SCONSET BEACH NOURISHMENT PROJECT

Proponent Responses Following Conservation Commission Meeting #5 (held October 1, 2007)

The information included herein is intended to directly respond to questions asked at the Nantucket Conservation Commission meeting held on October 1, 2007 regarding the Sconset Beach Nourishment Project. At that meeting the Proponent, the Siasconset Beach Preservation Fund, and Project Team members were able to respond directly to many questions from the Commissioners. Meeting constraints, however, prevented the Proponent from directly responding to many questions asked by the public and some of the questions from the Commission itself. Although many answers could have been provided at the meeting had there been sufficient time available, the Proponent hopes that these responses are helpful and informative.

In an effort to be thorough and comprehensive, this document includes responses provided at the meeting itself as well as responses to questions that were left unanswered or required follow-up information. This information is organized according to the order in which questions were raised at the meeting. Where possible, the Project Team has identified the individual asking the question; we apologize if any names are incorrectly recorded here.

PRESENTATION 1: Cobble Habitat Analysis, Mitigation and Monitoring

1. Question (Rudin): What is the typical diameter of reef balls?

(Barrett): They come in a variety of sizes, with the smallest being perhaps one foot in diameter; some recent applications have used reef balls as high as eight feet. To clarify, however, our presentation showed concrete reef balls as an example of how organisms colonize concrete.

2. (Rudin): Will you construct the mitigation using only railroad ties?

The current mitigation design, which is still undergoing refinement, includes a combination of natural rock, reef balls, and perhaps supplemental railroad ties (subject to availability at the time a commitment is possible) to provide greater structural diversity than would occur with a single material type. When piled together, the ties provide habitat that is more complex than structure created with piled stones alone. Stone will replace the low-relief cobble structure buried under nourishment material. Diverse habitat will result from this superior design.

3. (Rudin): After the initial nourishment, equilibration will bury roughly 105 acres, although erosion will remove some of that cover. I understand this is the justification you are using for your mitigation calculation, but after four years you are proposing to renourish. Since benthic habitat will take 1-3 years to recover, will the re-exposure of cobble following equilibration really provide any benefit?

As explained at the Commission meeting, the 1-3-year recovery period is primarily applicable to benthic habitat in sandy areas, and may even be overly-conservative for nourishment areas. Results from a seven-year biological monitoring program over 21 miles of nourished high-energy beaches in New Jersey showed that intertidal and nearshore species abundance, biomass, and taxa richness

recovered within 2-6.5 months of filling (Burlas, Ray and Clarke, 2001[1]); that program was conducted jointly by the U.S. Army Corps of Engineers, National Marine Fisheries Service, U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, and New Jersey Division of Fish and Game.

Cobble and hard bottom habitats located in dynamic zones naturally undergo repeated burial and re-exposure; this is one reason why benthic species in these habitats are particularly well-adapted to disturbance. The burial and re-exposure of cobble and hard bottom which is expected to occur during this Project's renourishment cycle will mimic the natural coverage and re-exposure of cobble habitat that occurs as a result of the area's dynamic conditions.

It is also important to note that the recently-completed photographic survey of cobble has reevaluated the extent of cobble that will be impacted by either direct burial or equilibration. The total reassessed area of cobble impact is approximately 30 acres.

4. (Rudin): I did not hear you mention any monitoring for unexpected impacts north or south of the nourishment due to littoral drift.

(Smith): We have an active program of surveying beach profiles, and that work will continue. Results from that effort will reveal any impacts north and south of the Project. We provide the Commission with reports on a quarterly basis.

5. (Rudin): Monitoring is useful for telling us what is going on, but that is only useful if you have expectations about what will happen. If there are unexpected negative impacts, will you have any contingency plans or actions that could be triggered by monitoring results in order to rectify the situation?

As we explained at the Commission meeting, experiences from other nourishment projects indicate this Project will benefit the longshore sediment system. Extensive pre-construction surveys and monitoring efforts have supported this perspective. Part of the Proponent's ongoing commitment to this Project will consist of careful post-construction monitoring of sediment transport. Some accretion will clearly occur adjacent to the Project, such as near Sesachacha Pond, but there is no indication that sediment transport will result in any negative impacts.

6. (Oktay): Have you looked at any of the organisms on the beach which will be buried under the nourishment material? Many of these organisms may not be able to burrow up through more than a meter of sediment. Burial of beach organisms will be a temporary impact which would benefit from monitoring.

The organisms in the nearshore environment have adapted to disturbance regimes, and many species identified in the Project's 2005-2006 benthic sample grabs are highly-mobile and migrate vertically through the water column on a daily basis. The vast majority of species identified in the nearshore are

[1] Burlas, M.; Ray; G.L.; and Clarke, D. 2001. The New York District's Biological Monitoring Program for the Atlantic Coast of New Jersey, Asbury Park to Manasquan Section Beach Erosion Control Project. Final Report. U.S. Army Engineer District, New York and U.S. Army Engineer Research and Development Center, Waterways Experiment Station. http://www.nan.usace.army.mil/business/prjlinks/coastal/asbury/index.htm.

free-swimming amphipods and isopods which live at the sand-water interface; they burrow into the sand at night but swim toward the surface during the day to feed on plankton in the water column. In addition, benthic grabs contained several burrowing species such as annelid worms and bivalve mollusks.

