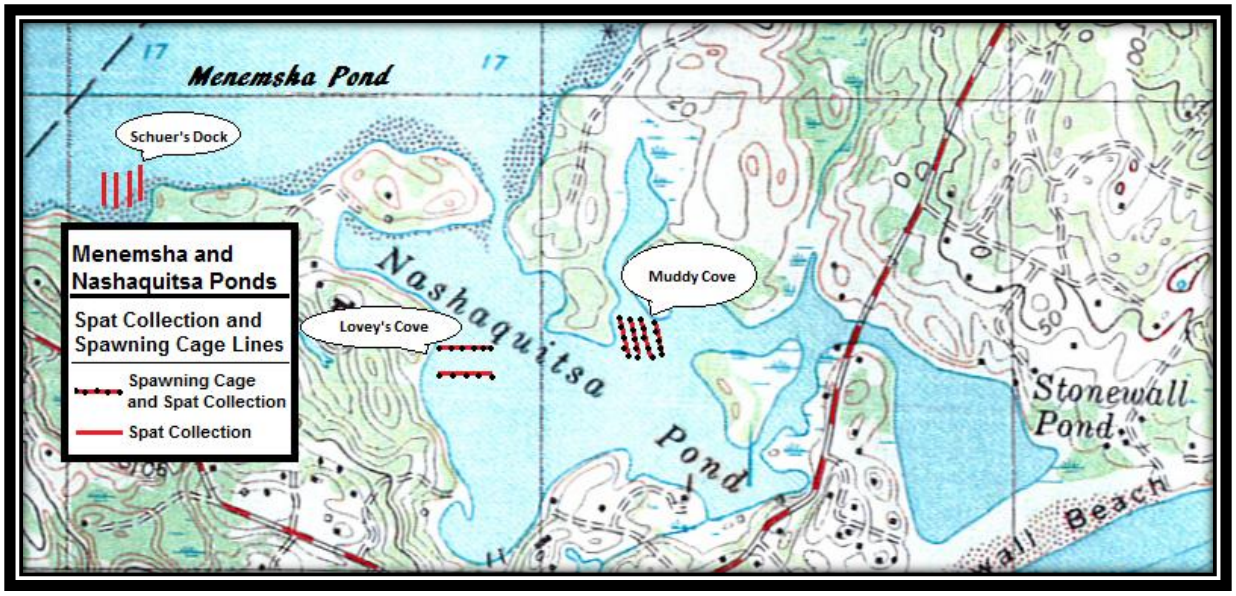
Spawning Cages

Spawning Cages are utilized to allow enough adult bay scallops to spawn and increase the likelihood of egg fertilization. The more eggs and sperm there are in the water and for a longer period of time the better the chances of having a natural seed set.

The spawning cage repairs and preparation is the Shellfish Departments first task in the spring. Forty cages were repaired and placed on lines at Muddy Cove and Lovey's Cove in Nashaquitsa Pond. Cages were spaced out on lines and anchored on either side as a type of floating trawl. The adult scallops placed in the spawning cages were broodstock of Edgartown from the 2009-10 season and Menemsha Pond first year adult scallops. The adults collected from Edgartown or Menemsha Pond had to be either large seed from the previous summer or nub scallops (second year adult scallop). All of the scallops purchased from fishermen in Edgartown

at the end of 09-10 season, were nub scallops from deep water, in the outer harbor. The CSD decided to use the nub scallops because research proves these particular scallops ripen quicker and produce higher quality gametes. Nubs will also spawn first so fertilized eggs will be present earlier in the growing season. Using first year adult scallops prolongs the spawning period by releasing their gametes late in the summer. This has been observed in the field by examining both first and second year adults as the gonad ripens. A ripe scallop can be determined by a large orange gonad indicating eggs with a white strip along the gonad indicating sperm. This seemed to be at its peak around the last week in June for the nubs and the first week in August for the first year adults.

Broodstock was placed in spawning cages at approximately 100 per cage for a total of 4,000 spawning scallops. Spawning cages were checked and cleaned periodically to ensure scallops remained healthy. Many fouling agents (like macro-algae, sea squirts, barnacles, etc.) will impede scallop growth and sexual development if not continuously removed by cleaning measures.



Map 1-2 Spat Collection and Spawning Cage Lines 2010

The natural seed set over the summer of 2010, can be attributed to spawning cages and the selection of broodstock. Not only is Chilmark getting a seed set during mid-summer, it is also happening later in the season. The different size seed found on collectors are a sign that the spawning period is relatively long. Having a lot of adults on the flats in Menemsha Pond is also a contributing factor for this accomplishment.

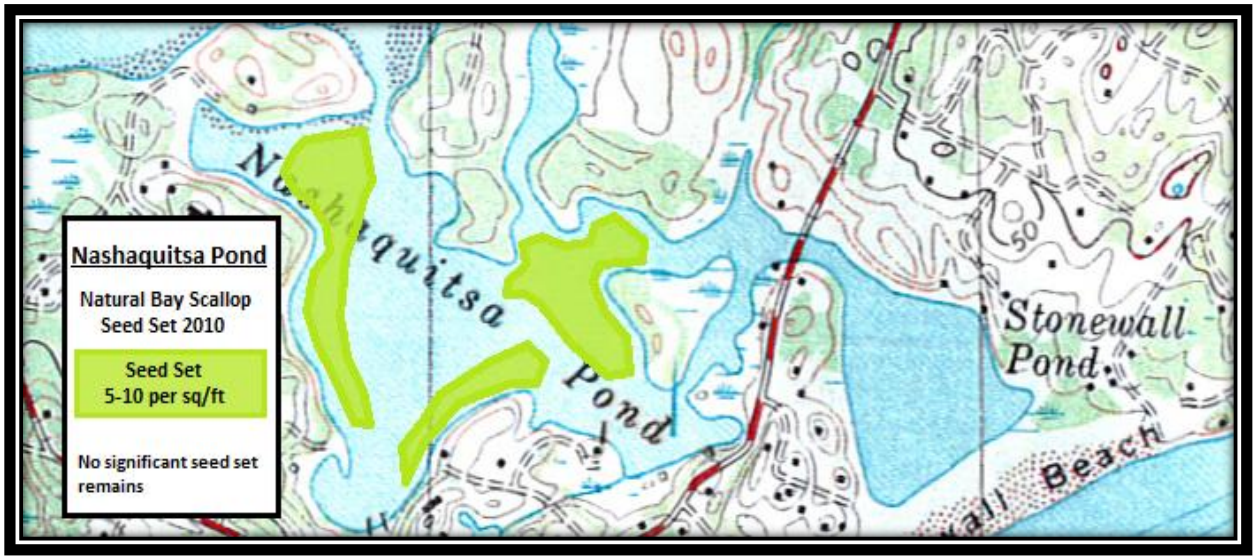
Natural Bay Scallop Seed Set 2010

Year in and year out, The East and West Flat in Menemsha Pond grow the largest bay scallops in Chilmark. The large size of the shell and the meat inside are good for fishermen because they are worth more. The harvest over the winter of 2010-11 was very good on the flats due to the Shellfish Department's propagation and seed relay program and also from a natural seed set in the summer of 2009. The seed relay program was a volunteer effort organized by the

town's shellfish constable. Seed was taken from Nashaquitsa Pond and spread on the flats in Menemsha Pond to increase fecundity and adult scallop size. The summer of 2010 proved that moving seed to the flats was a good decision. A good spawning group of adults in that area had a huge effect on the number of natural spat created throughout the pond.

