

COUNTY OF SUFFOLK



STEVE LEVY SUFFOLK COUNTY EXECUTIVE

It is with great pleasure that I present the final recommendations of the Great South Bay (GSB) Hard Clam Restoration Working Group. This report contains the long term management recommendations for hard clam restoration in the Great South Bay.

During late 2008 I initiated the formation of the GSB Hard Clam Restoration Working Group. This group was charged with making recommendations for interim and long term hard clam management. The ultimate goal of the Working Group was to provide recommendations for a sustainable hard clam fishery in the GSB for the benefit of all Suffolk County. Interim management recommendations were adopted by each of the three GSB Towns for 2011. These interim measures are slated to expire at the end of this year. The following report contains the long term recommendations from the working group to the three GSB Towns as we move ahead into 2012.

In 2005, with funding from the Suffolk County Water Quality Protection and Restoration Program, Cornell Cooperative Extension and Long Island University began the largest bay scallop restoration effort ever attempted in the United States. These restoration efforts have contributed to a huge increase in scallop populations. LIU and Cornell scientists documented a 5,000% increase in scallop populations in Orient Harbor. Last year's Peconic bay scallop fishery was the highest it has been in 17 years.

The paragraph above describes the success we have seen in the bay scallop restoration effort. Suffolk County has also contributed to the efforts of the Nature Conservancy and the Towns to increase the stocking of adult clams in the GSB and to develop a management plan for the future. It is my hope that with the cooperation of the Towns, the State and most importantly the Baymen; that we can achieve similar success with the clam population of the Great South Bay.

I would like to personally thank the Working Group for their great efforts at completing this report.

Sincerely,

Steve Levy
County Executive



**Report of the Great South Bay Hard Clam Restoration Working
Group**

to the Suffolk County Executive



December 16, 2011

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EXECUTIVE SUMMARY

The Great South Bay Hard Clam Restoration Working Group

Called together in late 2008 by Suffolk County Executive Steve Levy, the Great South Bay Hard Clam Restoration Working Group¹ (Working Group) was tasked with: (1) Ensuring adequate enforcement of hard clam harvest laws, regulations and codes in Great South Bay; (2) Establishing interim hard clam harvest management recommendations for the Great South Bay; and, (3) Developing a long term, science based, sustainable management plan for the hard clam population of Great South Bay. The first two of these goals were addressed during the course of 2009 through meetings of the Working Group and through the creation of an Interim Harvest Management Subcommittee and the development of that subcommittee's report (see Appendix 1).

To address the development of a sustainable management plan for the Great South Bay hard clam population, the Working Group established a goal of *“reestablish[ing] and protect[ing] populations of hard clams that are necessary to support ecological, economic, cultural and recreational values associated with restoration of the Great South Bay.”* To best prepare for meeting that goal, the Working Group contracted with Cashin Associates to perform a technical analysis on the hard clam population and with Forum Facilitation Group to develop and implement a comprehensive outreach and engagement strategy for the numerous stakeholders associated with this effort.

Report Summary

The hard clam population in the Great South Bay, the target of this report and its recommendations, suffers from multiple wounds. From its current low abundance and patchy pattern of distribution, a full recovery to meaningful commercial and ecological levels will not occur without critical interventions on a number of fronts, principally long-term improvements in water quality (an outcome contemplated here but ultimately outside the charge of the Working Group), expansion of the effectiveness of on-the-ground restoration efforts, and fixing the antiquated clam harvest management that precipitated the current dearth of clams. Regulators, commercial clambers, scientists and laypeople alike understand and agree that the current situation benefits no-one and leaves the resource vulnerable to further exploitation and diminishment in the future.

Agencies and governments have a responsibility to manage and protect public resources for the benefit of current and future generations – the clams of the Great South Bay most certainly fit that duty. This report acknowledges key management gaps that have persisted unaddressed for decades – placing future clam population recovery at risk should it ever occur. Even the present situation, a barely sustainable harvest of a severely depleted resource, is unstable. If, or when, circumstances result in even modestly greater interest in commercial clam harvest from Great South Bay, the already depleted population would experience renewed and barely regulated harvest pressure. The situation cries out for a principled, measured and fair response.

Widely accepted and successful fisheries harvest management protocols used around the country can set the stage for a future restoration of the Great South Bay clam population. First, the clam population itself has to be monitored regularly. Census data tell managers and regulators how large the population is and how fast it is growing or shrinking. Second, using clam census data, regulators can set reasonable harvest targets for commercial take. Finally, the commercial clambers have to inform the regulators of

¹ Participants included: Suffolk County, Babylon Town, Brookhaven Town, Islip Town, New York State DEC, Fire Island National Seashore, South Shore Estuary Reserve Citizens Advisory Committee, Clamming Industry, New York Sea Grant, Citizens Campaign for the Environment, The Nature Conservancy

the extent of their catch so that regulators can decide if the harvest amounts are within the sustainable yield of the population. Government then has the responsibility of institutionalizing this process and making sure that it responds to increases and decreases in clam population fairly and transparently over time. These actions, well-implemented, form the cornerstone of 21st Century fisheries management. By following this new process, everyone can benefit from a sustainable harvest of clams in the Great South Bay. This update can be accomplished without additional expenses to existing town bay management programs.

Commercial clammers clearly represent the affected individuals with the greatest economic stake in this revamping of clam management in the Great South Bay. As such, the Working Group carefully listened to their input over multiple meetings and interviews. The arrived at recommendations strive to “first, do no harm”. Commercial clammers represent a diminished presence in the bay from past decades. The intention of the Working Group was to avoid penalizing clammers as a result of recommended changes to management protocol. The recommendations in this report do the least possible harm and inconvenience to current commercial clammers and set forth reasonable ways in which clammers can re-enter or join the Great South Bay commercial clamming industry.

Problems facing the Great South Bay Hard Clam population

The technical analyses commissioned by the Working Group (Appendix 2) in combination with the other studies, reports, and information reviewed, pointed to three specific problems facing the Great South Bay hard clam population.

- *The harvest management framework in each of the Great South Bay towns does not allow for the sustainable management of the resource.* The interim regulatory framework, adopted by each Great South Bay town in 2010, and which will expire everywhere on January 1st, 2012, is not linked to the health or status of the hard clam resource. Moreover, prior to the adoption of the interim regulations, there were no limits on the number of commercial harvesters or the amount of hard clams that each harvester was allowed to take out of the bay.
- *There are currently too few clams and they are too widely distributed throughout the bay to create a naturally self-sustaining population.* The absence of a significant density of adult clams in much of the bay, especially the central bay (Islip and TNC property), represents a serious lack of spawning potential and poses an impediment to the natural regeneration of the clam resource.
- *Environmental conditions in the bay, in particular altered phytoplankton communities linked to nitrogen pollution, reduce spawning, condition, growth and even survival of juvenile clams.* The impacts of the resulting low clam recruitment are compounded by other challenging conditions such as high predation rates, particularly at the smaller clam life stages. Loss of critical bay habitats, such as eelgrass meadows, represents a serious threat to clams and the entire ecosystem of Great South Bay. This calls for a more holistic approach to protect and restore the health of the bay and the quality of life of people in Great South Bay communities.

Key Recommendations²

A long term restoration of a self-sustaining, commercially and ecologically viable hard clam population in the Great South Bay will only be realized through changes in harvest management, increased and

² These recommendations are presented here as broad categories. For greater detail on each of these categories please see the Recommendations in the complete report.

improved restoration, and a concerted effort to address the environmental factors that are negatively impacting hard clam growth and survival. As such, the Working Group recommends that:

- **The Great South Bay Towns should adopt an adaptive management approach that establishes harvest targets based on the sustainable yield of the hard clam population. Moreover, the Towns should adopt a harvest management framework that is predictively responsive to changes in the clam population and dynamics of the fishery and maintains harvest within in sustainable limits.** Managing the hard clam resource in such a way will provide the Great South Bay Towns with the necessary tools to meet their responsibility to their citizens and will bring management strategies up to current wild-harvest resource management standards. The continuation and improvement of coordinated methods for monitoring the health of the hard clam population in Great South Bay, and the timely reporting of harvest amounts across all three towns, are essential for regularly updating sustainable yield numbers to reflect the true health of the clam population.
- **Public and private hard clam restoration efforts should be improved and continued.** Harvest management efforts on their own will not restore the hard clam resource – instead a continued, and improved where necessary, effort must be put forth to increase the overall spawning potential of the hard clam population, in particular in the central areas of the bay. A vision for a coordinated, multi-faceted approach to hard clam restoration should be developed and implemented, pulling heavily from existing restoration programs and from interested stakeholders who have relevant knowledge. Increased coordination and further refinement of current management and monitoring techniques, in conjunction with pilot initiatives to explore additional restoration opportunities, all applied over a reasonably appropriate timeframe can meet the Working Group’s multi-faceted goal.
- **The Suffolk County Executive should create and charge a stakeholder and agency and working group or taskforce to address the issues of water quality and overall environmental degradation in the Great South Bay and its watershed.**³ While the Hard Clam Working Group was not empowered nor staffed in such a way as to provide specific recommendations on how to address the problems caused by poor water quality and deterioration of other habitats in the Great South Bay, this a serious issue that needs an appropriate and adequate response. The Working Group acknowledges that it is unlikely to succeed in its goal if these issues are not addressed and suggests that, when such an effort is initiated, the needs of the hard clam resource should be considered along with the other issues that need to be addressed concerning overall water quality improvements in Great South Bay.

³ There were a number of issues raised by stakeholders that the Working Group felt were outside of its purview to address but had considerable merit and should not get lost in the discussion. A further discussion of these issues can be found in Section 4: of the complete report.

SECTION 1: BACKGROUND AND HISTORY: THE GREAT SOUTH BAY HARD CLAM RESTORATION WORKING GROUP

Following several years of adult clam stocking in central Great South Bay, a juvenile clam set estimated at over 300 million was observed on the eastern portion of The Nature Conservancy's underwater lands and within the western half of Brookhaven in the summer of 2008. Originating in the summer of 2007, this was the first large set of juvenile clams that had been recorded in decades. The numbers and locations of these juvenile clams provided evidence suggesting that the investments to restore an abundant and self-sustaining clam population in Great South Bay were beginning to pay off, and that Great South Bay was still capable of producing strong year classes of clams.

Knowledge of this set was widely publicized and news circulated throughout the east coast shellfish industry. At that time there were no existing mechanisms to prevent an influx of participation in commercial clamming that had the potential to nip restoration gains in the bud. This created concerns amongst the shellfish managers who recognized that it would take the survival of several strong clam sets before the clam population would be considered restored and self-sustaining.

In response to this news, these concerns, and the desire to protect the significant financial investments Suffolk County had recently made in hard clam restoration efforts, Suffolk County Executive Steve Levy convened the Great South Bay Hard Clam Restoration Working Group (Working Group) in December of 2008. The Working Group consisted of various government, agency and stakeholder representatives, and was pulled together to increase coordination and management of ongoing efforts to advance hard clam restoration in the Great South Bay by Suffolk County and the towns of Babylon, Brookhaven, Islip, as well as The Nature Conservancy.

At the time of its convening, the Working Group was charged with three specific goals:

- Ensure adequate enforcement of existing and, potentially, new harvest management laws, regulations, and codes in Great South Bay.
- Establish a suite of interim management recommendations that will protect the progress made towards restoring the Great South Bay ecosystem by eliminating the potential for overharvesting.
- Develop a long term, science based, sustainable management plan for the Great South Bay, to be implemented by the parties cited above.

In the years since the establishment of the Working Group, it became apparent that the clam set of 2007 did not survive to adulthood in the numbers that were hoped. While it moved the needle on the overall status of the clam population in the Great South Bay and demonstrated the possibility of a successful restoration of the hard clam population, the subsequent extensive brown tide events in 2008 and 2009 took their toll on the juvenile clams. The detrimental impacts of algae blooms observed since 2008 have reemphasized the central need to address the nutrient loading that promotes conditions for harmful algae blooms as part of the long-term restoration of clams and for general improvement of bay health.