In the Proponent's ongoing monitoring program, 2007 shellfish surveys have been completed, and additional benthic grabs are scheduled to be performed in 2007 to refine the characterization of soft-sediment species composition in the vicinity of the nourishment area. Post-nourishment monitoring will include regular benthic grab sampling as well as shellfish surveys. Results will be used to assess the nearshore ecological community's recovery.

7. (Oktay): It sounds like most of your ecological surveys of species have focused on quality rather than quantity. A recolonized area, however, may contain different species assemblages which may not actually replicate the pre-construction habitat. Species diversity is critical.

The Proponent has completed ecological surveys using standard sampling practices and spatial and temporal parameters which aggressively assess resource area impacts. While it is typical for projects to submit a year's worth of data, the Sconset Project has provided two full years of sampling results. Re-establishing habitat conditions after construction occurs is most challenging when that habitat in its natural state is not subject to regular disturbance, because relatively stable habitats require a longer period of time to reach maturity. Habitats that undergo regular, natural disturbance are more easily re-created because environmental conditions are more active in restoring the area.

In the case of this Project's Borrow Site and nourishment area, it is apparent that energetic wave and tidal conditions will quickly re-work areas disturbed by the Project. These dynamic conditions will generate a naturally-undulating seafloor and will import nutrients and organisms into disturbed areas to promote recolonization and growth. Post-construction monitoring will assess the composition of the re-colonized benthic habitat relative to pre-construction conditions. There is no reason to expect, however, that the recovered habitat will support species assemblages significantly different from those which currently exist.

8. (Oktay): The mitigation will bury existing organisms and prevent burrowing species from utilizing the area. Do you have any pre-construction population estimates for burrowing creatures at the mitigation site?

It is true that some of the seafloor area where the mitigation is constructed will become unavailable to burrowing organisms. However, mitigation material will not occlude access to the entire seafloor within the mitigation area, and therefore much of the seafloor beneath the mitigation structure will still be available to burrowing organisms. Once mitigation locations are finalized, the Proponent will perform benthic surveys and provide subsequent results from grab samples.

9. (Oktay): You said the average height of the tallest existing boulders is 4 feet; when you calculate your cobble coverage from video, will you have habitat coverage delineated according to vertical relief?

As we explained at the Commission meeting, most images from the Proponent's video survey were taken from a video sled suspended approximately one meter above the bottom, and thus the images look straight down at the seafloor; two red LED lasers were calibrated so the beams would cross at the appropriate height and thus enable the survey crew to adjust the camera position. The height of the

sled was continuously adjusted to maintain the one-meter separation from the bottom. This method was selected to assess spatial extent and percent cobble coverage, and area calculations will be performed based on a plan view assessment.

Nonetheless, the video does allow for some limited assessment of cobble height. While some of the cobbles did show greater relief than others, the video sled did not collide with or hang up on any of the cobble; therefore, all cobbles over which the sled passed were less than one meter in height. Proposed mitigation will be performed with cobble ranging from 3 inches to approximately 2 feet in diameter. This mix of material will provide similar surface area to what currently exists on the bottom. A detailed cobble habitat assessment report on the amount, extent, and other characteristics will be provided under separate cover.

10. (Oktay): If you construct this reef complex, you could actually change recruitment patterns of some larger predator species such as seals. Concentrating some species' populations may be great for fishermen but may not necessarily provide an environmental benefit.

As Mr. Barrett explained at the Commission meeting, the Proponent has seen literature discuss this from a theoretical perspective, but from a practical perspective the small habitat features like those proposed for the Project mitigation will not generate the measurable changes in trophic structure that this comment suggests.

Since seals do not utilize Sconset as a breeding rookery, additional recruitment is not likely to result from enhanced fish habitat in the vicinity of the Project. Seal species which do visit the Sconset area enter a fasting stage during the breeding season (i.e., winter and spring) and resume feeding after their pups have been weaned. This seasonal offset between feeding and breeding behaviors in large predators such as seals is an additional safeguard against drastic changes in trophic structure in the Project area.

11. (Oktay): How far offshore does the equilibration toe extend?

As Mr. Spadoni explained at the Commission meeting, at its most seaward extent the equilibration toe will extend a maximum of approximately 1,200 feet from shore; on average, the toe will extend 960 feet offshore.