Seed dragged up from East Flats.

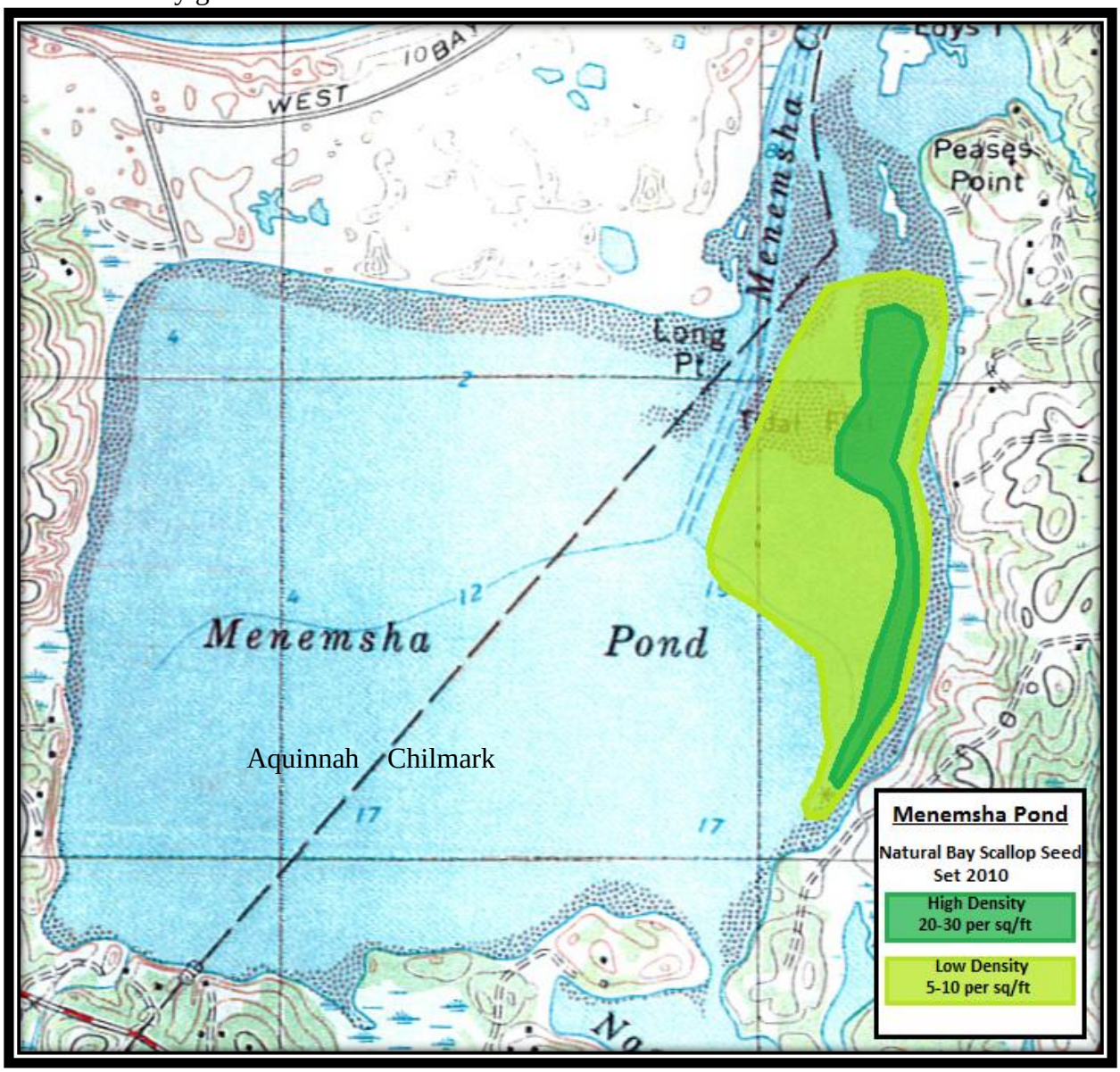
On August 14th during routine maintenance of bottom bags a piece of eel grass was recovered with ten bay scallop seed attached. On further investigation more eelgrass was checked and it was apparent that a massive seed set was present on the East Flat. Other areas throughout both ponds were checked and revealed similar results (See Maps 1-3, 1-4).



Map 1-3 Nashaquitsa Pond Natural Bay Scallop Seed Set 2010

Unfortunately conditions in Nashaquitsa Pond did not allow many seed to survive. A large Blue Crab population contributed to the lack of seed survival. Menemsha Pond however did quite well and did not seem plagued with the same problems.

At the end of the growing season seed on the flats had reached an average size of 30mm. Scallop seed was so dense in the area shaded in dark green on Map 1-4 that it will need to be relayed to some of the less dense areas. The extraordinary seed set, if it survives, should give Chilmark a very good harvest season for the winter of 2011/2012.



Map 1-4 Menemsha Pond Natural Bay Scallop Seed Set 2010

Spawning Cages will be set up in the same way and in the same areas as the 2010 season. Edgartown broodstock will not be available but there should be many nub scallops left in the pond that didn't get caught by fishermen this season. Nubs and large seed will be used to fill cages. All of these things combined should increase the likelihood of a natural seed set in 2011.

Conclusion

Despite a few setbacks with seed mortality over the winter of 2009, commercial fishermen were able to harvest 1,604 bushels of adult scallops during the 2010-11 season. The average meat yield per bushel was ten pounds. A total of 16,040 pounds of bay scallop meats were harvested commercially during the winter of 2010-11. An average price of $16.50 per pound makes the total worth of the harvest $264,660. Many businesses are used to either sell or harvest bay scallops so an economic multiplier of four and a half can be applied. The total value to the community is $1,190,970. The recreational harvest of bay scallops equated to 101 bushels.

The natural and hatchery grown seed that was produced in the summer of 2010 should make for a good scalloping season in 2011-12. The scallop seed is in the right places to create large adults that are worth more to the fishermen.

Oyster Enhancement

Tisbury Great Pond

The Tisbury Great Pond (TGP) has a grand history of producing oysters for recreational and commercial fisherman. It is located on the south side of the island and is partially owned and operated by the towns of Chilmark and West Tisbury. Since, the TGP is only separated by a barrier beach, the ponds water is brackish. Brackish ponds are known for their ability to grow and sustain oyster beds naturally and without assistance of propagation efforts.

Up until the 1990's, oysters both adult and seed size were harvested and replenished for decades until the shellfish disease Dermo depleted the stock. Dermo, still present in the pond, has continued to make it difficult for adult oysters to survive because it affects them in the third to fourth year of their life cycle. Unfortunately, at this age oysters are at peak reproductive activity limiting spawning abilities and overall stock within the pond.

As of the past few years, oysters are starting to show resistance to Dermo. The propagation agents and shellfish wardens are noticing a higher percentage of 3-4 year old oysters in the ponds again. Hopefully, the TGP oysters will continue to formulate their resistance into a cure and the ponds stocks will replenish naturally. In the meantime, the Chilmark Shellfish Department has been bringing in hatchery-spawned dermo-resistant oyster seed (from MVSG) to replenish stocks.

The West Tisbury and Chilmark Shellfish Departments decided to work together over the summer of 2010. Additional help provided by volunteers and equipment from both towns allowed for a very successful propagation season. The timing of this work was also crucial because of the short duration of the oyster's natural spawning period. Some of the funding for the work was provided by the two towns and also from a grant applied for by the MVSG during

the winter of 2008. This grant was a proposal to the Edey Foundation to restore the oyster reefs in TGP. The restoration of the oyster reefs was approached in several ways.