In spite of concerns about harmful algae blooms, the Working Group still believes that establishing a long-term science based restoration and management plan is an essential step in restoring the resource. As such, it turned its focus from the immediate needs of protecting a clam set to exploring and developing the scientific understanding, administrative structures, rules, regulations and protocols that

might both contribute to a restoration of the hard clam population and prevent its destructive exploitation at some point in the future when such restoration has been achieved.

Enforcement

Seven agencies have responsibilities associated with marine law enforcement in Great South Bay. However, in many of these agencies, the decline of the clam fishery necessarily brought about a change in focus, making the enforcement of shellfish regulations less of a priority. During the first meeting of the Working Group, representatives from six enforcement agencies assured the Working Group that the law enforcement agencies that patrol and protect the Great South Bay were well coordinated with each other as a result of an increased focus on homeland security and general enforcement.

These representatives also recognized that regulations alone won't protect the resources of Great South Bay and committed to making the enforcement of any new regulations deemed necessary to protect and restore the population a priority. This strong, watchful enforcement presence is committed to seeing the restoration of Great South Bay's ecosystem through to its completion, and to taking the necessary actions to make sure that the return of the clams, and of all the economic and ecological benefits that they provide, occurs in as timely and orderly a way as possible.

Interim Harvest Management *(adopted by towns in 2010)*

Given the concerns expressed above, and the desire to quickly develop protective management measures, the Working Group created the Interim Harvest Management Subcommittee (Subcommittee) at its first meeting, and charged it with "...develop[ing] a suite of recommendations to address interim management of the [hard clam] resource."

When first convened, the regulatory framework governing the harvest of hard clams in Great South Bay was not considered sufficient to prevent an influx of additional harvest pressure that would be detrimental during the population rebuilding process. The Working Group reviewed and evaluated the effectiveness of existing shellfish regulations, in particular town and state codes, regulations, and laws governing permits and harvest and made recommendations for interim harvest management measures that would effectively prevent an additional influx of new participants in the commercial fishery while more comprehensive long-term harvest management recommendations were being developed.

In order to guide the development of its interim management recommendations, the Subcommittee first agreed that the interim management recommendations should:

- Be implemented in 2009, although some of the recommendations might not take effect until 2010;
- Limit the number of new entrants into the hard clam fishery during the interim time frame in order to protect the resource and existing harvesters while longer term management measures are developed and implemented;
- Have no impact on any other shellfisheries in Great South Bay or any clam fisheries in other parts of Brookhaven. Change the management regulations at the town level;
- Enable those currently working in Great South Bay hard clam fishery to continue to work at their current level; and,
- Sunset on December 31, 2011, although the interim measures should be evaluated and modified as needed between the start of implementation and December 31, 2011.

Using these guidelines, the Subcommittee developed a set of interim harvest management recommendations. The following, though not a complete list, are the key recommendations for each of the Great South Bay towns that were developed in 2009⁴:

- ***The Great South Bay Commercial Hard Clam Endorsement*** – It was recommended that each town establish an endorsement on the town shellfish license that allows an individual to harvest hard clams from the Great South Bay. Individuals not possessing the endorsement should not be allowed to harvest hard clams from Great South Bay for commercial purposes. To be eligible for the endorsement, an individual must be a current town resident that had a NYS Shellfish Diggers Permit during any 2 years between 2006 and 2009 inclusive, was a resident of a Great South Bay town during any 2 years between 2006 and 2009 inclusive, and has a current NYS Shellfish Diggers Permit. Each town should also establish a hardship process for those individuals who don't otherwise qualify.
- ***Daily Harvest Limit of 2000 clams*** – It was recommended that individuals who have the endorsement should not be allowed to harvest more than 2000 clams per day from the Great South Bay.
- ***Cull On-Site*** – It was recommended that each town amend their shellfish ordinances to require that all boats used for raking hard clams have a cull box that provides for the immediate overboard discharge of seed hard clams, and that tong boats have no more than 3 bushels of bay cull (shellfish and assorted bottom material unavoidably taken during harvesting) on board at any time, and none while underway.
- ***Recreational Daily Limit of 50 clams*** It was recommended that each town reduce the recreational harvest of hard clams from 100 hard clams per person per day to 50 hard clams per person per day.

These recommendations, excluding the recreational limits, were adopted by all three Great South Bay towns in early 2010 for implementation in calendar year 2011. The provisions will sunset on January 1st, 2012. This Report supplies science based recommendations to replace these interim rules.

Long Term Management

Once the proposed Interim Harvest Management measures were adopted in all three Great South Bay towns, the Working Group began developing long-term management strategies to ensure that enough clams are in the bay to support the continued health of the Great South Bay ecosystem and the sustainability of the clam fishery. To ensure that these management strategies were based on a strong scientific understanding of the resource and its dynamics, and as well informed through stakeholder involvement as possible, the Working Group engaged the services of experts in fisheries management and launched other participatory processes with knowledgeable experts and relevant specialists.

With the help of these experts, the Working Group developed and implemented a planning process, with periodic public meetings held during the course of the development of the scientific understanding of the bay's hard clam resource. This process, combined with individual stakeholder interviews and small group meetings with commercial clambers, ensured that interested stakeholders could stay abreast of the findings of the scientific effort and could help share their knowledge and understanding of the system.

⁴ For the complete report of the Interim Harvest Management Subcommittee, please see Appendix 1

The results of this process are summarized in sections 2 and 3 of this document. Much more extensive detail is available in the supplemental Great South Bay Hard Clams Technical Report (Appendix 2). Moreover, the information that these experts provided, and their ability to link the impacts of various regulatory approaches to impacts on the resource and the people who rely upon it, helped to mold, inform and modify the recommendations put forth in the Report.

Goal of the Long Term Management Effort

One of the key steps of the process to develop long term harvest management recommendations was the creation of a goal statement for the Working Group. The hard clam resource in Great South Bay has always played a very multifaceted role in the lives of the people who live near or interact with the Great South Bay. Through stakeholder outreach it became abundantly clear that the health of the hard clam population in Great South Bay had not only economic and ecological implications, but recreational and cultural ones as well. In light of that, the Working Group developed the following goal to guide it through the development of harvest management recommendations:

“...to reestablish and protect populations of hard clams that are necessary to support ecological, economic, cultural and recreational values associated with restoration of the Great South Bay.”

Though the above mentioned values may be difficult to define, and may vary from person to person, the Working Group agreed that the recommendations from their planning effort should strive to:

- Ensure that sufficient adult hard clams remain in the system for the population to grow and be self-sustaining
- Increase, over time, the number of clams that are available to be harvested for commercial and recreational purposes
- Grow the hard clam population to the point that it is able to provide sufficient water filtration to improve the overall health of the bay
- Protect the economic opportunities currently afforded active commercial clambers
- Provide opportunities for new individuals to enter the commercial hard clam fishery
- Maintain traditional recreational clamming activities
- Create harvest management regulations that are practical, justifiable and can be implemented with fairness and transparency.

SECTION 2: KEY FINDINGS OF THE TECHNICAL ANALYSIS

Cashin Associates was commissioned to conduct technical analyses to assist the Working Group with their charge. These analyses were designed to supplement all of the existing studies and reports on the conditions of hard clams and Great South Bay. As such, the report is not intended to recreate, reiterate, or even summarize all of the findings of previous studies and reports such as those produced by the New York Sea Grant Hard Clam Initiative, Stony Brook University, Haskin Shellfish Laboratory and other academic institutions, Suffolk County, The Nature Conservancy, Town shellfish programs, COSMA, the various committees of the South Shore Estuary Reserve, and the many others who have studied and reported on this or related issues. These analyses do however represent the first time there has been a consolidated examination of all of the shellfish survey data from around the bay, mostly collected by the towns. Shellfish survey data were digitized and formatted in advance of commissioning this effort. The technical report was intended to provide new insight and clarification to assist the Working Group with completing their charge.

Readers are encouraged to reference the complete technical analysis report prepared by Cashin Associates which is presented as Appendix 2.

In summary the report findings are that the overall condition of the clam resource in Great South Bay is poor in terms of its potential for sustained harvest, capacity to restore itself, and ecological benefits to the bay. The current hard clam population in Great South Bay is too small and too widely dispersed in vast portions of the central bay to naturally recover on its own in the near-term. Active restoration of habitat, increasing clam spawning potential, and utilization of hatchery-born clams can all be targeted to accelerate recovery. Approximately three quarters of the bay cannot support commercial clamming and overall the fishery can only sustain a very small number of full-time commercial harvesters. Any significant increase in fishing pressure would place the resource in an over-fished condition and threaten to lower the population levels even further. Harvest amounts should be kept below the maximum sustainable amounts calculated for each town. A more active management and monitoring approach is needed to manage this resource in a way that is adaptive to changing conditions.

These issues are further explored below.

Status of the Great South Bay Hard Clam Resource

The overall abundance of the clam resource in Great South Bay is low in comparison to historic data. Roughly half of the bay (mostly the central portion) has such low clam abundance that it can no longer sustainably support commercial harvest while the eastern and western parts of the bay, where clams are more abundant, can only sustain a small number of full time commercial clam harvesters. Hard clams are no longer capable of filtering the volumes of phytoplankton from the water that they once did when they were more abundant. This is in sharp contrast to the potential shellfish resources that could exist in an estuary of this size and quality, and to the history of the Bay as a nationally recognized producer of shellfish, both clam, oysters and to a lesser extent, bay scallops.

Spawning Capacity

The absence of a significant density of adult clams in much of the bay, especially most of Islip and TNC, represents a serious lack of spawning potential and poses a serious impediment to the natural regeneration of the clam resource in those areas. The low spawning potential in the central bay makes it unlikely that the clam population can have any significant near-term recovery without the kind of on-

the-ground restoration programs that are currently underway. Some reliably successful reproductive populations of clams still exist in parts of Babylon and Brookhaven.

Ecological Value

The density of clams is so low in most of the bay that the ecological value of the resource in terms of filtering capacity and ecological function is minimal compared to its potential. The ecological niche for benthic filter feeders appears to be unfulfilled at the present time, and it is unclear how this niche is presently being utilized. Other benthic suspension feeders abundant in the past, such as the eastern oyster and *Crepidula*, have suffered declines in abundance, although the short lived duck clam *Melinia lateralis* periodically appears in parts of the bay as it did in the summer of 2011. The absence of a robust and stable community of filter feeders combined with nutrient loading to the water identified in other studies, makes Great South Bay more susceptible to chronic harmful algae blooms impacting both wildlife and people.

Habitat Loss and Conversion

Scientific and field evidence indicates that shell or other aggregate is important for hard clam survival through protection from predators, and buffering the pH of sediment poor waters. Historically, natural shell beds, remnants of the historically abundant shellfish populations, have served as important natural habitats for clams in Great South Bay. Reports from baymen now indicate that shell beds are deteriorating and diminishing in extent because of natural deterioration and burial of shell and the lack of significant new shell generation.

Another change in habitat for the bay is the decline of eelgrass beds, which has apparently accelerated over the past few years. The New York State Seagrass Task Force has provided detailed recommendations for the protection and restoration of seagrass beds on Long Island, including in the waters of Great South Bay.

Habitat Protection, Sanctuaries, and Hatchery shellfish production

The use of sanctuaries and closed areas are viewed as viable tools for shellfish restoration in the industry. The approximately 13,500 acres that comprise The Nature Conservancy's grounds represent a large sanctuary area in the central portion of Great South Bay. The closure of this land to shellfishing represents an extremely valuable opportunity for restoration of the resource within The Nature Conservancy boundaries, adjacent bottomlands, and down-drift areas of the bay. The Islip Shellfish Hatchery is likewise a valuable tool for improving the abundance of hard clams and other native shellfish species throughout the bay.

The Great South Bay Commercial and Recreational Hard Clam Fisheries

Results of analyses done for this study confirm the results of many previous studies, some of which date back almost three decades, showing that the number of clams annually harvested from Great South Bay in the heydays of the commercial fishery, were far in excess of what the resource was producing annually. This resulted in rapid population depletion and eventual collapse of the commercial hard clam fishery. Issues impacting the recovery of the hard clam are more complicated and involve the cumulative impacts of low abundance of spawning adults and challenging ecological conditions of the bay. Given the desire to rebuild the hard clam population and the investments being made in on-the-ground restoration programs, estimation of the number of clams that can be removed annually without further depletion of the hard clam population was identified as a priority component of this study.