Project engineers used three methods to determine the extent of the equilibrium toe of fill. The first method used SBEACH to model cross-shore profile changes with the assumption that complete equilibration would occur during a 50-year storm event; this is a fair assumption since sediment transport would be expected in water deeper than 26 feet MLW during an event of this magnitude. The second method used Dean's (1997) equilibrium profile theory, which says the equilibrium profile shape takes the form of $h=Ax^{2/3}$, where "a" is a parameter related to grain size. The third method was the CEM method, which uses a modified form of Dean's equilibrium theory to translate and alter the fill profile to account for grain size. This third modeling method resulted in the most seaward extent of the equilibrium toe of fill, and thus the Proponent has presented this result to ensure a conservative assessment of Project impacts. Given this conservative approach, it is quite possible that the equilibrium toe of fill may not extend as far offshore as this evaluation suggests; therefore, the Proponent's proposed monitoring program is critical for surveying equilibration and quantifying actual Project impacts.

12. (Oktay): You surveyed locations within and outside the equilibration footprint?

(Rits): We performed five shore-perpendicular transects approximately 500 feet apart going out to 2,500 feet offshore. This coverage enables us to assess species and diversity changes.

13. (Bennett): You are assuming a 1:1 exchange for the permanent 10 acres of burial? DMF recommends a greater ratio for mitigation.

Mitigation ratios are not established arbitrarily, but rather are based on the likely success of mitigation to achieve the overall goal of ensuring "no net loss" to the nation's wetland resources. Higher ratios are typically applied to mitigation undertaken in freshwater wetland habitats, where there is often a lower rate of success and/or habitat requires more time to re-establish; freshwater forested wetlands are a prime example of this. Mitigation in marine wetlands, on the other hand, has the best rate of success because hydrology and sources of energy are not affected by project activities; in other words, the habitat factors associated with creating marine wetlands are influenced by siting and structure decisions which reflect site-specific hydrology (tides) and energy (waves and currents). Since efforts to recreate marine wetlands are so often successful, permitting agencies typically do not inflate mitigation ratios. Furthermore, it is important to reiterate that although this Project will alter some wetland habitat types, it will not result in a loss of wetlands area. As a result of this important distinction, a 1:1 mitigation ratio is appropriate.

14. (Bennett): Benthic burrowing species such as worms will be covered by equilibrium fill; do you have data regarding these species?

Data from 2005 benthic grab surveys indicate that burrowing annelid worms (e.g., polychaetes and oligochaetes) comprise approximately 14% of the identified species while burrowing bivalve mollusks comprise approximately 11%. Annelid worms migrate through the sediment, feeding on detritus. These species exhibit high fecundity and possess reproductive capabilities that include hermaphrodism and asexual fission; these reproductive characteristics increase these species' abilities to sustain large populations.

Several species migrate vertically through the sediment and overlying water column. In addition, annelid worms are typically the initial colonizers of disturbed habitat, and are often transported by the movement of sand at highly-turbulent sites. As nourishment is incrementally completed over the length of the Project area, a portion of the annelid population will survive by migrating safely to unaffected areas or by surviving the sediment transport and emplacement. Areas where the annelid population is impacted will undergo rapid recolonization through the migration of new individuals from adjacent habitat.

Bivalve mollusks are also capable of some migration, but not in the same manner as burrowing worms. On average, bivalve mollusks live 5-10 years, and females spawn in the millions over their lifespan. Following Project nourishment, shellfish populations will rebound due to the settlement of free-swimming pelagic larvae produced during the mass spring spawning in adjacent habitat.

15. (Bennett): I anticipate it could be difficult to monitor how far sediment actually extends offshore during equilibration; will you be using markers of some sort?

(Rits): Post-construction monitoring will involve detailed bathymetric surveys which will show exactly where material is moving offshore. We will have a baseline pre-construction depth against which to

compare the high-precision bathymetry, which is accurate to a couple of inches. Using any kind of marker in such a high-energy environment is challenging because markers can move or become covered; we will consider markers, but primary data will derive from high-precision bathymetry, which is a standard method for determining sand movement.

16. (Oktay): How far with that bathymetry survey extend north and south? We must be able to identify any unanticipated coverage.

(Rits): Our ongoing, detailed monitoring program began many years ago and extends quite far north towards Great Point and also south of Codfish Park and the Sewer Beds. These surveys extend a mile or so out of the Project area, and bathymetry data extends 800-1,000 feet offshore. We submit reports from this program to the Commission quarterly, and will continue to do so.

17. (Bennett): You said the Borrow Site has very little silt, but dredging could release a significant amount of sand into the water column. Given the currents, will all of that sand settle inside the Borrow Site? What might that material cover?

Assuming the contractor uses a hopper dredge, material will be released into the water column at the Borrow Site either at the drag head or from barge overflow. This turbidity should be quite limited, however, since the nourishment material is relatively coarse-grained and contains a very small silt-sized fraction; furthermore, barge overflow should be minimal since coarse material is associated with short loading times and little sediment loss. Nonetheless, any sand that does wash over the weir in the hopper is expected to settle back to the seafloor within the Borrow Site boundaries.