- Planting shell called "cultch" on the bottom as a base substrate to plant oyster seed. The shell base is also good for natural spat collection.
- Creating several "spawning sanctuary" cages to increase the likelihood of spat collection and spawning success.
- Collecting natural seed by creating cultch bags to be hung around spawning sanctuaries.
- Seeding, "Dermo Resistant", hatchery spawned single oysters. Some of which were grown out to larger sizes.
- Remote-set oyster spat on cultch bags to grow out and later field plant.

Shell Reef Restoration

Shell reefs are made by piling cultch onto the bottom of the pond where an oyster reef is wanted. The shell provides a good substrate for pediveligers to attach and avoid silt covered bottom and predators. An oyster at its pediveliger stage of metamorphosis will crawl around with the use of a foot until it finds a suitable place to set. The clean shell base, piled on the pond's bottom, provides the perfect environment for this to happen. The shell reefs also provide a good place to release hatchery spawned seed.

Sea clam shell was purchased from Blount Seafood in Rhode Island and trucked to the Vineyard. The shell was piled on Land Bank property at the Sippeiessa Landing located in West Tisbury. Shell was aged there to make it clean for the project which is good for oyster pediveligers to attach. The two truckloads of shell were delivered in May of 2010. The two and a half weeks of labor provided by the Chilmark Shellfish Department, to move shell the previous year, was not practical for the other species it was trying to grow. The use of a bobcat, trailer, ramp, barge and volunteers made it possible for the entire shell pile to be relayed to the reef sites in one day. On June 12th several volunteers showed up and helped distribute shell in a very efficient way. The bobcat loaded the cultch into totes, which were then placed on a trailer and moved to the landing. The trailer was backed into the water at the landing and loaded by use of a ramp onto an aluminum barge. The aluminum barge was towed to the individual sites on both sided of the pond. Each tote was dumped off the barge and the whole process repeated until the entire pile was gone (Chilmark's shell reef sites can be seen on Map 1-5).

Volunteers that helped with the project.

Cultch being loaded from the trailer to the boats.

Clean shell collects better than shells fouled due to algae growth. The timing of shell being spread is very important, for the recruitment of oyster spat. Cultch must be placed in the water no shorter than two weeks before pediveligers are ready set.

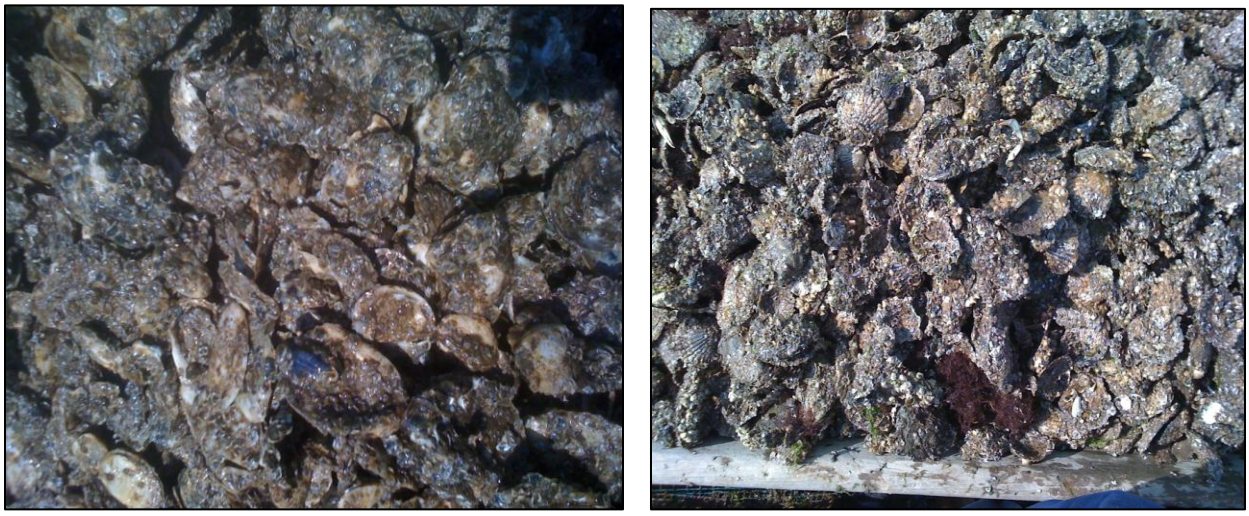
On July 17th, a routine survey of the oyster reef was performed and revealed thousands of oysters spat per shell. Not only was the shell covered with one millimeter spat but also a particular sea lettuce. The pond had experienced a natural seeding event that was revered by many in the field, as the best they have ever witnessed in TGP. The density of spat on the rocks along the shoreline was over a 1000 sq/ft. Cultch on the reef sites collected oyster spat as was hoped.

Oyster spat set on all surfaces of Tisbury Great Pond including Sea Lettuce.

Every piece of exposed shell on the bottom showed several spat attached. The magnitude of this event was far too great for the pond to possibly sustain. Over the course of the summer many died from food competition. Predation was also a factor because of the high number of blue crabs present in the pond. However, a substantial number of animals survived and will be monitored over the next few years to see how well they grow. In addition, the seed set on the reefs and other suitable substrates, a set on the natural collectors was beyond any expectation.

Natural Oyster Spat Collection

The natural collectors were constructed from plastic oyster growout bags. Each bag was outfitted with tree plastic floats and clips to attach to the spawning cage lines. Bags were filled with bay scallop and oyster shell donated by fishermen and oyster farms. Bags were then pinned shut and attached to the lines (See Map 1-5) on June 20-25th. Collectors were checked on July 20th to see if spat was present in the numbers equivalent to the reef sites. After examining collectors it was estimated that between 10,000 to 20,000 recruits had settled on the shell inside.