Maximum Sustainable Yield

In the context of this report, Maximum Sustainable Yield (MSY) estimates represent the maximum number of clams than can be removed from different areas of the bay annually without depleting the existing population. These estimates are based upon average conditions, the average number of juvenile clams recruiting to different areas, and average natural mortality rates. Unusually favorable or detrimental conditions, particularly if they occur in several consecutive years, are not accounted for in these projections. Ideally, if the desire is to increase the abundance of hard clams in the bay, the number of clams harvested annually should be less than the MSY estimates.

Two methods were used to calculate Maximum Sustainable Yield estimates. Method 1 was based on a conservative stock/recruitment analysis. Method 2 was based upon a less conservative surplus production model. These two methods provided a range in MSY estimates for commercial harvest areas of the bay. When the estimates are expressed as percent of adult standing stock and averaged, a maximum annual harvest target is calculated at 5.1 percent of the bay wide fully recruited clam population. A breakdown of the maximum annual harvest target or a percent of adult standing stock by zone is as follows: 8.5 percent for Brookhaven, 2.4 percent for Babylon, and 2.7 percent for Islip. These percentages can be used to calculate annual quotas in numbers of clams and bushels based on standing stock estimates derived from population surveys. Annual quotas based on the 2009 standing stock are: bay-wide – 13,650 bushels; Brookhaven – 8,250 bushels; Babylon – 5,000 bushels; and Islip – 400 bushels. These harvest estimates can be used to assess the impact of recorded harvest on the sustainability of the standing stock, or to set annual targets for management of the resource.

Table 1: MSY Expressed as Percent of Standing Stock

	Percent of Standing Stock		
	Method 1	Method 2	Average
Bay-wide	4.2	6.0	5.1
Brookhaven	9.6	7.4	8.5
Babylon	0	4.8	2.4
Islip	0	5.4	2.7

Table 2: MSY in Millions of Clams and Bushels

	Percent of Standing Stock	Millions of Clams	Bushels	2009 Landings
Bay-wide	5.1	4.6	13,650	9,405
Brookhaven	8.5	3.3	8,250	4,268
Babylon	2.4	1.0	5,000	5,078
Islip	2.7	0.1	400	59

MSY conversion to bushels is based on 400 clams/bushel for Brookhaven and 200 clams/bushel for Babylon and Islip

Estimates of maximum sustainable yield indicate that a very modest harvest, within the range of harvest reported in the past few years, may be possible in the Babylon and Brookhaven portions of the bay. No significant maximum sustainable yield is indicated for Islip and TNC. ***Any significant increase in fishing effort would place the resource in an over-fished condition and threaten to lower population levels even further. Maintaining the harvest at or near present levels would prevent overfishing and would allow a recruitment surplus which would help to allow stock growth in certain areas.***

Latent Commercial Fishing Pressure Potential

The present level of commercial fishing is near or at an all-time low over the past 40 years. The current level of harvesting appears to be within or close to a maximum sustainable yield for the bay overall, but this is due to the very low level of commercial clamming currently taking place. However, the number of shellfish permits issued is far higher than the number of clambers actually working on the bay. The unused permits and number of clambers that only harvest clams part-time represent huge latent potential harvest pressure on the resource. Under current conditions, the availability of shellfishing permits at numbers much larger than the resource can support is not resulting in overharvesting of the hard clam resource because economic conditions do not currently favor large numbers of entrants into the Great South Bay hard clam fishery.

Economics of the Commercial Hard Clam Fishery

Economics are a major driver influencing participation in the commercial clam fishery in Great South Bay. Currently the relatively low dockside price for clams and low abundance of clams set a ceiling on potential daily clamming revenue from Great South Bay that is lower than that from clamming in other areas around Long Island. In addition, clamming is hard physical work and weather impacts the number of days that can be worked.

It appears unlikely that the price of clams will undergo any significant increase because it is now governed by out-of-state supplies from large aquaculture operations. Changes that could intensify fishing pressure are likely to include a substantial increase in clam abundance in the bay or displacement of harvesters from other areas such as occurs during a red tide event. Based upon recent shellfish surveys a large rebound in harvestable clam abundance is not anticipated in the next 2-3 years. Any substantial restoration of the resource will require several years of above average clam recruitment.

Recreational Fishery

A comparison of commercial and recreational clamming areas indicates that there is presently very little or no significant overlap between the two activities. Recreation and accessibility were more important to recreational clambers than the size of the catch, which accounts for approximately 16 percent of the estimated sustainable yield within the recreational fishing areas. ***Based on this low level of harvest compared to the available stock and the lack of overlap with the commercial clamming areas, the recreational fishery appears to be sustainable and does not seriously affect the status of the commercially targeted fishery or the overall resource.***

Recreational clamming has been shown to be a popular past-time for many residents of the Towns of Babylon, Islip and Brookhaven. Although the fishery has close to 2,000 participants, the total catch is not great compared to the standing stock of clams in the areas where recreational clamming occurs. Furthermore, there is almost no overlap between the recreational fishery areas and the primary commercial fishery areas in the bay.

Recreational clamming is accessible to all residents and is done by people of all ages. Popular recreational clamming areas have been identified. These areas could be considered for seeding activities to increase the density of clams available for residents. This is especially relevant in areas of Islip (e.g. East and West Islands) where recreational clamming had been popular but where now there is a very low density of clams. ***Promotion of recreational clamming and educational/outreach initiatives for the recreational clamming sector may encourage environmental stewardship among residents and increase willingness to support bay management programs funded by the Towns.***

Traditional Relevance

The commercial and recreational hard clam fisheries represent traditional iconic activities that help define the culture of Great South Bay communities. Clamming is an activity that both the very old and very young can participate in and allows the passing down of shellfish harvesting skills through generations as an important part of many Great South Bay families' traditions. ***Clamming provides an important connection between people and the natural environment. Maintaining that connection, especially between young people and their natural surroundings, is an important part of fostering the environmental stewardship ethic of the next generation.***

Future Hard Clam Growth Scenarios

Potential population growth scenarios were constructed to provide insight into (1) the characteristics a restored clam population could have five years into the future and (2) what characteristics a population could have if it was restored to 50% of the level that was observed in 1978 (the year of the first bay wide clam survey) based upon current conditions. The predictions are based on assumptions that would provide for the growth of the resource in terms of populations density. These scenarios were used to consider potential characteristics including standing stock, sustainable yield, commercial harvesting potential, and ecological impacts.

The two resource growth scenarios show several important findings. Areas with current and historic clam populations will be the areas where increased clam abundance could be expected. Areas with favorable environmental conditions for clam growth and survival rate would be expected to be those areas most suitable for improved clam population growth. Clam population growth will largely depend on the presence of existing viable and productive congregations of clams.

Under either scenario, the amount of commercial clamming that could be supported is far below that which occurred in the 1970s and early 1980s. An increased clam population could only support a modest fishery compared to past levels, if it is to remain sustainable.

Areas with Little Spawning Capacity

The extensive areas of the bay with very low or no clam abundance may not have any significant spawning capacity, making the prospects there for natural recovery poor. Large portions of TNC's property and the Town of Islip underwater lands are in such a condition. Population growth scenarios indicate that existing natural clam populations are not significant enough to produce any natural restoration of these low population areas over a ten-year period. Enhancement of spawning capacity and of seed clams by methods which help survival, maintenance of sanctuaries and closed areas, and habitat enhancements are most needed in these areas.

SECTION 3: STAKEHOLDER OUTREACH AND ENGAGEMENT

A critical component of the Working Group process was to reach out to a wide range of community stakeholders to ensure that key issues and concerns of the community were heard, understood, and incorporated into the Working Group recommendations. An independent facilitator was hired to design and manage the stakeholder outreach process. This outreach consisted of several components as described below:

Facilitated Outreach Opportunities

Stakeholder interviews

A total of 34 stakeholders were contacted and detailed conversations were conducted with 20 stakeholders who represented a wide range of interests including long-time residents, baymen, fishermen, recreational clammers, academics, private aquaculturists, seafood wholesalers, restaurateurs, attorneys, boating and marinas, and environmentalists. Interviews were conducted in person and on the telephone and generally lasted about 30 minutes.

May 25, 2011- Introductory Workshop

The goals of this workshop were to introduce all interested stakeholders to the purpose, process, and expected outcomes of the 2011 activities of the Hard Clam Restoration Project; introduce stakeholders to the project leaders and the project team; obtain stakeholder feedback on the planned process to assure that it will be responsive to key stakeholder concern; and encourage stakeholders to participate in the process and help make the activities and opportunities meaningful and accessible. The workshop was attended by approximately 70 stakeholders, of which about 25% identified themselves as commercial clammers. Participants also represented all local governments, state and federal agencies, marinas, sailing and paddling, aquaculture, seafood industry, restaurants, universities, environmental groups, foundations, and a range of civic, community, historical, and cultural groups.

Commercial Clammer Dialogues

Two open meetings were held with commercial clammers in July 2011 to identify issues and concerns from their perspective. A total of approximately 25 commercial clammers attended the two evening meetings. The meetings were used to identify and clarify issues from the commercial perspectives and to explore the history of the Great South Bay, identify current clamming conditions throughout the bay, and discuss the types of programs and approaches that might work best.

September 20, 2011- Workshop

The goals of this workshop were to share project results to date; obtain input from commercial clammers and other key stakeholders; provide an updated understanding of the conditions of the hard clam population in the Great South Bay; and explore possible ideas and considerations in providing a regulatory framework for growing and sustaining the hard clam population. The workshop was attended by approximately 40 stakeholders, of which approximately 25% identified themselves as commercial clammers. Participants also represented all local governments, state and federal agencies, marinas, sailing and paddling, aquaculture, seafood industry, restaurants, universities, environmental groups, foundations, and a range of civic, community, historical, and cultural groups.

November 5, 2011 – November 19th 2011 – Public Comment Period on Draft Report

The Draft Report from the Working Group to County Executive Steve Levy was posted to the website on November 5th, and the public comment period was opened at that time. By the close of the public

comment period, only three written responses to the document had been received. These are noted, with a response from the Working Group, in Appendix 3 to this document. Comment was also received during two public workshop sessions open to all stakeholders and interested parties.

November 6, 2011- Draft Report Comment Workshop

The Working Group held a Sunday meeting open to commercial clammers and facilitated by consultants to collect feedback on the draft Working Group Report to County Executive Steve Levy. This meeting paralleled and informed the later meeting for the full public and all stakeholders held on November 9th. About 20 commercial clammers attended. The discussion largely echoed previous sentiments concerning the need for greater water quality focus, the economics of clamming, and the importance of inlets to bay health. Comments generally supported the draft report, in so far as they directly addressed report topics.

November 9, 2011- Draft Report Comment Workshop

On November 9, 2011, the Working Group hosted a workshop that was attended by approximately 40 stakeholders. Workshop goals were: to present and discuss the draft final report of the Hard Clam Restoration Working Group, including review of work performed, public input to date, draft conclusions and recommendations, and to get public input to help finalize recommendations to be included in the Report. After a review of the contents and recommendations of the draft report, stakeholders were invited to react and to comment. Comments ranged widely. There was a repetition of concerns that the Working Group was overlooking the importance of the quality of the benthos to clam population health. There were concerns about asking commercial harvesters to keep track of and report their harvest. There was desire to have more discussion on habitat restoration needs and more description of why shellfish restoration projects to date have not restored the hard clam population and fishery. There was a desire to see a clearer scientific reasoning behind the baseline harvest targets proposed. There was a desire to have a clear Executive Summary in the final report.

Summaries of all the meetings, prepared by the facilitating consultant, are provided as Appendix 4 to this report.

Using the Feedback from Stakeholders

Basic Information Added to Technical Report

Through inputs from commercial clammers and other stakeholders, the basic scientific findings of the Technical Report received considerable verification. Areas that survey data indicated to be devoid or replete with clams were substantiated as such by clammers. Also, clammers verified the trend data, confirming declines in abundance and distribution identified through direct survey methods. While direct experience with the clam population was of significant value to the formulation of the Technical Report, stakeholders had a more difficult time providing useful and consistent information regarding possible causes for the precipitous decline in clam population from the 1970s to the present. Here, there was no agreement.