Any silt-sized fraction introduced to the water column will disperse with the current. It is important to reiterate that the silt content of Borrow Site materials is extremely low (~1%), and wind, waves, and currents will disperse any silt component of dredge-induced turbidity over a wide area. Although this area will likely extend outside the Borrow Site, and any resulting depositional thickness will be negligible. No significant impacts will occur from deposition of dredge-induced suspended sediment given the dynamic conditions of active natural sediment transport at the Borrow Site coupled with the very thin veneer of deposition.

18. (Oktay): You only have 4 video survey sites for the Borrow Site?

(Rits): Yes, there were three 200-300-foot-long transects of video survey in the northern excavation area and a fourth transect in the southern excavation area.

19. (Andrews): How fast is a "rapid" colonizer?

(Vaccaro): High-energy dispersers must be able to disperse over a long distance, and they generally expand and establish themselves within a few months after a disturbance. Thus, recolonizing species can be expected to establish themselves during the spring following construction.

(Rits): Storms in this area cause a lot of natural disturbance, so you will naturally have habitat damage followed by spring recolonization.

20. (Andrews): How do you know you have only small cobble? You could be seeing only the top of a 10-foot-high rock.

(Rits): There is a tremendous volume of sand in the area, and as it shifts back and forth there are constant cycles of burial and exposure. We have seen bedforms 6 inches to a foot high, and these are actively migrating.

21. (Andrews): How much control are you going to have over the effectiveness of the concrete railroad ties, since the area is so dynamic that burial conditions could be constantly changing?

As explained at the Commission meeting, mitigation will occur in 20-30 feet of water, where it will not be subjected to extremely high wave energy. Any railroad ties used in the mitigation design will remain in place principally due to a high ratio of density to surface area.

22. (Andrews): How much does the species composition in the cobble environment change year-to-year?

As we have presented at the Commission meetings and in Project submittals, the Proponent has characterized habitat conditions and understands the existing cobble habitat and the species likely to occur there. Species diversity and abundance vary naturally from year to year due to a number of factors, but the habitat type will remain relatively stable. As for existing growth patterns, repetitive turbulence favors small growths of organisms in the nearshore, while larger growths of encrusting sponges and macroalgae are characteristic of offshore areas. Offshore habitat supports greater species diversity.

23. (Andrews): Do you know how deep the sand is at the mitigation site? Is there structure under the sand that will support the railroad ties?

(Barrett): The mitigation site contains coarse-grained sand that we expect is stable enough to support the railroad ties. The site is not characterized by silts, for example, into which the ties could sink.

24. (Rudin): The original agenda for this meeting included discussion of the waivers being requested?

The Proponent will discuss any necessary waivers during the Commission meetings held in November.

25. (Oktay): You show a lot of surf clam habitat slightly south of the Project area; are you planning any transects in this area? We are concerned about impacts from sand moving outside the Project area.

(Joe Battaglia): We have been performing nearshore shellfish surveys, and so far 7 of the 12 transects are complete; we have detected only one surf clam. This is not an area where you would typically find surf clams. A shallow spit south of the Project area separates the Project area from the surf clam habitat, so sediment should not reach the surf clam habitat.

26. (Oktay): When identifying mitigation sites, did you assess other fisheries?

The Proponent's evaluation of mitigation alternatives included assessments of fisheries and fish habitats which were based on the best available existing information. Oceanographic and geological information was gleaned from USGS maps, and fish habitat was evaluated from shellfish and eelgrass mapping as well as data from the New England Fisheries Management Council and the National

Marine Fisheries Service's Essential Fish Habitat designations. Discussions with local fishermen who fish in the vicinity further informed the mitigation site selection process.

27. (Smith): You would be using an igneous rock like granite for the mitigation?

(Barrett): We would certainly be using a hard rock similar in size to what exists in the area.

28. (Smith): When do surf clams spawn?

The National Marine Fisheries Service states that Atlantic Surfclam spawn in summer and early fall, with spawning beginning and ending earlier in the southern extent of the species' range than in its northern extent (Cargnelli et al., 1999[2]). Spawning also occurs earlier in nearshore locations than offshore. Based on this information, spawning on the Nantucket Shoals probably occurs during late summer and early fall.

29. (Josh Eldridge): Did you perform fish sampling at your mitigation reef site? That site is our second-best location for bass fishing, and I would strongly encourage you to assess fish populations.

As explained at the Commission meeting, the Proponent performed survey transects in the Project area but did not trawl in the mitigation area. Based on available data, the Proponent was able to assess the habitat and confirm there is little cobble present. Cobble is one important indicator of striped bass habitat. The site selection process for a final mitigation site is still underway, however, and the Proponent is carefully considering input from local fishermen on this matter.

30. (Robert DeCosta): Irish moss grows 3-4 inches long? How long does it take to grow to that size? If buried by sand, could the moss grow up through the coverage? What about the boring sponge?