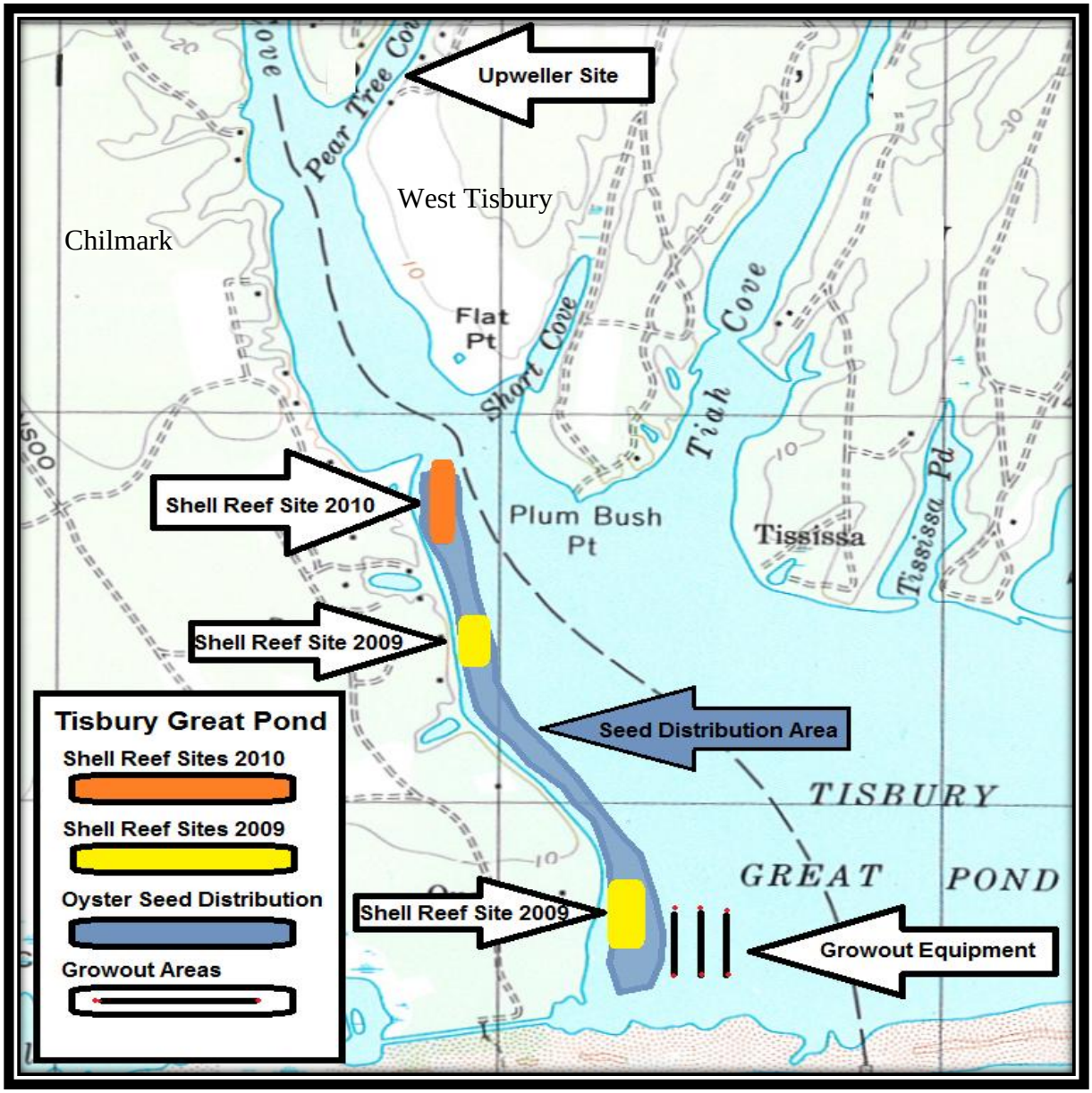
Oyster seed covering shells from natural spat collectors.

The collector was returned to the water to allow slightly more growth before release. The high density of seed on these collectors made it hard to continue growout. If they were left in bags the end result would be high mortality due to overcrowding. Starting July 26th, and for the next two weeks, collectors were released. The estimated number of recruits for the 40 collectors deployed was **400,000**. Likely, competition for growth will reduce these numbers a great deal as the fast growing oysters overcome slow growers. Nonetheless, there will be a good increase in oyster numbers.

Remote-Set

The method of oyster restoration called "Remote Set" is an effective way to produce a large number of spat. The remote set starts by producing cultch bags for the oysters to be set on. Each cultch bag was made from lobster bait bag material. The material was cut into one foot

lengths and crimped at one end with a hog ring. Bags were then filled with shell and a six inch piece of twine attached to the tops so they could be hung on the growout rafts. The types of shell used to fill bags were bay scallop and oyster. Four tanks were set up on Manter Point in West Tisbury, along the pond's edge, and filled with water and shell bags. The tanks were outfitted with an air manifold and air pump that kept water in the tanks agitated and oxygen-rich. Oyster spat was brought to the pond from the hatchery and placed in the tanks a little at a time, until all of the cultch bags were covered. Tanks were monitored daily and oysters fed a diet of algae until spat was visibly set on shells. After one week, shell bags were taken out of the tanks and suspended from rafts along the western shore of TGP. The rafts were tied together and monitored over the next three weeks for growth. Once a week, a careful cleaning of bags by lightly lifting them out of the water reduced bio-fouling.



Map 1-5 Tisbury Great Pond Propagation 2010

The growth of spat was very slow compared to the 2009 remote-set. After two weeks of monitoring the cultch bags it was presumed that something went wrong with the project. After consulting Rick Karney at MVSG, he advised that the oysters be given more time before determining if they were present. The competition between the naturally set oysters and the pond being opened, resulting in a change of salinity, which slowed growth. After several more weeks the cutch bags were examined again and spat was visually present on bags.

Spat can grow through the mesh of the plastic bags and can be very difficult to remove without killing them. Therefore, it is also important to get the maximum amount of growth before this occurs. Bags were opened and their contents released on the shell reef along the western shore of TGP.

Remote set tanks being set up on Manter Point.

Tanks filled with pond water and cultch bags.

Aerated water in covered tanks promotes set.

Rafts were strung together to hold shell bags.

Chilmark's portion, of the remote set, was 350 out of the 700 cultch bags created for this project. West Tisbury was given the other 350 bags. Each bag had approximately 200 oysters set in them. At the release stage, it was estimated that **70,000** oysters were released with an average size of 15mm.

Cultch bags filled with shell and spat.

Oysters covering bay scallop shells after 8 weeks.

Spawning Sanctuaries

Floating spawning sanctuaries were created to increase the natural seed set throughout the pond. By placing many adult oysters in the same area, the likelihood of spawning success increases. As eggs and sperm are released in the same area more fertilized eggs are present throughout the pond.

Oysters were dredged up from the bottom and selected by age class and placed in these sanctuaries. Older oysters were chosen for this experiment because they are believed to have a resistance to Dermo. The older oysters have lived through the presence of Dermo within the pond and not died as a result of it. There were 25 sanctuaries placed at the site by the old Coast Guard Station (See Map 1-5). Each sanctuary was filled with 100 adult oysters. In addition to the oysters grown in cages, a base of shell was added to the bottom of the cages to increase spat recruitment. At the end of the season, all of the oysters and shell covered with spat were released on the western shore of TGP. The total enhancement of oyster seed from the cultch base in each cage was estimated to be **100,000**.

Spawning Cage/Sanctuary

It is hard to gauge the success of this part of the program, considering there is no way to distinguish where the spat derived from. However, the natural set throughout the pond was extremely good this year. This is the second year of setting up these sanctuaries and a good seed set followed. The spawning cages will be a yearly addition as part of the propagation program to increase the oyster population.

Oyster spat attached to shell from spawning cages.

Bay Scallop shell covered with spat.

Hatchery Spawned Single Oysters (The Upweller)

The **Fl**oating **Up**weller **Sy**stem or FLUPSY is an upwelling system used to grow shellfish at a very small size. An electric pump delivers water to silos and allows seed shellfish to grow at a fast rate. The TGP is only tidal when it is breached which means it has very little water movement. Moving water is essential to maximize growth of oysters. The constant flow of water, supplied by the flupsy, delivers food and oxygen to seed that is better than the natural environment of the TGP.

The project started by getting permission from the owners of Flat Point Farm in West Tisbury, to place the Flupsy at their dock. The approval of the project by the West Tisbury Conservation Commission was a requirement before a permit was issued. The upweller was placed in TGP and secured in placed at the Fischer's dock. It was plugged in and allowed to run for a week to work out the kinks and make sure that it would not trip the breaker at the electrical source. The upweller was fine tuned and three of the eight silos were outfitted with 500 micron

mesh. Mesh 500 micron is the size used to allow for oysters to be received at 1,000 microns (1mm) or larger. This guarantees full containment of all the oysters to be grown.