Stakeholder Input Directed Formulation of Permit Recommendations in the Final Report

The Working Group listened closely to the arguments and concerns of commercial clammers and other stakeholders in formulating its recommendations. This is most apparent in the way that the Working Group proposes that permitting and the issuance of endorsements be managed into the future. Stakeholders expressed several key concerns: seniors should be allowed easy access to the permit or endorsement to harvest clams; some mechanism should be provided for family members to “pass down” their permits to younger generations; new entrants to the Great South bay Clamming industry

should be permitted in a fair and transparent way. The recommendations in this report accommodate these and several other concerns voiced by stakeholders.

Water Quality Concerns Raised by Stakeholders and Included in the Report

Though beyond the scope of the Working Group as composed by County Executive Levy, water quality concerns quickly emerged as central to a long-term recovery of a sustainable clam population and water quality is cross cutting in that it impacts many other aspects of the bay that people are concerned with. The stakeholder meetings and workshops provided ample proof that water quality in the Great South Bay deserves attention at a much larger scale than it receives now in Suffolk County. The Working Group responded to this concern by including a recommendation for the County to create and charge a stakeholder and agency and working group or taskforce to address the issues of water quality and overall environmental degradation in the Great South Bay and its watershed.

Key Values and Concerns Expressed by Great South Bay Stakeholders

As a result of this outreach, a great deal of information and input was obtained from Great South Bay stakeholders regarding hard clams and a wide range of related issues. The key values and concerns, as expressed by stakeholders, are summarized below. Several issues raised that were beyond the scope of the Working Group's purview are discussed in the Section 4 of this report.

Improve overall public understanding of the Great South Bay

The public understanding of the history and causes of the current state of the bay's health are mostly anecdotal, stakeholders and the general public commonly express a wide range of knowledge about and theories regarding the decline of the bay; while all of the causes and issues are widely discussed, there is no commonly understood narrative of what actually happened. The Working Group process should provide this sort of background.

- *The Working Group tasked Cashin Associates to put together a timeline of events to help with this effort. The timeline and all the other technical documents have been posted on the web page that was created for this effort www.gsbclams.org.*

Disappointment in outcomes of breeding and stock enhancement programs

Disappointment and frustration were expressed because spawner sanctuaries, transplants, and seeding programs have failed to yet meet the expectations for a clam population recovery, due in part to environmental conditions and predation. Seeding small clams is viewed as unsuccessful, and there is concern and consensus that resources devoted to this purpose have been wasted. Many felt that money needs to be focused on programs with higher potential for success. Planting larger clams, protection of chowders, protection of eelgrass, and re-creating shell beds were areas that stakeholders felt should all be considered.

- *The Working Group has made a number of recommendations in this regard in Section 5 of this report.*

Learn from the past and from others

We do not need to reinvent an approach to bay restoration, we should be looking to what is working elsewhere and also learn from the past. It is important to understand the real cyclical history of shellfish in the Great South Bay and recognize that very large clam populations actually only existed there for a short period. Baymen, in particular have a great deal of knowledge that should be explored and included in the process.

- *The Working Group has tried to capture these sentiments in its reports and in its recommendations.*

Better environmental conditions and water quality are the key issues for the Great South Bay

Water quality is the most important issue concerning clam health. Many believe little will be achieved without success at improving overall water health. Overall the bay and the clam population are perceived to be slowly improving, however bay conditions must be addressed more aggressively. There were differing opinions and anecdotal information among stakeholders on impacts that sewerage in the South West Sewer District has had. There is concern that fertilizers and other toxins have flowed into the bay in mass amounts. There is belief that current inlet configuration, loss of grasses, predation, and environmental conditions such as brown tide also conspire to keep the clam population low. Overall stakeholders believe that focus should not be on a single species management but on the entire ecosystem. There was desire for more clarification on how ‘good’ water quality might be described.

- *The Working Group has tried to capture these sentiments in its reports and in its recommendations (see Section 4). This sentiment was also presented to the South Shore Estuary Reserve Council at its December 7, 2011, meeting since the charge of that group is broad and it contains many of the relevant agencies and stakeholders.*

Look beyond clams

Scallops and oysters are both species that grow to market size faster and have a higher economic value than clams. Stakeholders do not want to replace clams but rather look to a more diverse ecosystem and market.

- *The Working Group report and the technical report now make reference to these other species. Unfortunately, restoration of self-sustaining wild bay scallop and oyster populations are expected to be even more challenging than restoration of self-sustaining wild clam populations. Private aquaculture may provide opportunities to produce and market these species.*

Aquaculture should be explored but implemented fairly

Many stakeholders view private aquaculture as a potential part of the overall solution to address low wild shellfish populations and water quality of Great South Bay and feel it should be explored. Most of the interest has been for oyster cage aquaculture. However, most commercial wild-harvest clambers do not view shellfish aquaculture favorably. They see leases for private shellfish aquaculture as benefitting a few on what should be unfettered public land, further reducing available clamming grounds, as well as placing downward pressure prices received for wild-harvest shellfish.

- *The Working Group report briefly discusses the potential for oyster cage aquaculture and the opportunities that could be created should the towns choose to advance this idea further than they have already. The Working Group believes that at appropriate scales and with appropriate methods, private shellfish aquaculture can provide economic opportunities and provide fresh local seafood with limited environmental impacts. Collective government efforts in the Peconic Estuary have resulted in criteria, protocols, and new private aquaculture opportunities that are now in place. A similar approach might help rationalize private shellfish aquaculture in the Great South Bay, making sure that new leases for private aquaculture are appropriately sited and made available in a fair and transparent manner.*

The economics control clamming

Clam harvesters and clam dealers note that very few clammers remain on the bay and many of those are part-time. Clam prices are low and will not likely rebound. Some were concerned that dramatic increases in clam numbers would only reduce prices further and make it harder to sell harvested clams. As a result, commercial clammers believe that efforts to limit catches to prevent overharvesting are not needed now. Several believed that there would be plenty of time to work on permit changes from a big set of clams as it would take several years for clams to reach maturity. As a result of poor clamming economics, no new clammers are emerging, existing clammers are aging, and there will be no real industry moving forward.

- *These sentiments inspired much discussion within the Working Group. Sections of both the technical report and the Working Group report contain discussions on economics and the age of clammers. As a result, the final management recommendations include special provisions for seniors. Based upon past precedent, the Working Group agreed that the town resource managers would not be well positioned to make changes in the future if no actions were taken now to update the management framework so it could be more responsive to changes in the clam population or the dynamics of the fishery. The immediate actions proposed by the Working Group are designed with little impact on current harvesting activities but to position the towns to better meet their responsibility to take fair and predictable actions if and when they may be needed in the future.*

Focus on fairness and the future

Several stakeholders expressed that long-time clammers should have access to licenses and available clams. It was not believed to be fair to restrict licenses for long-time but currently inactive clammers or make it difficult for next-generation clammers to learn the trade. Any attempts at aquaculture must also look to the issue of fairness as to who receives leases and how lands are managed.

- *Although the Working Group has made recommendations to transition the commercial clam fishery away from being simultaneously accessible to all town residents, provisions are recommended that, based on stakeholder input, provide preferential access to long-time Great South Bay clammers and their families.*

Commercial clammers are an aging population – look at the demographics of current license holders before making any recommendations

With so many commercial clammers perceived to be in their 50's or 60's already (and therefore not as likely to be working the bay full-time or as intensively as other age cohorts of commercial clammers), any future recommendations of the Working Group should be made after an assessment of the relative age of commercial clammers, over all.

- *Based on these comments such an analysis was undertaken and it is presented in section 1.2.4 of the Technical Report. Based upon this, a special provision for seniors is included in the final recommendations.*

Remaining commercial clamming lands are extremely limited

Environmental conditions, private lands, and restricted areas dramatically limit the availability of clams for the commercial clammer. Islip town waters have very few clams. The only area with fairly abundant amounts of clams is west of the Robert Moses Bridge, and certain areas of Brookhaven.

- *Charts showing what areas are open to clam harvest, and maps of current hard clam abundance are included in the technical report and were used in the Working Group's deliberations. Early*

conceptual drafts of Working Group recommendations had considered closing additional areas as harvest management and/or active restoration tools. Based on stakeholder sentiments and analyses, closing additional shellfishing areas was dropped from consideration in the final recommendations of the Working Group.

Keep the bay bottom open

Commercial clammers believe that sanctuaries should not be placed in the few remaining productive clam areas. The Nature Conservancy lands and uncertified shellfishing areas already provide land for sanctuaries. Clammers felt that seasonal sanctuaries do not work, as soon as they are opened, clammers will come on the first few open days and wipe the clams out.

- *Based upon this sentiment, seasonal sanctuaries, rotational shellfish closures, and closures within productive shellfishing areas were not considered as part of the final Working Group recommendations.*

Coordinate rules and regulations

State and local rules are not always in sync. Review regulations to ensure relevance, coordination, and fairness.

- *The Working Group recommends the same initial actions for all three towns, but recognizes that different social and ecological conditions in each town may eventually call for towns to take divergent actions based upon conditions that are specific to the areas that each town is responsible for stewarding. Continued coordination and cooperation among the town and state should help to keep programs synchronous.*

Shell beds are disappearing and need to be restored.

Shell beds are important habitat for clams and other species. Without large amounts of natural shellfish production, shell beds are a finite resource and are disappearing.

- *The Working Group agreed that this was a concern and incorporated recommendations in Section 5 pertaining to shell and shell substrate.*

Commercial clammers on the Working Group

There was concern expressed that commercial clammers were not well enough represented on the Working Group.

- *Although several clammers were invited on the Working Group, the Working Group had many day-time meetings and conference calls, making it difficult for some clammers to regularly participate. In addition, the Working Group early on found that there was a wide diversity of opinions among the clammer community, making it difficult for this user group to be adequately represented by a few representatives. Because of this, the Working Group expanded its initial outreach plan to include more one-on-one communications between commercial clammers and Working Group members and contractors. This outreach included three additional evening and weekend meetings specifically aimed at the commercial clamming community. The Working Group hopes that it is clear from this and other sections of the final reports that considerable attention was given to listening to and making adjustments to accommodate what was learned from the clamming community. The Working Group is confident that this effort added value to the final work products.*

Outreach and communication are important

There is overall appreciation and interest in conducting more participatory and inclusive processes. Participation has not traditionally included a broad enough set of interests and should be expanded. Few people had a good understanding of the programs and efforts that are underway, and few understood the purpose and scope of the hard clam restoration effort. The Working Group and the Towns all need to work harder to communicate and work with the overall community. Local media should be engaged in the process.

- *The Working Group took outreach very seriously and where possible made accommodations for the core values of the stakeholders that pertained to the Working Group's charge. This process however has emphasized the need and value for more thoroughly enlisting the citizenry in discussions and decisions concerning important issues that are likely to impact the future of the natural resources in Great South Bay and the quality of life in Great South Bay communities.*

Available harvest reports should be more current

There was discontent that harvest statistics, reported by NYS DEC licensed shellfish dealers and collected by NYS DEC, was only available through 2009, thus preventing more timely updates in these analyses through 2010.

- *This was also a concern for the Working Group, which recommended modernization of reporting and record keeping and timelier dissemination of shellfish dealer report summaries by NYS DEC.*

Strong support for taking action

While there is disagreement over the type and extent of action that should be taken, almost all stakeholders agree on the value of the clam population to the Great South Bay and the need to plan and take action.

SECTION 4: RESPONSES TO IMPORTANT ISSUES AND ITEMS IDENTIFIED BY STAKEHOLDERS THAT FELL OUTSIDE THE PURVIEW OF THE SUFFOLK COUNTY HARD CLAM WORKING GROUP

The Suffolk County Hard Clam Working Group (the Working Group) was called together by the County Executive's office to develop recommendations that the County Executive could pass on to local and state resource management agencies to improve their management and enforcement of the bay-wide harvest of hard clams. The requested recommendations should help government agencies manage and enforce bay-wide harvest in a coordinated and cooperative manner that is consistent with the long-term goals of restoring an abundant and self-sustaining hard clam resource.