(Vaccaro): Irish moss can grow to lengths of 3-4 inches over 9 months to a year. Sand scour can remove Irish moss from the surface of rocks, and sand transport may bury the species and cause a dieback. However, in dynamic environments such burial is often temporary. If permanently buried, however, Irish moss would not grow up through the sand. Scientific literature shows the boring sponge can grow several inches over the course of a few months. This species would die in the nearshore if buried by sand, but our surveys have only found these sponges offshore.

31. (Robert DeCosta): Will mitigation be constructed before, during, or after dredging?

(Barrett): The timing of mitigation construction depends on the permitting process, but our intention has been to put mitigation in place during May or June, followed by Project dredging and nourishment. The Proponent is in favor of implementing a pilot mitigation effort to demonstrate the efficacy of the overall mitigation proposal.

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[2] Cargnelli, Luca M.; Griesbach, Sara J.; Packer, David B.; and Weissberger, Eric. 1999. Essential Fish Habitat Source Document: Atlantic Surfclam, *Spisula solidissima*, Life History and Habitat Characteristics. NOAA Technical Memorandum NMFS-NE-142. U.S. Department of Commerce. 13 pp. http://www.nefsc.noaa.gov/nefsc/publications/tm/tm142/tm142.pdf.

32. (Robert DeCosta): You will need a separate Chapter 91 License for the mitigation?

As we explained at the Commission meeting, the Proponent will need to obtain a Chapter 91 License or Permit (depending on final design) for the mitigation structure. The pertinent application will be submitted to the Massachusetts Department of Environmental Protection after the mitigation design is finalized. Even though the mitigation will be constructed under a separate Chapter 91 License or Permit, the Project's Chapter 91 Permit for dredging and nourishment may require the Proponent to obtain that additional License or Permit prior to constructing the Project.

33. (Robert DeCosta): The mitigation site is a viable spot for us to fish striped bass; at certain tidal cycles the fish frequent the area between Wauwinet and Squam. There are a couple of spots to the north towards the Gulls where we do not fish as much. I am still concerned, however, that you are only proposing 60 acres of mitigation because you are creating an area that *may* provide good habitat while destroying habitat we know is good. It will take some time for the mitigation site to attract organisms, and we have a short growing season. Mitigation at 1:1 is not advantageous, and you should provide a minimum of 3:1.

As explained previously, the final site selection process for a suitable mitigation area is still underway, and the Proponent is carefully considering input from local fishermen and others who have specific knowledge of the Project area. Given the record of success for recreating marine habitats, a 1:1 mitigation ratio is appropriate (see Question/Response #13).

34. (Robert DeCosta): I would like to see video of the area 600-1,000 feet offshore; we have video of the area which shows excellent habitat.

The Proponent conducted a detailed video survey of the entire Project area on September 20-21, 2007. Video transects 100-300 feet long were performed at 121 locations ranging from 400-4,500 feet offshore of the Project shoreline. The Proponent has performed detailed video analysis, and results will be provided to the Commission under separate cover. Preliminary results indicate that nearshore cobble is sporadic, with increasing cobble densities at the seaward limit of the equilibrium toe. The densest cobble supporting the most diverse habitat is located more than 1,000 feet offshore.

35. (Robert DeCosta): Is this your full mitigation plan?

The current mitigation design, which is still undergoing refinement, includes a combination of natural rock, reef balls, and perhaps supplemental railroad ties (subject to availability at the time a commitment is possible) to provide greater structural diversity than would occur with a single material type. As designed, this mitigation is intended to ensure that the Project's unavoidable impacts to cobble habitat do not result in a net loss in habitat functions or values.

In addition to the habitat mitigation, the Proponent is investigating additional possibilities for lessening potential effects on fishermen; there is some potential for temporary regulatory relief of the 3-mile fishing limit. The mitigation proposal presented to the Commission, however, relates to direct habitat mitigation in response to unavoidable Project impacts.

36. (Robert DeCosta): I would like to see a very comprehensive mitigation plan in place prior to Project construction. Mere assurances that mitigation will be provided and will be adequate make me nervous. When we come back in November it would be comforting to see a well-developed plan and to have the permitting process for that plan underway.

The Proponent will pursue required permits and approvals once the mitigation design has been finalized. As presented at the Commission meeting and further demonstrated in this document, the Proponent does have a well-developed mitigation plan that takes account of existing habitat conditions, a firm understanding of the Project's unavoidable impacts, and information relevant to the success of mitigation structures. Multiple facets of the regulatory framework are designed to ensure that the Project will provide mitigation adequate to generate a net benefit to habitat functions and values. This regulatory structure should provide interested parties with confidence that the mitigation plan is an essential component of the Project which the Proponent will complete in a timely manner.

37. (Oktay): I am trying to get an idea about how much of the mitigation design must be approved by DMF? That agency's feedback is important to us, since we want to ensure you will adhere to DMF guidelines.

As we explained at the Commission meeting, DMF is not a permitting agency. Agencies that do issue permits consult with DMF during the regulatory review, at which time DMF will provide input. Throughout the regulatory process and during Project design, the Proponent has coordinated with DMF, NMFS, MCZM, and the USACE to evaluate Project alternatives and mitigation options. All agencies have been submitting comments through that process.