The MVSG takes a portion of the fertilized eggs they spawn for the towns and sets them on pulverized egg shell to create single oysters. The very small size of the egg shell ensures that only one setting oyster will attach to each piece. A single oyster is easy to handle and in the long run easier to harvest and get to market. The growth of single oysters, if conditions are right, is a more round and attractive shape for the public to eat. Also, single oysters are easier to sieve into the appropriate size growout mesh making the end product much better.

When oysters reach one millimeter at the hatchery they are given to the towns. The West Tisbury and Chilmark allotments were delivered in increments as they became the appropriate size at the hatchery starting on August 4th. The last installment of oysters came on September 6th. A total of 245,500 oyster seed was received by both towns to split equally. All of the 245,500 seed was placed in the upweller to speed up growth.

The pictures below show a silo outfitted with 500 micron mesh. There are 30,000 1mm oyster seed spread out on the bottom of this silo. When oysters were received they were placed in the smallest mesh silos.

Oyster seed from the hatchery placed in the upweller.

Silo with 30,000 oyster seed.

After only two weeks in this silo oysters became almost seven millimeters. The upweller was growing the seed better than expected. The nutrient rich water of TGP coupled with the constant flow of the upweller's delivery system made these oysters grow seven times as big as when they were received from the hatchery. Four millimeter is the next largest mesh size on silos. The oysters were sieved and split up into the other seven silos to allow for further growth. Giving seed proper room to grow is crucial to produce a large round shaped oyster. The shells also tend to be stronger because they get the proper nutrients.

Seed after three weeks in the upweller.

Seed being sieved out into different sizes.

The pond was opened to the ocean soon after the oysters were split into the other silos which slowed growth. The drastic change in salinity usually stunts oysters for a brief period which was the case with the oysters in the upweller. After a week they started to grow again. The five weeks that each batch of oysters spent in the upweller resulted in almost all oysters reaching a one inch size. From there they were transferred to oyster growout bags and placed in cages. This was done to allow more room in the upweller for the next installment of oysters. Then the process was performed all over again until all of Chilmark's oysters were either in floating or bottom growout cages or planted on the shell reef. After seed was transferred to the cages seed grew to approximately one and a half inches by the end of the season. The seed placed in growout cages will be held over the winter to allow for further growout during the summer of 2011.

One inch oysters from the upweller.

Bottom cages and bags filled with oyster seed.

Oysters (Remote Set)……..…….80,000
Oysters (Single Seed)……..147,000
Oyster (Natural Collection)……400,000
Total Oyster Enhancement in 2010……...627,000

Quahog Enhancement

Quahoging is primarily a recreational fishery in Chilmark. The low commercial value of these shellfish stems from numerous quahog farms and a poor economic climate. The pressure on the natural resource is less than other types of shellfish due to the market demand. This has made a big difference in the programs ability to increase a recreational fishery for quahogs without worrying about commercial fishermen depleting them. The areas that have been seeded over the last few years are starting to yield some nice littlenecks and in some of the better growing areas cherrystones. Access to the best fishing and planting areas are still an issue for those who don't have a boat. The addition of a new area was utilized this year in Stonewall Pond. This site was chosen to help alleviate the burden of needing a boat. This area will be accessible by staying along the shore and wading at low tide on the flat. The quahogs should be ready for harvest in two years.

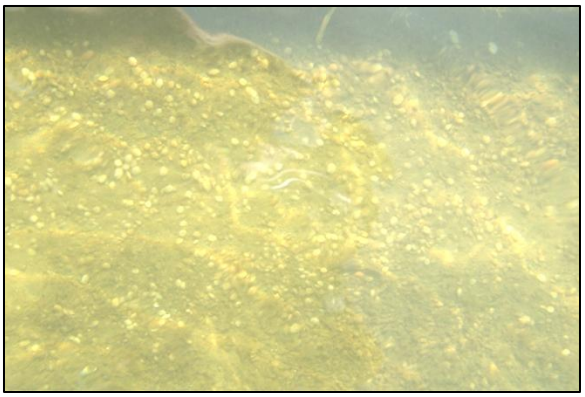
The quahog enhancement part of the program has grown from 2009. There were four new quahog rafts constructed to increase the amount of seed the Shellfish Department can grow out. The four new rafts increased growout quantities by 40% from the previous season. It also allowed for less seed to be placed in each raft resulting in larger seed to be field planted.

The most efficient way to raise quahogs is by using quahog rafts. Each raft is capable of producing 60,000-80,000 fifteen millimeter quahog seed. Rafts float seed above the bottom to avoid predation by crabs. Eight quahog rafts were used during the 2010 season. Rafts also known as sandboxes, are made from 2x6 lumber with a 4'x8' piece of plywood attached to the bottom. There are floats attached at each corner of the raft to suspend it two feet from the water's surface. The boxes are filled with four inches of sand, so seed quahogs will dig into the sand and grow.

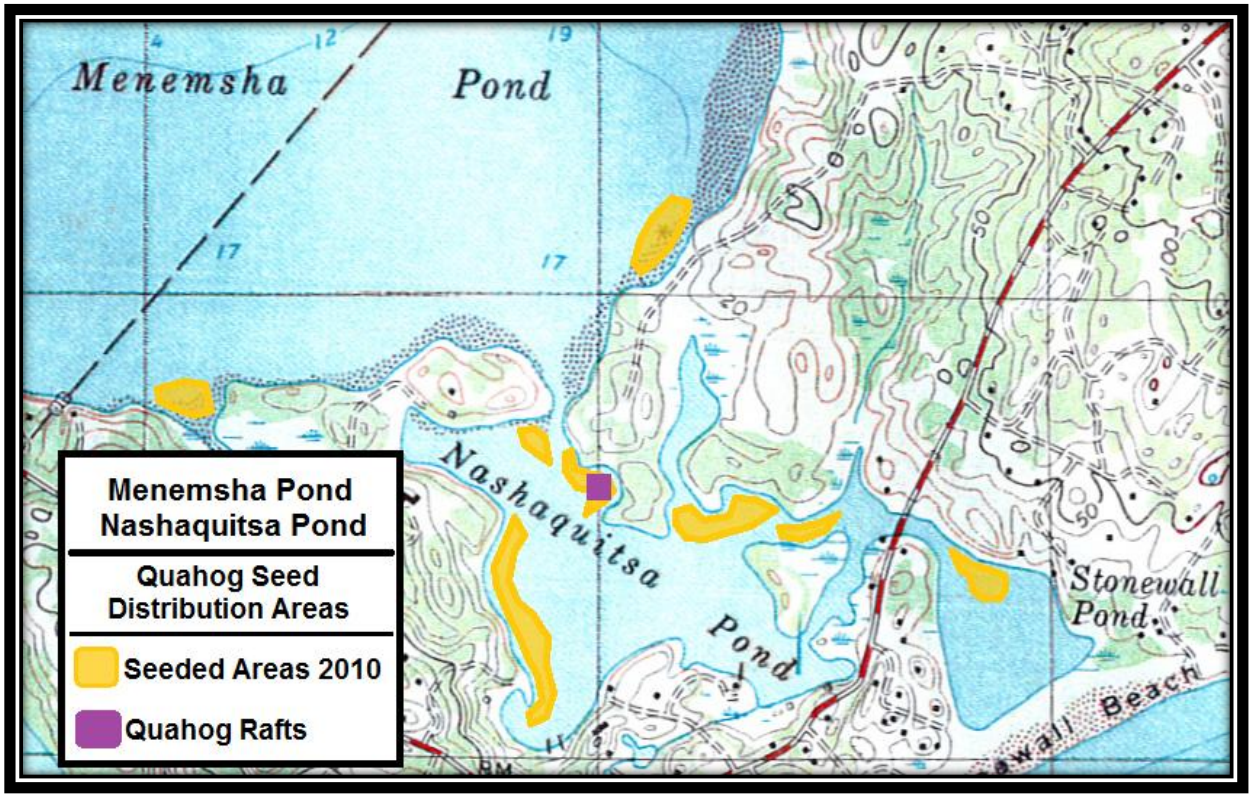
On June 12th the hatchery supplied Chilmark with 700,000 quahog seed. The average size of these seed was one millimeter. The 700,000 quahogs were split up between the ten quahog rafts. Four of the ten rafts were outfitted with a mesh predator net keep the blue crabs from swimming onto the rafts. The experiment was to also see if growth was diminished by having mesh over the rafts. After four weeks the mesh became overly fouled and was removed to check on growth. There was noticeable difference in size of quahogs that did not have mesh over them. There was no more mesh added for the rest of the growing season. Crabs were not a nuisance compared to the previous season. On June 19th the MVSG delivered 384,000 quahog seed at one millimeter. With no raft vacancy, the rest of the quahog seed was spread on Clam Cove Flat.