During the stakeholder engagement process described in Section 3, several opinions and themes were voiced that fell outside of the narrow purview of the Suffolk County Hard Clam Working Group. The Working Group could not fully consider and integrate all of these issues in this process. However, the Working Group believes that it is valuable to clearly articulate the concerns that were raised and, where possible, at least recommend future action be taken by some other entity (either government or private) to facilitate the advancement of these stakeholder objectives and concerns by promoting them to other groups and programs. Themes heard from stakeholders are in ***bold italics***. Themes are grouped into two categories; those expressed from the broad cross section of stakeholders, and those expressed specifically from individuals that self-identified themselves as shellfish harvesters.

Broad Based Stakeholder Themes

There should be a more holistic approach to addressing issues in Great South Bay; one that goes beyond hard clams and hard clam fishery management. Restoration of hard clams is just one part of what is needed to restore and manage the Great South Bay, and harvest management is just one part of hard clam restoration. The Suffolk County Hard Clam Working Group does not have the authority to address the broader goals; however several of our members represent groups that do have this charge. New York State and the South Shore Estuary Reserve (SSER) have been discussing ecosystem-based-management and the potential for using the Great South Bay as a demonstration area. The South Shore Estuary Reserve Council of the SSER may be the appropriate entity for discussing and advancing these broader goals. These issues and outreach summaries have been shared with the South Shore Estuary Reserve Office.

Poor water quality is the main issue in the bay, and it is a problem that needs to be addressed before we can expect a full recovery of the Bay. New York State and the US EPA have determined that parts of Great South Bay are impaired due to pathogens which result in bathing beach and shellfish closures due to human health concerns. However it is worth noting there is no evidence that the presence of human pathogens negatively impacts shellfish. In addition, the entire Great South Bay has recently been added to the EPA's 303(d) list due to nutrient impairments and the contribution of anthropogenic nutrient loading to harmful algae blooms which do negatively impact shellfish, eelgrass, and other species and habitats. These impairments are directly related to development, land use, waste water, storm water and the roughly 1 million people who live and work in the Great South Bay watershed. Actions to further reduce and mitigate these impairments will take time, resources, and commitment. Over the past decade, completed storm water mitigation projects have resulted in some areas becoming recertified for shellfishing, however other areas have recently been closed, emphasizing that more effort is needed in this area. There is currently no plan to manage nutrient loads to Great South Bay; however, there have been several public dialogs on nutrient loading in Great South Bay and impacts to ground water in Suffolk County. The Working Group recognizes that a long term solution to impaired water

quality is necessary to achieve a full and permanent recovery of the Bay. As such, **The Working Group Recommends that the Suffolk County Executive create and charge a stakeholder and agency working group or taskforce to address the issues of water quality and overall environmental degradation in the Great South Bay and its watershed.**

Based upon comments received and consistent with the findings of other reports, an appropriate vision for the desired water quality in Great South Bay might be; 1) water that is routinely characterized as containing phytoplankton communities that are seasonally appropriate for maintaining healthy self-sustaining populations of the kinds of native estuarine shellfish (including hard clams) that people desire, 2) water that does not promote and fuel chronic harmful phytoplankton and/or macroalgae blooms, 3) water chemistry that does not negatively impact other critical and historically important habitats such as eelgrass meadows and saltmarshes and/or species such as winter flounder, 4) surface and bottom water that has sufficient oxygen for fish and wildlife, 5) water that does not impair waterways for their best human uses such as shellfishing and swimming.

More inlets or other actions to increase oceanic water exchange would improve water quality in the Bay. Concentrations of land-derived nutrients and other pollutants are diluted by oceanic water exchanges through inlets, and as such, greater ocean water exchange would make the bay water more similar to the near shore ocean water. This is already the case close to the inlets. Areas near inlets are not typically high shellfish abundance areas, in part because the higher salinity tends to favor some important shellfish predators. Changes in oceanic water exchange patterns have historically occurred through periodic changes in barrier island inlet configuration. However, due to the potential impacts to communities, property, and infrastructure, barrier island breaches are now strictly controlled, and inlet management is beyond the scope of the charge of the Working Group. Agencies involved in decisions regarding this issue include the Army Corps of Engineers, NYS, FINS, the County, Towns, Villages, and Fire Island communities. Under the current decision making structure, water quality in the bay is not one of the decision-making criteria used in inlet management and breach contingency policies. Convening agencies to review the science and possible options going forward is a worthy endeavor, even if the possibility for change is highly constrained.

Enhancing populations of other species of shellfish, not just hard clams, could contribute to improved water quality in the bay. Increasing the hard clam population of the Great South Bay is an effective way of achieving the goal of the Working Group – providing ecological, economic, cultural, and recreational benefits to the Bay. Several species of native shellfish, when abundant enough, could also provide the kind of positive ecological and economic impacts that comprise part of the goals of the Suffolk County Hard Clam Working Group. In fact, consideration of the combined grazing capacity of all species of suspension feeders is a more appropriate way to set some ecological objectives. There are some native suspension feeders with little or no economic value (such as bank mussels and dwarf surf clams) that also graze on phytoplankton. Long lived species such as hard clams can provide more ecosystem stability than short lived opportunistic species such as dwarf surf clams. Oysters and bay scallops have economic and recreational value in terms of harvest; however, restoration of abundant self-sustaining populations of these species requires addressing even more obstacles than those associated with restoring hard clams. While outside the charge of the Hard Clam Working Group, it is worthy of further exploration in the context of other recommendations related to private shellfish aquaculture outcomes provided by the Working Group elsewhere in this final report.

Bay restoration efforts could be focused on other habitats and species in the bay, not just shellfish, to achieve a healthier Bay. Seagrass meadows and saltmarshes are also critical fish and wildlife habitats in

Great South Bay. There are already other stakeholder and agency coalitions working to protect and restore these habitats. For example, The New York State Seagrass Task Force just recently released a report to the Governor and NYS Legislature. Suffolk County's Wetlands Stewardship Committee composed of different regulatory agencies and local stakeholders, provides technical advice to County projects related to maintenance and restoration of marshes. Recent evidence shows that despite regulatory wetland protections there have been alarming rates of marsh loss in Jamaica Bay and the south shore bays of western Nassau County in the last 25 years. As the causes of this marsh loss to the west become clearer, efforts to avoid similar losses in Great South Bay should be taken.

More should be done to promote other economic and recreational activities in and around the Great South Bay, including Fire Island – the hard clam population is not the only economic and recreational driver in the Bay. The Working Group hopes that hard clam restoration will improve both commercial and recreational shellfishing opportunities in the bay. A 2008 study shows that many more people participate in recreational clamming compared to commercial clamming, and that recreational clamming is a 'very important recreational activity.' But overall, the Working Group acknowledges that other activities play a larger economic and recreational roll in the bay than hard clam harvesting does now or is likely to in the future. For example, a 1992 study of nearby Long Island Sound showed that less than 3% of the then 5.5 billion dollar value of Long Island Sound was generated by commercial fisheries, while over 94% was generated through boating, recreational fishing, and swimming. Improving environmental conditions in the bay, particularly lessening of water quality use impairments that result in bathing beach closures and undesirable swimming, recreational fishing, crabbing, and shellfishing conditions are anticipated to increase recreational opportunities and economic returns for local communities. Ideas for the expansion of recreational opportunities on Fire Island should be addressed to FINS as part of their updating of their General Management Plan.

Shellfish Harvester Themes

Fire Island National Seashore's pending revisions to its upcoming General Management Plan could impact commercial shellfishing within the boundaries of the seashore. The Fire Island National Seashore (FINS) is in the midst of a five year effort to revise its General Management Plan (GMP). The GMP will be a guide future park management, programs and policies. FINS's pending GMP revisions could impact commercial shellfishing within the boundary of the Seashore. FINS's jurisdictional boundary extends about 4,000 feet into the bay and covers parts of the water column that lie above public submerged lands owned and managed by Islip and Brookhaven Towns as well as private submerged lands owned by The Nature Conservancy (and some smaller parcels owned by individuals and Fire Island communities) (see Map #1). It is anticipated that the topic of commercial fishing within the FINS boundary will be addressed within the GMP. Fire Island National Seashore has yet to release an official draft of the management alternatives for the public to comment on.

The Working Group's current assessment of where commercial and recreational clam harvesting is occurring suggests that very little commercial clamming is occurring within the boundary of the Seashore; while the majority of recreational harvest is occurring within the seashore boundaries (see Map #11). The Working Group has developed its recommendations with the belief that the condition of the hard clam resource and the development and adoption of a monitored and enforced sustainable hard clam harvest management framework in GSB will be conditions that FINS will consider when drafting and ultimately deciding upon its GMP revisions. It is recommended that all stakeholders of the bay/seashore examine the pending FINS documents and supply feedback at appropriate times to FINS during public comment periods. At the appropriate time individual Working Group members may

submit individual comments, however the Working Group will not be developing or submitting a set of unified comments on the pending GMP alternatives.

The Nature Conservancy owns a significant fraction of underwater lands in Great South Bay – its actions with respect to these lands could have significant leverage with respect to future ecological, recreational, and economic outcomes in the Bay. The Nature Conservancy (TNC) owns and manages the former Bluepoints submerged lands holdings in central Great South Bay through two acquisitions, in 2002 and 2004. TNC has stated that its intention is to utilize its underwater land holdings as a tool and catalyst to advance ecosystem health improvements in Great South Bay. Legal constraints and internal policies limit the Conservancy’s ability to participate in activities that provide a direct benefit to for-profit ventures on its property. The Working Group encourages anyone interested in learning more about the Nature Conservancy’s Great South Bay programs to contact them directly.

SECTION 5: ACTIVE RESTORATION: DISCUSSION AND RECOMMENDATIONS *(TO BE CONSIDERED IN CONCERT WITH RECOMMENDATIONS OUTLINED IN OTHER SECTIONS OF THIS REPORT)*

Active Restoration: Challenges

Bay-wide shellfish survey information shows that the central part of the bay, roughly covering the Islip Town jurisdiction and The Nature Conservancy's property, has the lowest average clam abundance, the lowest number of areas with naturally occurring high densities of adult reproductive clams, the highest proportion of area completely devoid of clams, and the lowest average annual recruitment of juveniles (see Map #6). The abundance of clams has recently been so low in large parts of the bay that it is considered 'recruitment limited'; the low abundance of reproductive adults is now an important factor constraining the number of juvenile clams that set each year. These facts suggest that even if all harvest were eliminated (as has been the case for the TNC property since September 2004) it is unlikely that these areas will show any near-term appreciable increase in the number of clams without active on-the-ground restoration efforts. Additional population declines would make future restoration even more challenging.

Active restoration, for the purposes of this report, consists of restoration techniques that fall outside the active management of the clam harvest itself. Simple examples, already used in the Great South Bay and elsewhere, might include stocking hard clams in spawner sanctuaries, and the release of hatchery-born clams. The present report and past research and analysis (such as SSER 1999, NYSG 2009) highlight the need for active restoration as a tool to rebuild the hard clam populations in Great South Bay. Although these efforts are currently called for, the long-term goal should be for active restoration to be temporary, ceasing once the population is more abundant and self-sustaining. Great South Bay is not homogeneous with respect to the distribution of clams: some areas have significantly greater clam abundance than others. This patchy clam distribution suggests that a variety of techniques and approaches will be needed for active restoration of the Bay's clam population to successfully contribute to increasing the numbers of clams.

Unfortunately, restoration of viable self-sustaining reproductive populations of any shellfish, in any area where they are considered recruitment limited, is not a simple task. In recruitment limiting situations the shellfish start out at a disadvantage since the impacts of other naturally occurring obstacles, such as predation, are amplified. The recent scientific acknowledgement of the important ecological role that shellfish serve in estuaries has greatly expanded the number, size and scope of shellfish restoration efforts around the country in the last decade. Prior to about ten years ago most endeavors referred to as shellfish restoration projects were actually fishery enhancement projects, and these projects had a poor track record at short-term revitalization of failing fisheries. Transformation of shellfish fishery enhancement projects, to shellfish species and habitat restoration projects has resulted in new approaches and development of new measures which are showing better success track records.