38. (Rudin): I have no position on the 3-mile limit, but you should be aware that there is quite a community of non-commercial sportfishermen who are strongly opposed to relief of the 3-mile limit.

The Proponent is firmly committed to mitigating for the Project's unavoidable permanent impacts to cobble habitat. Such mitigation is stipulated within the regulatory framework and will ensure no net loss in habitat functions or values. Any regulatory relaxation of the 3-mile limit would be an additional and temporary measure meant to minimize potential impacts to fishermen who are concerned about the Project. As we explained at the Commission meeting, such regulatory relief would not change the status of any fishing quotas. Therefore, this temporary relief would not increase any pressures on fisheries populations; rather, it would effectively spread the same amount of fishing effort over a larger area, actually decreasing the concentration of fishing and generating conservation benefits.

39. (Bam LaFarge): Most of the discussion has been about commercial or charter fishermen, but it seems that DMF is more concerned with habitat and fisheries. DMF has said that recovery periods are quite uncertain, and the agency seems to believe the Project area will not recover prior to renourishment, which essentially means that impacts will be permanent. Furthermore, DMF is not satisfied with the Proponent's quantification of potential impacts.

The Proponent has responded to issues raised in DMF's comment letter. A copy of this response to DMF was submitted to the Commission as an attachment to the Proponent's responses to questions raised at the third Conservation Commission meeting.

40. (Bam LaFarge): DMF questions the viability of using concrete to replicate habitat.

The current mitigation design, which is still undergoing refinement, includes a combination of natural rock, reef balls, and perhaps supplemental railroad ties (subject to availability at the time a commitment is possible) to provide greater structural diversity than would occur with a single material type. When piled together, the ties provide habitat that is more complex than structure created with piled stones alone. Stone will replace the low-relief cobble structure buried under nourishment material. Diverse habitat will result from this superior design. The Proponent is in favor of implementing a pilot mitigation effort to demonstrate the efficacy of the overall mitigation proposal.

While designing the mitigation plan, the Proponent performed a significant amount of research on using concrete as mitigation structure. Studies suggest that in the context of mitigation structure, concrete is at least equal if not superior to rock, and concrete is considered to be a suitable, high-quality material for use in artificial reefs. Although the mitigation structure will not be a "reef" per se, guidelines for artificial reefs are applicable and appropriate to use for reference, since those structures are intended to replicate high-quality marine habitats.

The authoritative publication on artificial reef creation, "Guidelines for Marine Artificial Reef Materials," states: "*Concrete, either in fabricated units specifically designed for artificial reefs or imperfect concrete manufactured products, such as culvert or rubble from razed buildings, sidewalks, roadways and bridges, has a demonstrated high success rate as artificial reef material in both marine and estuarine environments. The obvious reason for this high rate of success is the strong compatibility of the material with the environment in which it is placed, and for the purpose for which it is placed. Concrete is generally very durable and stable in reef applications."*[3] The draft Massachusetts Marine Artificial Reef Plan prepared by the Massachusetts Division of Marine Fisheries[4] concurs with the findings that concrete is a suitable material for artificial reef creation.

41. (Edie Ray): You mentioned that a marine mammal observer will be onboard the dredge, but we cannot determine the Project's potential impacts on marine mammals until you have characterized those populations in the Project area.

The Proponent prepared a thorough Biological Assessment (BA) of the Project area associated with National Marine Fisheries Service consultations pertaining to the Marine Mammals Protection Act. A copy of the BA, along with the Biological Opinion recently issued by NMFS after the agency's review of the BA, is being submitted to the Commission.

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[3] Gulf and Atlantic States Marine Fisheries Commissions. 2004. *Guidelines for Marine Artificial Reef Materials, second edition*. Number 121. Page 6.
http://www.gsmfc.org/pubs/SFRP/Guidelines_for_Marine_Artificial_Reef_Materials_January_2004.pdf

[4] Massachusetts Division of Marine Fisheries. 2006. *Draft Massachusetts Marine Artificial Reef Plan.* Policy Report PR-1. Page 27.
http://www.mass.gov/dfwele/dmf/programsandprojects/draft_ma_artificial_reef_plan_ii_111706.pdf

42. (Edie Ray): You showed a map of the shellfish beds that indicated there were no shellfish beds east of the Island. Is this due to a data gap? If so, how can we say there will be no Project impacts there?

DMF produces shellfish suitability maps to identify areas that contain or may contain suitable shellfish habitat. The Proponent used these maps as screening tools to assess the potential for shellfish populations and also met with DMF shellfish biologists to review the Project and solicit additional input. At these meetings, DMF indicated that the offshore shoals, but not non-shoal areas, may provide surfclam habitat. Project activities and any Project-induced impacts will occur in locations entirely distinct of the shoals, and hence will not affect suitable shellfish habitat.