During weekly checks of the rafts, it was apparent that seed quahogs were growing better than any of the past three seasons. Many of the seed were lying on the top of the sand forced out by those below. The tops of the sandboxes were scraped off and the seed field planted. At the end of the season the rafts were completely emptied and the quahogs were distributed to the areas shaded on the map below (See Map 1-6).

Quahog seed scraped off the tops of rafts.



Rafts with quahog seed lying on the sand.



Map 1-6 Quahog Seed Distribution Areas.

The Shellfish Department will continue to build quahog rafts to accomodate the large number of seed produced by the MVSG. This project at full capacity will require approximately 15 rafts. Over the next few years several rafts will be added to achieve this number. Releasing seed at a small size has not proved to be a good way to increase the fishery. The target size of 15mm is the only way to insure that crabs will not be able to prey on seed.

The contents of four rafts.

Some seed from last year with seed from this year.

Total Quahog Enhancement 2010……..645,000

Predator Control

Protecting the bay scallop has been the main focus of a our predator control program. The fragile shells of juvenile scallops and other shellfish are easy prey for the five species the town is targeting (European Green Clab, Black Claw Mud Crab, Atlantic Rock Crab, Spider Crab and Blue Crab).

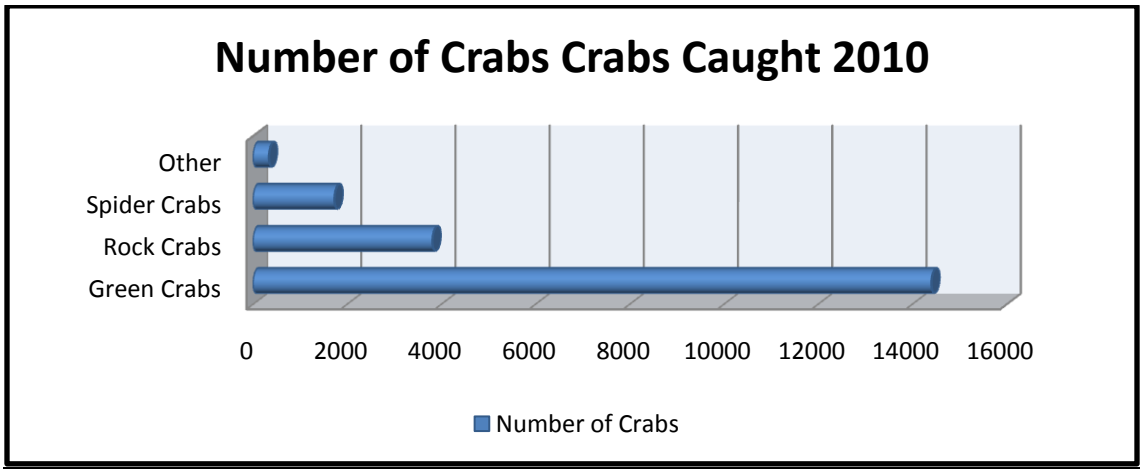
The crabs caught over the last few seasons show a decline in the number of crabs present in Menemsha and Nashaquitsa Ponds. The first season of this program was in the summer of 2007. During that time 16,071 crabs were harvested by fishing fifty traps and starting late in the season. It was clear, with traps coming up almost full, that the endeavor was going to have to be increased. Nearly 200 crab traps were used during the 2008 season, starting in April and ending in December. The crab problem was inexaustible during that season and yielded 44,994 crabs. There were no signs that this problem would be able to be controlled, untill the 2009 season. As seen by comparing the graphs below, crab numbers were far less with the same amount of effort. Not only were crab numbers in decline, with 20,800 caught, the size of the crabs being harvested were noticebly smaller. The smaller crabs, mostly green crabs, meant that there were far less adults present, resulting in a slight break in the cycle. These numbers prove the Shellfish Department was taking out more of the spawning adults and decreasing numbers. The more small crabs being harvested the better the chances of reducing the spawning adults in the future.

The predation control trend has seemed to stabilize with 20,300 crabs being harvest during the 2010 season. An intresting phenomenom has emerged that has been seen in other areas. The number of green crabs have declined, but the number of other crabs have increased. This is usually attributed to the lack of one crab in a system preying on the other juvenile crabs, which makes those other species more prolific. Predator control in 2009 and 2010 showed an increase of Blue, Spider and Rock Crabs that was different compared to the previous two seasons (See Graphs 1-1,1-2,1-3 and 1-4). There could be some natural variation calculated into this phenomenom and this will have to be analyzed, with more data, in the future.