Shellfish restoration projects in many places, such as in Florida and the seaside bays of Virginia, have been showing impressive progress. The most readily identifiable successes however are coming from areas where recruitment limitation is not one of the confounding impediments to restoration, as is the case with several of the high profile local efforts. For example; in New York Harbor, oysters are completely extirpated, most historic oyster habitat was lost to dredging and filling, and there is a legacy of oyster diseases, in Peconic Estuary, the formally abundant bay scallop population was very seriously truncated by the first years of brown tide and there has also been serious concurrent loss of the eelgrass meadows that are critical scallop habitat. The hard clam population in Great South Bay also has multiple obstacles to recovery. The central bay is now clearly recruitment limited due to the scarcity of adult

clams. Simultaneously, chronic blooms of brown tide and other small form algae reduce the health, spawning and growth of clams. Due in part to low abundance and the scarcity of other shellfish, predators impact the survival of all life stages, particularly juveniles.

Current conditions

There is currently very low abundance of naturally occurring clams on The Nature Conservancy property and evidence suggests that this can be attributed to efficient mechanical shellfish harvesting vessels utilized by the Bluepoints Company prior to 2004. As partial evidence of that impact, a very sharp delineation of clam abundance still occurs directly along the border of the Brookhaven public lands and the property now owned by the Nature Conservancy (along the N-S line running roughly from Homan's Creek to just west of Barrett Beach). Today there are very few areas where adult reproductive clams naturally occur in high enough abundance to reproduce on the Nature Conservancy property, thus even with the complete cessation of mechanical harvest, this area is unlikely to show appreciable near-term recovery on its own.

The very low abundance of clams in Islip town appears to be less directly linked to a single cause, however evidence shows that unsustainable harvest rates in the 1970's and 1980's drastically and rapidly reduced the standing stock of adult clams and reduced the natural reproductive capacity of this part of the bay. From the late 1980's to present, brown tide and other small form algae, sub-optimal food for clams, have clearly been linked with reduced clam condition, reduced spawning, and slower growth rates (compared to other estuaries). In addition, the parts of Great South Bay that are most directly influenced by Fire Island Inlet, have a high abundance of shellfish predators. Predation of juvenile hard clams, particularly by crabs, impacts the survival of wild-born clams and complicates the use of hatchery-born shellfish as a fishery enhancement and population restoration tool. Evidence suggests that predation rates of juvenile clams are extremely high for clams smaller than 25 mm shell length.

Today, the central part of Great South Bay is characteristically different than areas within Babylon and Brookhaven, which still have patches of clams in modest abundance. Though patchy in its distribution, there is enough harvest and standing stock of clams left in these areas to suggest that current and future commercial harvest is a factor influencing clam abundance in these areas.

General Restoration Discussion

Rebuilding reproductive potential in the low abundance areas of the central bay is a high priority and will benefit from the tools and techniques described below. These same enhancement approaches can also be useful tools for increasing rates of natural reproduction and expanding fisheries throughout the bay.

On-the-ground tools available for restoration of hard clams are limited. The Working Group's recommendations, outlined here, should be applied programmatically, utilizing opportunities, conditions, and resources that are collectively available among the public and private stakeholders interested in restoring hard clams to the bay. The Working Group recognizes the necessity to achieve efficiency through collaboration and cooperation among all entities involved in these efforts. The Working Group also acknowledges the need to monitor and document important indicators of success and to adapt programs to focus on approaches that work best and are most cost effective.

Ideally, restoration of the clam population includes approaches aimed at mitigating direct threats to their survival while simultaneously enhancing overall ecological conditions. Some threats are more

readily addressable than others. For example, large-scale efficient mechanical harvest was stopped when The Nature Conservancy took over the Bluepoints submerged lands. Other threats, such as harmful, algae bloom-promoting, nitrogen loading to the bay, may require watershed-scale changes to water resource management. Such outcomes are clearly a high priority but fall outside of the scope and timing of the charge of the Working Group (see Section 4). It may be possible to mitigate other types of threats at a relatively small to modest scale, but more difficult to mitigate them bay-wide. The threat posed by some shellfish predators falls into that category. It may be possible, for example, to reduce the impact of predators at a specific restoration location, but it may not be practical to take the same actions at a bay-wide scale. Such targeted threat reduction can still provide meaningful benefits to clam populations, depending on the locations where they are implemented.

Restoration efforts, at various scales, have been applied in the Great South Bay for several decades. Although there have been documented successes, the reality is that the combination of all restoration work done to date has not yet resulted in a consistent large-scale rebound of the hard clam population. Much has been learned through these efforts and the Working Group recognizes that those lessons are being applied, where practicable, to improve success of future efforts. *For programs where the underlying reasons for failure to meet expectations is not understood, or the results have not been well monitored, the Working Group strongly recommends additional evaluation before continuing along the same path.*

Although there is a strong network of shellfish restoration practitioners in the US, and significant literature on the topic, each site is different and approaches often require some trial and error. All restoration efforts should have critical indicators regularly monitored; results should be periodically compared to a set of predicted success benchmarks. Data from various restoration efforts should be reported to other project partners and programs should adjust according to what is learned through monitoring. The following recommendations are focused on ways to adjust, improve or augment hard clam restoration efforts. The resources of all entities involved in these restoration efforts should be utilized cooperatively and efficiently to maximize results.

Restoration Approach Recommendations

Utilization of Hatchery-born clams

The largest source of hatchery-born hard clams in the Great South Bay area is the Islip Shellfish Hatchery. Continuation of the Hatchery program is in the best interest of stakeholders hoping to restore shellfish to Great South Bay. The Islip program is already striving to meet the goals below. Use of hatchery-born shellfish is a proven technique for enhancing localized areas. Although predation rates are high on small clams, the proportion of hatchery-born clams re-captured as adults compared to wild adult clams in bottom samples in Islip suggests that this program is in fact contributing to the population. The goals below apply to the use of all hatchery-born clams regardless of who is utilizing them. Both Babylon and Brookhaven have facilities and staff experienced in growing and releasing hatchery-born clams. The following guidance should be employed when utilizing hard clams originating from shellfish hatcheries as a restoration tool in Great South Bay:

- Grow clams to large sizes (optimally above 25 mm) before releasing them to maximize post-release survival.
- Utilize brood-stock adapted to the ecological conditions of Great South Bay.
- Release hatchery-born clams in areas where they are most likely to survive to reproductive age.
- Advance creative partnerships with non-traditional experts (such as baymen), academic institutions, and communities to improve and expand volunteer workforce, expand number of

knowledgeable individuals who can provide advice on areas for stocking, and/or assist in nursery operations and monitoring.

Spawner Sanctuaries

Hard clam spawner sanctuaries are areas where hard clams are stocked in relatively high abundance ($>10/m^2$) on natural bottom. Sanctuaries can be relatively small ($1/4 - 1/2$ acre). The use of a network of many small sanctuaries has benefits over fewer, larger sanctuaries, particularly if there is uncertainty about the appropriateness of the locations chosen. Sanctuaries are best located within large no-shellfishing areas so that they do not need to be individually marked and so that poaching can be more easily avoided. The potential for survival of stocked clams is a key criterion for choosing sanctuary locations. Areas of high predation or other mortality should be avoided. Areas where larvae are likely to be exported out of the bay should also be avoided (such as very close to the inlets).

Sanctuaries are a tool for increasing the potential reproductive capacity in an area. The use of sanctuaries makes the most sense in areas where natural recruitment of hard clams is known to be limited by the low number and density of reproductive adults. In the Great South Bay, that includes most of the underwater lands of Islip, The Nature Conservancy property, and perhaps Bellport Bay. Sanctuaries may have no net positive impact if located in areas where there are already sufficient numbers of reproductive clams in high densities. Evidence suggests that, at a large enough scale, spawner sanctuaries can significantly increase the settlement of wild-born clams within and outside of sanctuary locations. However not every year is a good spawning year in Great South Bay. The following guidance should be applied when establishing spawner sanctuaries in the Great South Bay:

- Focus the use of sanctuaries in places where there are otherwise few areas of high abundance of adult clams.
- Utilize networks of small sanctuaries rather than one large one to hedge against high predation, poaching, or dispersal of larvae to unsuitable habitat.
- Locate sanctuary network appropriately to maximize spawning success and survival.
- Utilize local clams that are in high condition and which are also most likely to adapt to conditions of GSB.
- Avoid stocking littlenecks which suffer higher whelk predation rates, and avoid very large chowders which often don't recondition as rapidly under typical plankton conditions in Great South Bay.
- Advance creative partnerships with non-traditional experts (such as baymen), academic institutions, and communities to improve and expand a volunteer workforce and expand the number of knowledgeable individuals who can provide advice on areas for stocking and assist in operations and monitoring.

Predator Control

Predation is the largest source of mortality for small juvenile clams in most years. Although many different species of fish, crustaceans, snails, and waterfowl eat small clams; typically, crabs are the most important predators of juvenile clams. As clams grow larger, the number of predators capable of eating them decreases. By the time clams reach little neck size, whelk, seagulls (in shallow areas), and people are the most important predators. Whelks (knobbed whelk in particular) are the most prevalent predators of mature or adult clams stocked in hard clam spawner sanctuaries in the central Great South Bay.

Whether releasing hatchery-born juvenile clams or wild-caught adult clams, localized efforts to reduce the impact of predators can and should be utilized to maximize the investments made in restoration. Once the appropriate permits are secured, localized approaches can include actual predator removal, use of cages or meshes, sediment enhancement, and even the congregation of local native fish species, such as toad fish, to help control the abundance of predators. This can be labor intensive, thus creative partnership opportunities should also be explored to work with local fishermen and other stakeholders and encourage their assistance with predator control.

Controlling predators at the bay-wide scale to protect wild-born clams is much more problematic. Large fisheries already exist for some predators such as blue crabs and channel whelk; yet those species are still important predators. Any proposed effort to control predators at the bay-wide scale needs to be considered carefully in the context of the health of the ecosystem, and the other important roles those species may serve. For example, blue crabs eat clams, but they also eat other small crabs, and they support one of the most important commercial and recreational fisheries remaining in the bay. One fact seems evident; the more shellfish (not just hard clams) that are available, the less impact predators will proportionally have on the population. At the current very low levels of recruitment, predation is a real obstacle. The abundance of other species of shellfish, such as dwarf surf clams, may reduce predation impact on hard clams. The following guidance should be applied in the course of predator control to favor clam population growth in the Great South Bay:

- Restoration practitioners and management agencies agree upon areas and methods where targeted predator control is appropriate in consideration of impacts on other resources in the bay.
- Advance creative partnerships with non-traditional experts (such as baymen), academic institutions, and communities to improve, and expand a volunteer workforce and expand the number of knowledgeable individuals who can provide advice on areas and species to target and assist in operations and monitoring.

Substrate Enhancement

Private shellfish aquaculturists have long recognized that certain sediment characteristics favor the settlement and survival of certain shellfish species, including hard clams. For example, shell and gravel areas can increase the survival of juvenile hard clams by buffering the pH of the sediments and making it more challenging for predators to locate small clams. Therefore, adding shell or gravel can enhance substrates to favor the settlement and survival of shellfish. It has also been suggested that digging within existing sediments may reduce sediment compaction, bring shell to the surface, and oxygenate poor waters which can also favor the settlement and/or survival of juvenile hard clams. The roots and rhizomes of eelgrass meadows also provide protection to juvenile clams.

Both oysters and clams produce large shells that can remain in the system for decades. The disappearance of the oysters and reduced clam numbers has decreased shell production in the bay. Over time this results in a decrease in the amount of shell at the surface of the sediments. Shell is, therefore, a finite resource, and many states have recognized the value of returning shell to the water (typically for oyster production). Some states have initiated shell recycling programs.

Shell recycling is problematic on Long Island since the source of shell, which can be from all over the world, has the potential to import exotic diseases if not handled properly. Also, the lack of large shellfish processing facilities on Long Island means that there are not large aggregations of shell that exist near processing facilities. This makes it hard to easily access large volumes of shell on Long Island.

It is not practical or realistic to consider enhancing or manipulating the substrate in vast portions of the bay. Similar to predator control at the bay-wide scale, any proposal for large-scale manipulation of the bay for the benefit of a single species or a single fishery needs to consider the potential consequences to the ecosystem and all species that rely on the bay. It is worth noting that the New York State Seagrass Task Force recently created recommendations for state actions to protect and restore eelgrass beds in New York State. Any action that results in increasing acreage of eelgrass, which has been declining in Great South Bay, is likely to benefit shellfish and the whole ecosystem of Great South Bay.