43. (Edie Ray): How did you go about selecting the video frames you showed? Did you selectively show us only what you want us to see?

The photographs included in the presentation were randomly selected from video transects surveyed on September 20-21. These photographs accurately depicted the existing habitat and were not selected with any intent to distort or somehow misrepresent existing conditions. The Proponent strongly objects to any suggestion that data collection, processing, and presentations have been anything less than scientifically sound and objective. Significant technical, scientific, and academic resources have been invested in designing a project that will achieve the stated objectives while avoiding and minimizing any detrimental impacts; as such, the Proponent sincerely shares an interest in accurately characterizing existing conditions and appropriately mitigating for any unavoidable, permanent impacts. The Proponent will submit to the Commission, under separate cover, a detailed report on overall cobble assessment performed at 121 locations offshore of the Project shoreline; this report describes in detail the randomized, scientifically-valid methodology for selecting still images for analysis.

44. (Edie Ray): Regarding the picture of the Stellwagen Bank shipwreck which you used to illustrate colonization, I would like to know the name of that wreck and how long it has been on the bottom.

There are numerous shipwrecks in the Stellwagen Bank National Marine Sanctuary. The photograph Ms. Ray refers to was shown on the sanctuary's official government website (http://stellwagen.noaa.gov/). The National Oceanic and Atmospheric Administration (NOAA), however, did not provide information on the vessel or identify the year it went down. As used in the Project's presentation, the photograph was meant to provide an example of colonization by marine organisms.

45. (Edie Ray): Why don't you have to mitigate for the areas where sediment deposition will occur north and south of the Project area? If you count these areas as impacts, you are mitigating at less than a 1:1 ratio.

Sediment will diffuse north and south out of the Project area due to natural sediment transport processes. Over five years, Project engineers estimate that the average annual diffusion losses will exceed the background transport volume by 80,000 cubic yards; in reality, the rate of diffusion loss will be greatest immediately following Project nourishment and slightly lower toward the end of the five-year period. This additional sediment volume will benefit adjacent shorelines by increasing their sediment supply. As the Proponent has presented previously, shorelines adjacent to the Project are expected to accrete perhaps 40 feet in width, with this zone of Project-related accretion tapering down with

increasing distance from the Project area. The thickness of additional fill will also taper down with increasing distance from the Project.

The Proponent will mitigate for any unavoidable, permanent habitat impacts related to burial of cobble bottom beneath the equilibrium toe of fill. However, it would be inappropriate to mitigate for sediment transport north and south because Project activities will not induce habitat conversion in those areas. Indeed, based on survey results and information from fishermen, there is no significant cobble habitat north or south of the Project area that will be covered by the nourishment template. Rather, those areas are sandy and inhabited by organisms that have evolved to survive where waves and currents regularly create disturbances that transport and deposit large volumes of sediment. The Wetlands Protection Act regulations specifically encourage beach nourishment as an appropriate solution to shoreline erosion because the method allows natural processes of sediment transport to continue; this is an acknowledgement that marine organisms utilizing these areas are adaptable to varying rates and volumes of sediment transport, including sediment transport on the magnitude that is associated with this Project.

46. (Edie Ray): Eventually the railroad ties will break up, and you still have not provided data on the size of the aggregate material that could end up on the beach.

The concrete of the railroad ties, which may be used as a supplementary material for Project mitigation, contains typical gravel 0.8-2.0 mm in diameter. Designed to support train traffic, the railroad ties are composed of high-strength concrete that should break down at a rate comparable to natural rock. Any fragments that break away from the aggregate will likely remain in the subtidal trough below the surf zone until wave energy breaks them into smaller fragments which can be transported within the littoral system; it is conceivable that some of this material could eventually be transported onto the beach. At such a time, however, the weathered fragments will be comparable in size to other coarse-grained material on the beach.

47. (Brian Borgensen): I want to see dates on your maps which show shellfish beds and other habitats, because I would not be surprised if the data are old.

Habitat maps for shellfish delineate what is referred to as “suitable habitat”, which includes areas that are presently or have in the past been harvested for commercially-important shellfish species explicitly protected by the Massachusetts Wetlands Protection Act. This type of mapping recognizes that the locations of shellfish habitat do not shift over time. Fluctuations in shellfishing intensity do not indicate shifting shellfish habitats, but rather may be due to water quality issues that have degraded formerly-suitable habitat. Thus, shellfish suitability mapping is used as a tool to promote habitat restoration.

DEP’s eelgrass mapping was based on 2001 aerial photography. Eelgrass habitat primarily occurs in sheltered areas such as coves, bays, and landward of barrier islands, where wave energy is relatively low; within this generalization, however, bed growth may extend and retract based on natural or anthropogenic environmental conditions. The 2001 mapping is sufficient for evaluating the extent of eelgrass east of Nantucket, and this mapping (consistent with previous 1995 aerial maps) shows no eelgrass in the area. This is logically consistent given the high-energy conditions characteristic of the dynamic Project area, which would preclude eelgrass survival.