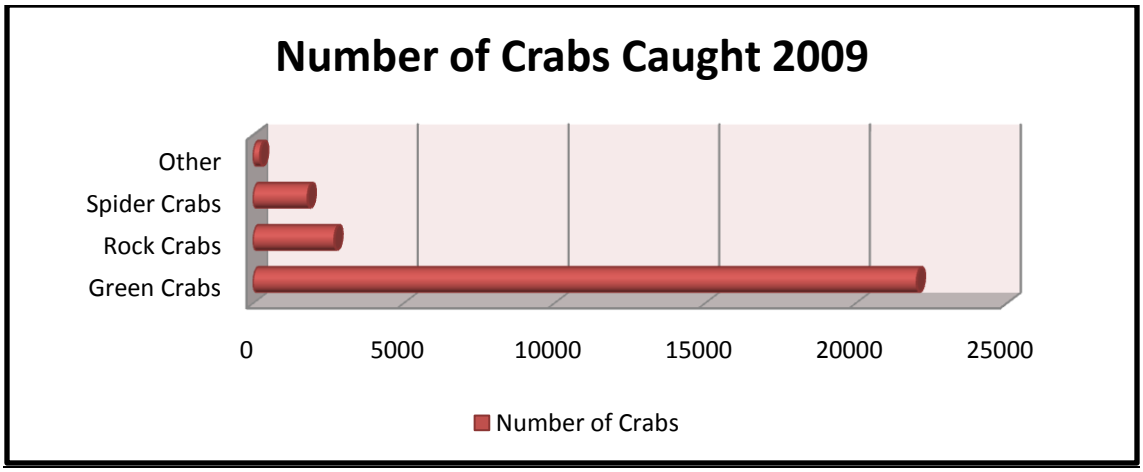
Predator Control Program 2010

Date		Green Crabs	Rock Crabs	Spider Crabs	Other	Total Estimated Crabs
5/10/2010		600	150	25	10	785
5/17/2010		600	200	10	5	815
5/26/2010		1000	150	15	5	1170
5/31/2010		1020	100	20	5	1145
6/4/2010		600	70	50	5	725
6/10/2010		350	100	75	10	535
6/15/2010		800	50	100	15	965
6/24/2010		600	200	100	15	915
6/29/2010		900	300	20	10	1230
7/7/2010		350	150	20	20	540
7/13/2010		350	100	100	20	570
7/20/2010		500	60	30	15	605
7/27/2010		500	60	100	10	670
8/4/2010		300	50	90	15	455
8/11/2010		300	100	80	15	495
8/16/2010		500	250	100	10	860
8/23/2010		550	150	100	10	810
8/31/2010		340	100	30	15	485
9/7/2010		600	100	100	25	825
9/16/2010		595	150	90	30	865
9/24/2010		400	200	100	20	720
10/1/2010		420	250	30	15	715
10/8/2010		350	50	100	10	510
10/15/2010		425	50	90	5	570
10/21/2010		200	25	10	5	240
10/29/2010		400	150	40	10	600
11/5/2010		300	175	10	5	490
11/12/2010		200	175	50	5	430
11/19/2010		358	150	50	2	560
Totals		**14408**	**3815**	**1735**	**342**	**20300**

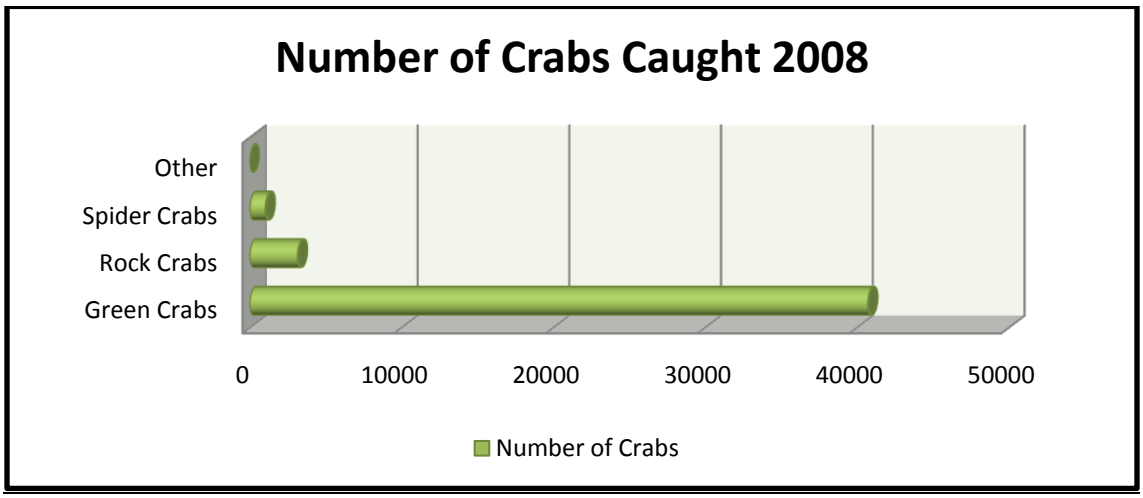
Table 1-2 Crabs Harvested in 2010



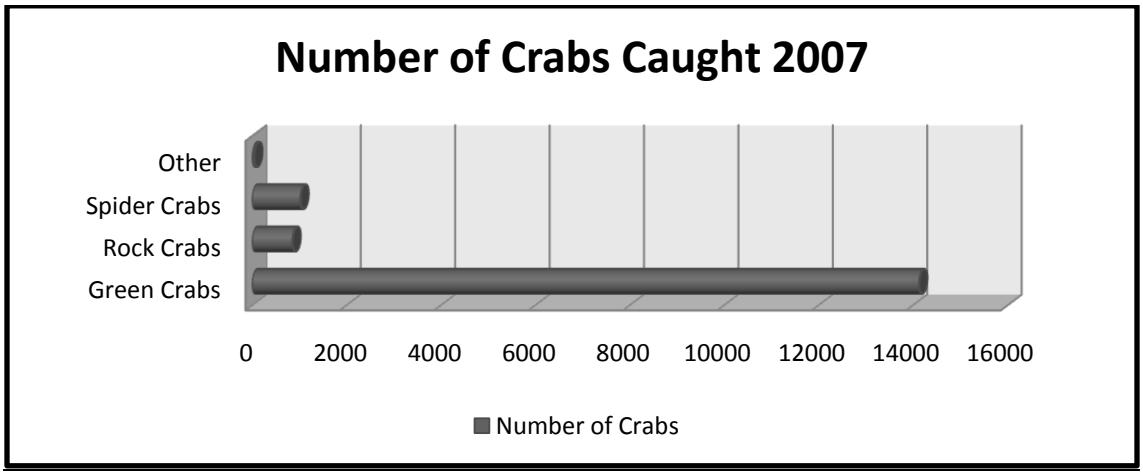
Graph 1-1 Number of Crabs by Species in 2010



Graph 1-2 Number of Crabs by Species in 2009



Graph 1-3 Number of Crabs by Species in 2008



Graph 1-4 Number of Crabs by Species in 2007

Total Crabs Harvested in 2010……20,300

A New Enemy

The common eider duck has been frequenting the ponds in great numbers over the past few seasons. It appears that they were eating the large mussel sets on the East Flat of Menemsha Pond. Smaller mussels are these particular ducks primary food source. However, if there has been a consistent food source, eider ducks will often return to an area year after year because they remember where the food source is. The juvenile mussels became adults last year and smaller mussels were not available. Witnessed by the shellfish constable and fishermen alike, the ducks had been seen eating scallop seed. Chilmark had a decent season on the Flats of Menemsha Pond indicating much of our seed was safe due to boats scaring eiders to the other side of the pond. Aquinnah who decided not to open their commercial season last year to protect scallop seed did not have the same commercial scalloping traffic as Chilmark. The ducks were constantly being pushed over to their side of the pond. After a survey in the spring an estimate of more than 50% of Aquinnah's seed had vanished. Chilmark suffered some predation but not to the extent of Aquinnah.

The Chilmark Shellfish Constable was observing eider ducks diving down and eating something in an area that does not have any mussels. After the ducks sat on a rock for an hour it was decided that getting a sample of eider feces would reveal what shellfish they were eating. During the collection process it was noticed that crunched up scallop shells were all over the rock. A sample was collected and can be seen in the picture below.

Eider Feces showed a diet of almost all bay scallop seed.

There are currently many fishermen on the pond keeping the ducks from scallop beds and pushing the ducks to the center of the pond where there is no shellfish. As soon as the fishermen leave or if there is a cold day so fishermen can't fish, eiders will fly to the heavily seeded areas

and eat. There are 300 ducks in the raft that are capable of eating 20-50 scallop seed per day depending on both the size of the ducks and the size of the seed. This means that the entire flock can eat up to 6,000 seed per day if left unchecked. Thankfully some fishermen are planning to fish until March. But the days without people on the pond the Shellfish Department must ride out and scare the ducks away from the beds. There is also a laser light available that can be shined across the water in low light that will make the ducks move.

There is no easy solution to this problem. With fewer hunters around the ducks will not leave the area. They will keep circling from one end of the pond to the other and attract more ducks. Without being shot at by hunters they feel quite comfortable in the pond. There are negative effects from their feces degrading water quality that could cause problems in the future.