The Working Group has identified several steps which could be taken to facilitate the return of shell to existing shell beds that may be on the decline. The following guidance should be applied in the course of implementing substrate enhancement to favor clam population growth in the Great South Bay:

- Establish areas in each town where used or discarded shells can be stockpiled and stored for long enough that such stockpiles become free of marine pathogens and diseases. Stockpiling shell now will ensure that there is an easily available supply when restoration efforts are ready to begin.
- Select an appropriate location and design an appropriately scaled demonstration area for enhancing the bottom to achieve enhanced settlement and/or survival of juvenile clams. Whether through private organizations or municipal efforts, if a concerted effort to increase shell beds or prepare the sediments to better receive juvenile clams is to be pursued, its efficacy could first be tested at a demonstration scale using thoughtful site selection criteria.
- Enable harvesters to enhance the shell habitat areas that they regularly harvest from with the addition of new shell, or returning of shell back to the areas it came from. If it is determined that enhancing shell beds is a viable restoration alternative, regulating agencies should consider establishing a program or procedure through which harvesters can pick up clean shell and add it to the areas where they harvest shellfish.

Advance collaborative projects with those involved in aquaculture to capitalize on their operations for enhancement of wild populations of hard clams or other shellfish species

The potential for there to be a growing presence of shellfish aquaculture activities in the Great South Bay may provide opportunities to enhance restoration. Even if hard clams are not the focus of the aquaculture operation, increasing the overall amount of shellfish in the bay could provide some ancillary benefit to the hard clam population through reduced predator pressure, reduced fishing pressure, and increased water quality and environmental factors. Also, participation in restoration activities, such as shell collection or even creation of a hard clam spawner sanctuary within their aquaculture leases, could be explored as a condition on leases, or in partial waiver of lease fees.

SECTION 6: HARVEST MANAGEMENT: DISCUSSION AND RECOMMENDATIONS *(TO BE CONSIDERED IN CONCERT WITH RECOMMENDATIONS OUTLINED IN OTHER SECTIONS OF THIS REPORT)*

Hard Clam Harvest Management in the Great South Bay: Challenges

The development of meaningful harvest management recommendations for the hard clam fishery in Great South Bay required balancing the harvest pressure on the clam resource (commercial and recreational clamming) with the ability of that resource to recruit and increase over time (through successful clam sets that survive to maturity). Findings of the technical assessment (Section 2, Appendix 2) suggest that the recreational fishery is not currently nor is it likely to soon become unsustainable. However, the clam resource is currently at such a low abundance that it can only sustainably support a very small number (18-24) of full-time commercial harvesters. Any significant increase in harvest pressure would further reduce the resource over time. However, under the town codes that existed prior to 2010 an unlimited number of commercial harvester permits were available and even under the recent interim codes (which expire at the end of 2011) over 600 people are eligible to purchase the Great South Bay commercial hard clam harvest endorsements. The number of endorsements issued in 2011 is just over 200. Currently, the low abundance of clams and the relatively low value of clams today is contributing to the fact that most individuals who hold Great South Bay commercial harvester endorsements are either not using them, or are not harvesting hard clams from Great South Bay in a full-time capacity. Based upon the most recent available harvest and survey data (through 2009), the current harvest rates are not unsustainable, meaning that over time they will not further deplete the population. However the resource status is not robust. There is real long-term risk that external factors, such as displacement of individuals from other shellfishing areas or changes in the availability of Great South Bay clams, could bring more commercial clamming into the bay and easily push harvest beyond sustainable levels. Should that occur, the public agencies charged with managing this resource lack a management structure that is adaptable to changes in the clam population or the dynamics of the fishery. A new management structure is needed to allow for the flexibility of adjusting harvest levels and maintaining them, over time, within sustainable limits. Without the changes in management structure and periodic assessments described below, the responsible agencies will not have the tools they need to sustainably manage the hard clam resource in Great South Bay for the long-term public good.

Despite the fragile status of the clam resource, reducing the ability of current holders of Great South Bay commercial hard clam harvester endorsements to continue to have access to such permits would fall short of meeting one of the Working Group's criteria for developing new harvest management recommendations: to minimize possible impacts to current harvesters. Additionally, although available data suggest that commercial clamming in Great South Bay is disappearing as a viable career, preserving this culturally significant activity requires accommodating some new entrants into the fishery, over time; either through new arrivals or through the traditional passing of knowledge and access to the fishery to younger family members of the remaining active Great South Bay commercial shellfish harvesters. However, there is a limit to what the resource can support. Allowing new entrants into the fishery can negatively impact those who are currently struggling to maintain themselves within the fishery. Given the large disparity between the number of permits currently available and the current state of the clam resource, some mechanism for keeping track of and adapting management to changing circumstances is needed to lower risk, provide clarity to harvesters and managers, and increase the chances of successfully rebuilding an abundant and self-sustaining clam resource. Ultimately, successful rebuilding of the hard clam population in the Great South Bay is critical to preserving the culture and traditions of both recreational and commercial shellfishing and the quality of life in Great South Bay communities.

Hard Clam Harvest Management Recommended Approach

The Working Group finds and recommends that the most appropriate and fair way to assure that harvesting remains consistent with the long-term restoration of the hard clam population in Great South Bay will be through adaptive management that considers both the status of the clam resource and the magnitude of the harvest. To facilitate this approach the Working Group calls for the adoption of annual maximum harvest targets, using estimates of the number of clams that can be sustainably removed from the population based upon the most recent population surveys. The clam populations in each of the three Great South Bay town jurisdictions currently have different characteristics that warrant different annual harvest targets for each town. Annual retrospective comparisons of the actual harvest to the harvest target will provide an assessment of the effectiveness of existing management measures at maintaining harvest within sustainable levels.

Under the guidance outlined here, town managers are called upon to annually ascertain if harvest occurred within sustainable levels in the previous year through an annual comparison of year-end total harvest amounts to the target harvest numbers. In addition, based upon biennial population surveys, managers are called upon to update the sustainable harvest target numbers every other year. If, based upon market conditions, the abundance of clams, and participation in the fishery, annual harvest amounts naturally fluctuate within sustainable levels, then modification of the adopted harvest management provisions may not be necessary. However, if it is determined that harvest amounts excessively or chronically exceed sustainable amounts, then actions will be called for to align actual harvest to sustainable levels through fair and transparent mechanisms such as reductions in daily harvest limits and cessation of issuing new permits. Conversely, if it is determined that harvest management provisions needlessly constrain harvest below sustainable levels then regulations could be adjusted to increase daily limits and/or issue more permits.

This approach is a departure from the way the resource and fishery has historically been overseen. Prior to 2010 there were an unlimited number of permits available for residents to commercially harvest hard clams from Great South Bay. Similarly, there were no limits on individual harvest amounts and no adjustments of the management structure based on the health of the resource. Taking the steps outlined here will now bring the fishery in line with the way that many modern wild-harvest resources are managed.

Recognition of Information Needs for Adaptive Management

The Working Group notes that proper stewardship of the hard clam resource and management of an active fishery will require periodic evaluation of the effectiveness of harvest management measures. This will require the collection and evaluation of both fishery independent population surveys and fishery dependent catch statistics. This information is also important for assessing the impacts of active restoration investments.

Historically these data have been collected by the towns and state. The Working Group is recommending modest updates to existing programs. This modest enhancement of data collection can be accomplished through cooperation and coordination among all three towns, within the budget constraints of existing bay management programs.

Clam population surveys

All three townships already have programs to annually survey the Great South Bay hard clam population. These surveys were originally developed with the goal of using the information gathered for the very purpose proposed here. Islip began its survey in 1977 and Babylon and Brookhaven began

theirs in the mid 1980s. Coordination among towns and The Nature Conservancy in the methods and protocol for surveying the population has been well-managed, particularly in the last year. Through continued coordination and cooperation the needed information can be collected without expenditures that are in excess of what has been allocated in past budgets for these activities. If deemed necessary, the potential additional cost needed for spatial expansion of the existing survey could be accommodated by reducing survey frequency to every other year, rather than every year. In some cases the surveys are also used to assess the effectiveness of on-the-ground restoration efforts, in those cases restoration monitoring needs should also be considered before switching from annual to biennial surveys.

Harvest statistics

Currently commercial shellfish harvest information is collected in aggregate through reporting of New York State DEC licensed shellfish shippers/dealers as part of 6NYCRR Part 42 (Regulation for Sanitary Control over Shellfish). Cashin researchers used this information in the analyses that underpin the Technical Report appended to this paper. However, by working with this information it became obvious that this data collection process could be streamlined and made timelier if NYS DEC implemented a more efficient mechanism for the compilation of shipper/dealer reports so that annual shellfish landings data for NYS could be more readily available for use by all stakeholders. An option for electronic reporting would likely provide long-term cost savings, reduce the burden on those reporting, and expedite data compilation (which recently has taken greater than eleven months to compile).

Harvest statistics would be much more useful if, in addition to the total number of clams sold by licensed shippers/dealers, the information collected contained additional important information that would add precision and timeliness to periodic evaluations of plan effectiveness called for here. This needed additional information should include: number of active harvesters, size composition of harvest, average daily harvest amounts, specification of harvest areas, and seasonal composition of harvest. Some of this information needs to be supplied by the actual harvesters.

Under existing state regulation 6NYCRR Part 42.7(b) licensed commercial shellfish harvesters in New York State are already required to make *“daily dated entries in a ledger or using other methods approved by the department indicating quantities (net weights or numerical counts or standard measures) of shellfish harvested, the harvest date, an identification of the areas from which the shellfish were harvested, and the names and permit numbers of all purchasers of shellfish.”* However, NYS DEC does not currently require regular submittal of information from these ledgers but rather only checks them in cases of a shellfish-related human health emergency. The Working Group recommends that holders of town-issued commercial GSB clam harvest endorsements submit monthly summaries of their clam harvest from the ledger that they are already required to maintain so that this information can be used to more accurately manage the hard clam resource. There are currently so few active commercial shellfish harvesters in Great South Bay that collecting, digitizing, and summarizing this information will not create a significant additional burden to the resource managers. Harvesters are already required to maintain this information by the State of New York. Any harvesters that are involved in other commercial or for-hire fisheries are already accustomed to reporting their harvest from other fisheries. Thus, this provision is not expected to create much of an additional burden on harvesters. The Working Group recommends that all individual catch statistics remain confidential and that regulators provide an option for simple and easy digital submittal of this information.

General Recommendations

There are benefits to having uniform regulatory provisions across all three towns; however, the Working Group recognizes that each town has unique circumstances, not the least of which are different conditions of the clam population in each of the three towns' waters. As proposed here, the recommendations from the Working Group are similar across all three towns. However an important provision of these recommendations is that the towns keep track of conditions in their waters and take actions to adjust management, if necessary, based upon changing conditions. In anticipation of this possibility it is important for towns to consider the impacts of existing reciprocity agreements with neighboring towns. Existing reciprocity agreements currently allow for residents of Islip to commercially harvest in Babylon and Brookhaven (west of Howells Pt), and for Brookhaven and Babylon residents to harvest in Islip. The Working Group was unable to exhaustively explore the potential pitfalls that these reciprocity agreements could create should significantly divergent management approaches be adopted among towns. It is, however, readily apparent that future town codes should be clarified so that harvesters are required to abide by the codes that are in place where they are harvesting, regardless of what town they reside in.

1 Harvest Target Adoption

The Working Group recommends that each town adopt an annual target harvest amount for the commercial fishery that is lower than the Maximum Sustainable Yield from the hard clam resource within their town waters based upon current resource conditions. This number will serve as a benchmark to retrospectively measure whether or not the fishery is operating within the desired parameters. Analyses done by private contractors for the Working Group provided numerical estimates of the maximum number of clams that could be removed annually without reducing the existing population. Managers should adopt an annual harvest target that is lower than that maximum to allow the clam population to increase over time. As is common practice with these analyses, the Working Group's contractors will obtain a peer review of the methods and calculations used to produce these numbers by outside experts in this field in the next twelve months. This peer review may result in some adjustments to the methods or calculations. However, as shown here, the 3 year average landings, as reported to NYS DEC by shellfish dealers, do not exceed the maximum sustainable yield estimates. Thus, this future review need not delay timely implementation of recommendations in this report. This is especially important since these provisional numbers will be used as a benchmark for future assessments of the resource and fishery until updated by new clam census and harvest data.