48. (Brian Borgensen): You think of cobble as hard rock; we think of cobble as anything larger than fist-sized that is on the bottom.

This Project has consistently considered "cobble" to include any rock, regardless of size, that provides fish habitat that differs from the surrounding sandy substrate. Such cobble often has vegetation attached to it which provides additional habitat characteristics. Some cobble, however, may consist of smaller gravel-sized rocks that undergo active transport within the surf zone and hence are free of vegetation.

49. (Brian Borgensen): You have not discussed depth changes in terms of mitigation.

The Project impacts associated with cobble habitat burial will occur in water depths of 20-30 feet. Mitigation will be sited in similar water depths.

50. (Brian Borgensen): If you install mitigation at Squam, we will not be able to trawl there.

Since the mitigation is intended to replicate areas of cobble where impacts are unavoidable, it is reasonable to assume that mitigation area uses will be similar to those associated with existing cobble. Any potential for fishermen to lose lures in mitigation areas should be comparable to the potential at existing cobble locations.

51. (Josh Eldridge): Are the railroad ties Type 1 or Type 2 Portland cement?

The railroad ties are composed of Type 1 Portland cement. As Mr. Spadoni explained at the Commission meeting, Type 2 Portland cement is generally utilized in anaerobic, high-sulfur environments while Type 1 Portland cement is standard cement.

52. (Josh Eldridge): Reef balls are highly-effective. Is there any chance you could incorporate these into your mitigation design?

The Proponent does not deny that reef balls can create valuable habitat. As explained at the Commission hearing, the proposed mitigation will generate a complex structure similar to what reef balls provide. This complex structure will be created with a combination of materials including natural rock, reef balls, and perhaps supplemental railroad ties.

53. (Bob Rank): I have a problem with your proposed use of the railroad ties. When you have found algae growth on the existing rocks, what was the water depth?

The current mitigation design, which is still undergoing refinement, includes a combination of natural rock, reef balls, and perhaps supplemental railroad ties (subject to availability at the time a commitment is possible) to provide greater structural diversity than would occur with a single material type. When piled together, the ties provide habitat that is more complex than structure created with piled stones alone. Stone will replace the low-relief cobble structure buried under nourishment material. Diverse habitat will result from this superior design. The Proponent is in favor of implementing a pilot mitigation effort to demonstrate the efficacy of the overall mitigation proposal.

As explained at the Commission meeting, sparse growth nearshore was in about 10 feet of water, and similar conditions extended offshore to depths of about 25 feet. Deeper water contained more sponges.

54. (Bob Rank): Your mitigation farther offshore will favor sponges over algae, and your railroad ties will have sharper edges relative to the rounded shapes that existing rock provide. Your mitigation should replicate existing conditions, including water temperature.

Mr. Rank raises some valuable points, and it is important to note that the Proponent intends for mitigation efforts to replicate existing conditions to the extent possible while maximizing benefits. Railroad ties have both sharp and smooth surfaces, a characteristic which should not adversely affect vegetation growth or use by organisms. The Proponent is committed to working with interested parties to identify suitable locations for mitigation which will maximize habitat value and ensure success.

55. (Edie Ray): Have you modeled how your mitigation structure could affect wave energy coming ashore? How might your mitigation structure cause shoreline erosion? I know residents at Quidnet have submitted a letter to the Commission expressing concerns, and I imagine people at Squam have similar concerns.

Project engineers will perform thorough modeling of the proposed mitigation's potential effects on wave energy and sediment transport once the mitigation locations have been refined. Since the proposed mitigation would provide low-relief structural habitat, it is not likely that the mitigation would have any adverse impacts on these coastal processes.

56. (Emily Moulden): Material, size, and composition of artificial reefs all have great impacts on species composition. What percentage of your mitigation structure will be composed of rock versus railroad ties?

The current mitigation design, which is still undergoing refinement, includes a combination of natural rock, reef balls, and perhaps supplemental railroad ties (subject to availability at the time a commitment is possible) to provide greater structural diversity than would occur with a single material type. When piled together, the ties provide habitat that is more complex than structure created with piled stones alone. Stone will replace the low-relief cobble structure buried under nourishment material. Diverse habitat will result from this superior design. The Proponent is in favor of implementing a pilot mitigation effort to demonstrate the efficacy of the overall mitigation proposal.

57. (Robert DeCosta): When will written responses be provided to our questions?

The Project team is working to provide responses to all questions raised at the series of Commission meetings. In many cases, these responses have been slightly delayed to allow for additional data processing and presentation of results. The Proponent hopes to submit all responses to the Commission before meetings resume in November, and the responses will also be posted on SBPF's website.

58. (Robert DeCosta): Does SBPF own the railroad ties?

(Barrett): SBPF has an agreement with the MBTA, but does not currently own the railroad ties. Some railroad ties may be used as supplementary material for the Project mitigation pending availability at the time it becomes feasible for the Proponent to make a commitment.