Conclusion and Acknowledgments

The Shellfish Department designs and executes all parts of the Propagation Program, you just read about. There are other tasks not included in this report including: catch data, permitting, enforcement of shellfish rules, building and maintaining of all equipment used for the program and managing the resource. This would never be possible without the Shellfish Advisory Committee, Selectmen and Town Administrators that behind the scene help the program immensely. The program would also like to thank Rick Karney from the Martha's Vineyard Shellfish Group for his inexhaustible expertise. He and all of his employees work very hard to supply healthy seed for the town of Chilmark. Rick can answer any question about shellfish in our area and has been a huge resource for the department.

The town would also like to thank all of the volunteers that helped create the oyster shell reefs in Tisbury Great Pond. Even though it was a fun day reminiscent of a time when individuals got together combined their resources and got a job done, it was a lot of work.

Those people were: David Merry, Ray Gale, Jason Gale, John Osmers, Jeff Lynch, Isaiah Scheffer, Johnny Hoy, Devan Greene, Mal Jones, Willie Whiting, Peter Vann

Equipment Supplied for the Project: Bobcat (David Merry), Trailer (David Merry), Trailer (Jason Gale), Barge (John Packer), Boat (Jeff Lynch), Boat (Louis Larsen Sr.), Boat (John Osmers), Boat (Ray Gale)

The town's ponds are a resource for all of us to enjoy and take care of. The Shellfish Department spends a lot of time cleaning up the edges of the pond so it is not riddled with trash. The job is big and time is tight. If anyone would like to organize a massive volunteer cleanup day for our resource please feel free to call the Shellfish Department (508-645-2100 ext. 2145). The Shellfish Department would like to invite anyone who wants to come out and learn about aquaculture (it will be a hands on experience) contact by email (shellfish@chilmarkma.gov). If there are any volunteers that would like to participate in enhancing the town's resource by helping the Shellfish Department please call us at the same number above.

I would personally like to thank Jacob Bassett and Jeff Lynch (Assistant Shellfish Constables and worked very hard to make the program successful), and the Fischer's for the use of their dock, and Matt Merry for moving the upweller.

Thank You
Isaiah L Scheffer
Chilmark Shellfish Constable

I love my job and appreciate all of you for giving me a chance to design and run this program. Please enjoy the additional photographs on the next few pages.

Bay Scallops Propagation

Scallop seed (25mm) being taken out of spat bags to be placed in bottom bags

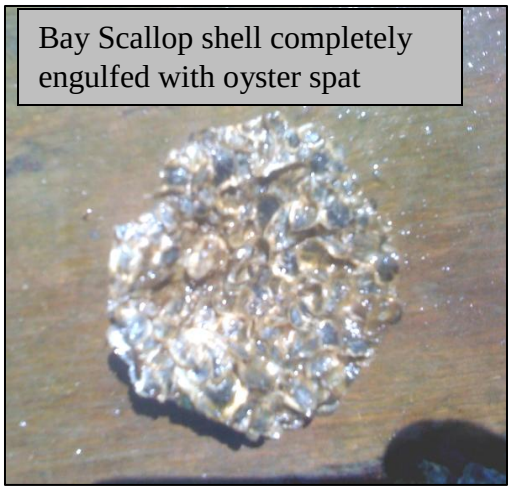
Bay Scallop seed covering spat collector. From the 2010 natural set.

25mm scallop seed from the spat bags.

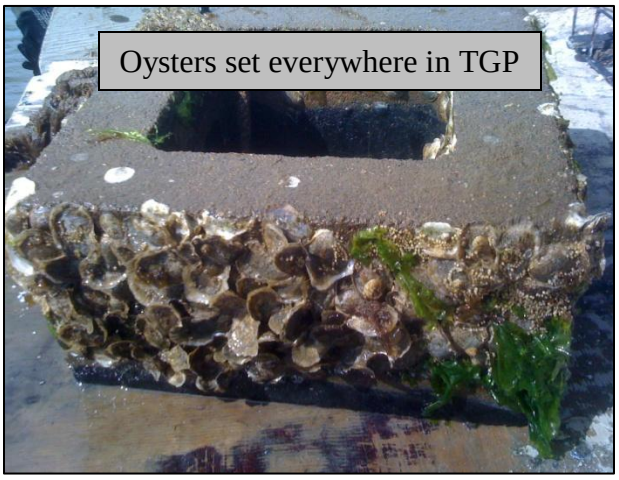
45mm seed from Stage 3 Growout. Bottom Bags

Oyster Propagation

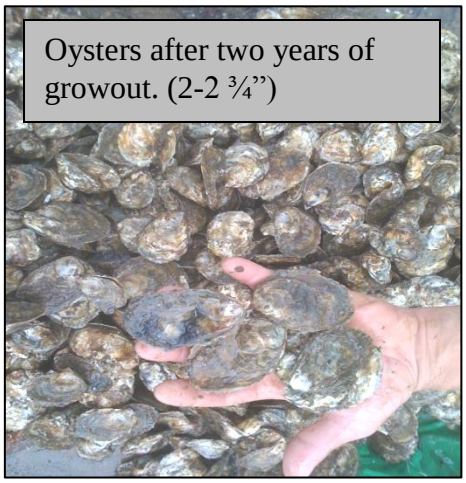
Oyster Spawning Cages- Broodstock is on a bed of cultch



Bay Scallop shell completely engulfed with oyster spat



Oysters set everywhere in TGP



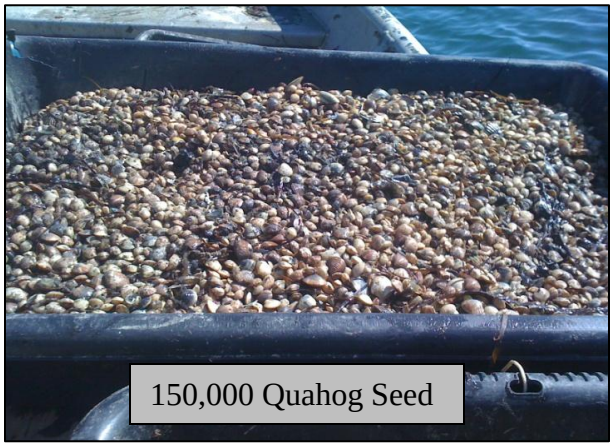
Oysters after two years of growout. (2-2 ¾")

Upweller at Flat Point Farm

Cultch Bags from the Remote Set

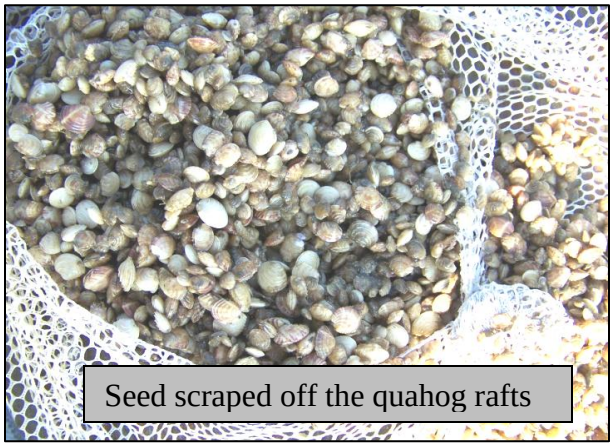
Oyster Spat Collector

Quahog Propagation



150,000 Quahog Seed

15mm Quahog Seed



Seed scraped off the quahog rafts