Maximum sustainable harvest in millions of clams and bushels compared to recent harvest

	Maximum Sustainable Harvest as Percent of Standing Stock	Maximum Sustainable Harvest as Millions of Clams	Maximum Sustainable Harvest as Bushels of Clams	2007 Landings in Bushels	2008 Landings in Bushels	2009 Landings in Bushels	3 Year Average 2007-2009 Landings in Bushels
Bay-wide	5.1	4.6	13,650	5,774	6,816	9,405	7,332
Brookhaven	8.5	3.3	8,250	2,205	2,422	4,268	2,965
Babylon	2.4	1.0	5,000	3,538	3,634	5,078	4,083
Islip	2.7	0.1	400	31	764	59	285

Maximum Sustainable Harvest conversion to Bushels is based on 400 clams/bushel for Brookhaven and 200 clams/bushel for Babylon and Islip

2 Coordinated periodic population surveys

The Working Group recommends a coordinated biennial survey of the clam resource in the Great South Bay to track changes in the hard clam population abundance and size structure. Annual surveys are not necessary; however it is critical to continue standardizing methods among jurisdictions so that a single standard analysis can be used to more precisely interpret the information collected. The efficacy of combining resources and expertise among jurisdictions to conduct a single bay-wide survey rather than multiple town based surveys should be explored as a means to better obtain standardization and also achieve cost savings.

3 Standardized collection of harvest statistics

*The Working Group recommends that holders of commercial Great South Bay clam harvest permits submit monthly summaries of their clam harvest to their home towns. This information is already required to be maintained by harvesters per state regulations cited above. Information collected by the three towns should be consolidated and interpreted simultaneously during periodic re-evaluations of survey data (every other year) and harvest data (annually). This will allow for more accurate management of the hard clam resource. There are currently so few active commercial shellfish harvesters in Great South Bay that collecting, digitizing, and summarizing this information should not create a significant additional burden to the resource managers. Moreover, harvesters are already required to maintain this information by the State of New York and any harvesters that are involved in other commercial or for-hire fisheries are already accustomed to reporting their harvest from those fisheries, thus this provision is not expected to create an additional burden on harvesters. *The Working Group recommends that an option for simple and easy digital submittal of this information be developed and that individual catch statistics remain confidential. The Working Group also recommends that NYS DEC implement a more timely and efficient mechanism for the compilation of shipper/dealer reports and that this also contain an option for digital submittal.**

4 Coordination of daily harvest limits in consideration of reciprocity agreements

There are currently reciprocity agreements between the three towns, allowing residents from some towns to harvest clams in other town waters. These agreements should be considered when advancing any proposals that are not uniform across all three towns. For example, it is possible that now or in the future; based upon town specific conditions in the clam population and the number of people actively shellfishing, town managers may conclude that conditions in their town warrant a daily harvest limit or other rule that is different from that in a neighboring town. *The Working Group recommends that towns coordinate with each other if this situation occurs and craft codes in such a way so that all of the harvesters working in the town waters of any particular town are bound by the same regulations regardless of the town in which they reside.* Reciprocity agreements should not hamper individual towns from taking actions necessary to responsibly manage the resources of their particular town.

5 Coordinated periodic assessments and adaptive management

The Working Group recommends that all three towns agree to participate in biennial updated assessments of the hard clam population, the continued appropriateness of their respective harvest targets, and the effectiveness of their management programs with respect to meeting their harvest targets. The working group recommends that towns have discussions in advance, and have plans in place for what actions they will take, if annual harvest amounts greatly exceed or chronically exceed the level that can be sustainably accommodated by the population. In general, the Working Group agreed

that, should it be necessary to constrain harvest in the future, the fairest way to do so would be through temporary contractions in the daily harvest limits and temporary cessation of issuance of new permits.

Specific Recommendations Pertaining to Commercial Clamming Permits and Permit Conditions

The Working Group recommends, given the status and history of this resource, that the towns should maintain some restrictions on the number of commercial harvest permits that they issue and establish rules governing the amount of clams that can be harvested per individual per day. This is consistent with many other wild-harvest fisheries, including hard clam fisheries in other Long Island Townships. Without such provisions, combined with periodic assessments described in the previous section, it is not possible for town governments to adapt their harvest management in response to changing circumstances in a way that facilitates restoration of the clam population to levels that provide for all of the ecological, social, recreational, and economic goals desired for the future. The Working Group also recommends that the towns clearly articulate how plans will be adapted under the more predictable condition changes, so that both town managers and shellfish harvesters have clarity and can adjust efficiently should the plans that are adopted fall short of, or be in excess of what is needed in the future. It is important for towns to consider reciprocity agreements when making decisions concerning permits and harvesting rules. Due to reciprocity agreements among towns, it is important that codes are written in a way that requires all harvesters to abide by the rules of the town they are harvesting in, regardless of which town they reside in.

The Working Group considered a long list of different types of harvest management provisions (see Appendix 5). The first public draft of this report contained four alternative management scenarios which were evaluated against five criteria that reflected the ecological, social, recreational, and economic objectives of the Working Group. Practicality and fairness of implementation was also considered for each scenario. General comments were received from the shellfishing industry pertaining to the categories of individuals who they strongly felt should not be denied access to Great South Bay commercial hard clam harvester endorsements. However, no comments were received that were specific to preference of one scenario over another. After the close of the public comment period the Working Group carefully considered provisions of all the scenarios compared to the evaluation criteria and the public comments and then developed one uniform set of recommendations which strikes a fair balance among all of the concerns and criteria while still positioning the towns to become more responsible managers of this shared natural resource.

The Working Group recommendations include all of the following provisions:

A limited number of permits to commercially harvest hard clams from Great South Bay

The Working Group recommends that the towns maintain their annually issued Great South Bay commercial hard clam endorsements (adopted in 2010) as the structure by which the towns authorize residents to commercially harvest hard clams from the waters of Great South Bay and as the mechanism for explicitly conveying the conditions of this specific term-limited authorization. Maintaining the endorsement, as opposed to relying on the more general commercial shellfish harvesters permit, is necessary to avoid unintentional interference with other shellfisheries (scallops, mussels, soft clams oysters, etc.) and, in the case of Brookhaven, hard clam fisheries in town waters outside the boundaries of Great South Bay.

The Working Group further recommends that the towns establish a cap on the number of Great South Bay commercial hard clam endorsements issued annually in each town based upon the number of endorsements that were issued in 2011 (see section below on exemptions to the cap). As of the time of

writing of this report the numbers are as follows Babylon – 27, Islip – 50, Brookhaven – 125. Research shows that even this number of permits is about 10 times higher than the number of full-time harvesters that the hard clam population in Great South Bay can currently support. However, based upon observations and input from the shellfishing industry, it is anticipated that many of the perspective commercial hard clam endorsement holders will simultaneously be participating in other fisheries or land-based businesses and only engage in harvesting of clams in Great South Bay part-time.

The Working Group further recommends that permits should be granted to applicants who held them in 2011 with a 6 week deadline for renewal ending on February 14th. If, after February 14th, the number of Great South Bay commercial hard clam endorsements issued is lower than the cap, new permits can be issued, up to the cap number, to applicants who did not hold an endorsement in 2011. Names will be held on a waiting list and selected through random lottery after the close of the 6 week renewal deadline on February 14th.

The total number of Great South Bay commercial hard clam endorsements issued may exceed the cap in any given year based on a recommendation that the **following categories of individual town residents may be issued a commercial GSB hard clam endorsement even if the cap is reached**. Application for endorsements by town residents in the following exemption categories should be made, and permits shall be issued prior to the close of the 6 week permit renewal period. These permits will be counted under the cap, but individuals in these categories will not be denied a permit, even if the cap is reached.

Exempted town residents include:

- Applicants who held a commercial shellfish harvester permit while they were residents of Islip, Brookhaven, or Babylon during any five consecutive years.
- Applicants who can clearly and unambiguously demonstrate that applicant's immediate family⁵ has historically been and is now engaged in commercial clamming in the Great South Bay provided that the applicant is at least 16 years old at the time of the application
- Applicants who were previously unable to obtain a Great South Bay commercial clam harvesters endorsement in 2011 due to active military service
- Applicants who can clearly and unambiguously demonstrate that they have already invested in the necessary equipment and that they hold a valid NYS shellfish diggers license and that they have held such a license for at least 3 previous years prior to 2012.

Senior town resident exception:

In addition, any applicant who has reached the age of 62 years old on any date prior to the application date may apply for and receive a Great South Bay commercial clam harvester's endorsement at any time, even if the cap number has been reached.

Permit reissuance to family members:

The working group recommends that the towns allow valid Great South Bay commercial hard clam harvester endorsement holders to have their permit re-issued to an immediate family⁵ member who is at least 16 years old at the time of the application. This provision is not intended to result in a net increase in active permits, thus this provision is designed to be most useful if or when there might be a temporary cessation of issuances of new permits due to a determination that harvest had reached an

⁵ "immediate family" includes spouse, sibling, parent, child, grandparent, grandchild, and, if domiciled in the house of the Great South Bay commercial hard clam harvester, all persons who are related by blood, marriage or adoption to the Great South Bay commercial hard clam harvester

unsustainable level in a previous year. This provision is designed to provide a mechanism for maintaining family traditions through a one-time passing down of family businesses, even if there is a temporary cessation on issuing new permits.

Vessel endorsements:

Under the current regulations only holders of the Great South Bay commercial hard clam endorsement may be onboard vessels that are engaged in commercial clam harvesting (regardless of whether or not these other individuals are observed participating in the clamming activities). The Working Group recommends that the towns officially acknowledge Vessel Endorsements that are authorized through a NYS DEC Digger Endorsement permit (no new town permit is required). These endorsements allow harvesters to take other individuals with them while they are engaged in shellfishing activities, and these individuals can then legally participate in harvesting activities. However the holder of the permit and vessel endorsement must be aboard at all times, and the vessel is still subject to the individual daily catch limit. Additionally, only one rake or other shellfish harvesting device may be used for the taking of clams on a vessel operating under the Digger Endorsement. Adoption of this provision is designed to allow harvesters to pass down their knowledge, or share the shellfishing experience without concern, if their passengers do not have the proper permits. This provision would also allow harvesters to hire crew to assist in harvesting activities.

Daily catch limit:

The Working Group recommends that the towns maintain the recently adopted daily harvest limit of 2000 clams per day. This daily harvest limit should be regularly re-evaluated based upon the status of the clam population and the total amount of clams harvested in previous years. Adjustment of this limit, if deemed necessary, is seen as the fairest way to assure that harvest is occurring within sustainable limits. Many other Long Island townships already have daily harvest limits for the commercial harvest of hard clams.

Reporting Requirements:

Accurate and timely information on harvest amounts is a critical component of the success of any wild-harvest fishery. Thus the Working Group recommends that all holders of the Great South Bay commercial hard clam harvest endorsement submit monthly reports on their catch and effort. State law already requires all shellfish harvesters to maintain a log book containing this information. The towns should develop a reporting mechanism that is simple and efficient for both the harvesters and the managers who will compile the data, including an option for electronic reporting. Timely and accurate reporting by harvesters should be a condition for keeping their endorsement in good standing.

Town Obligations

As outlined in the previous section, successful sustainable management requires that the towns work together and annually compile harvest statistics, biennially conduct population surveys, and re-assess the sustainable harvest limit based upon changes in the clam population. If this information shows that the current management program has resulted in harvest of clams in numbers in excess of the sustainable harvest target amount it shall trigger appropriate reductions in daily catch limits and there shall be a temporary cessation of permits to individuals who did not hold them in the previous year until such time as annual harvest falls below the harvest target amount.

State Obligations

As outlined in the previous section, it is recommended that NYS DEC implement a more timely and efficient mechanism for the compilation of shipper/dealer reports so that annual shellfish landings data

for NYS could be more readily available for use by all stakeholders, including those doing population and fishery assessments. An option for electronic reporting would likely provide long-term cost savings, reduce the burden on those reporting, and expedite data compilation.